

**Preliminary  
Stormwater Management Report**

**Heritage Line Subdivision  
Keene, ON**

**Residential Subdivision Development**

**D.M. Wills Project No. 21-10985**



**D.M. Wills Associates Limited**

Partners in Engineering, Planning &  
Environmental Services  
Peterborough

**June 2022**

**Prepared for:  
2564669/520039 Ontario Limited**



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## 1.0 Purpose

D.M. Wills Associates Limited (Wills) has been retained by 2564669/520039 Ontario Limited (Client) to prepare a Preliminary Stormwater Management (SWM) Report for the proposed residential subdivision located on Heritage Line in the Village of Keene, Ontario.

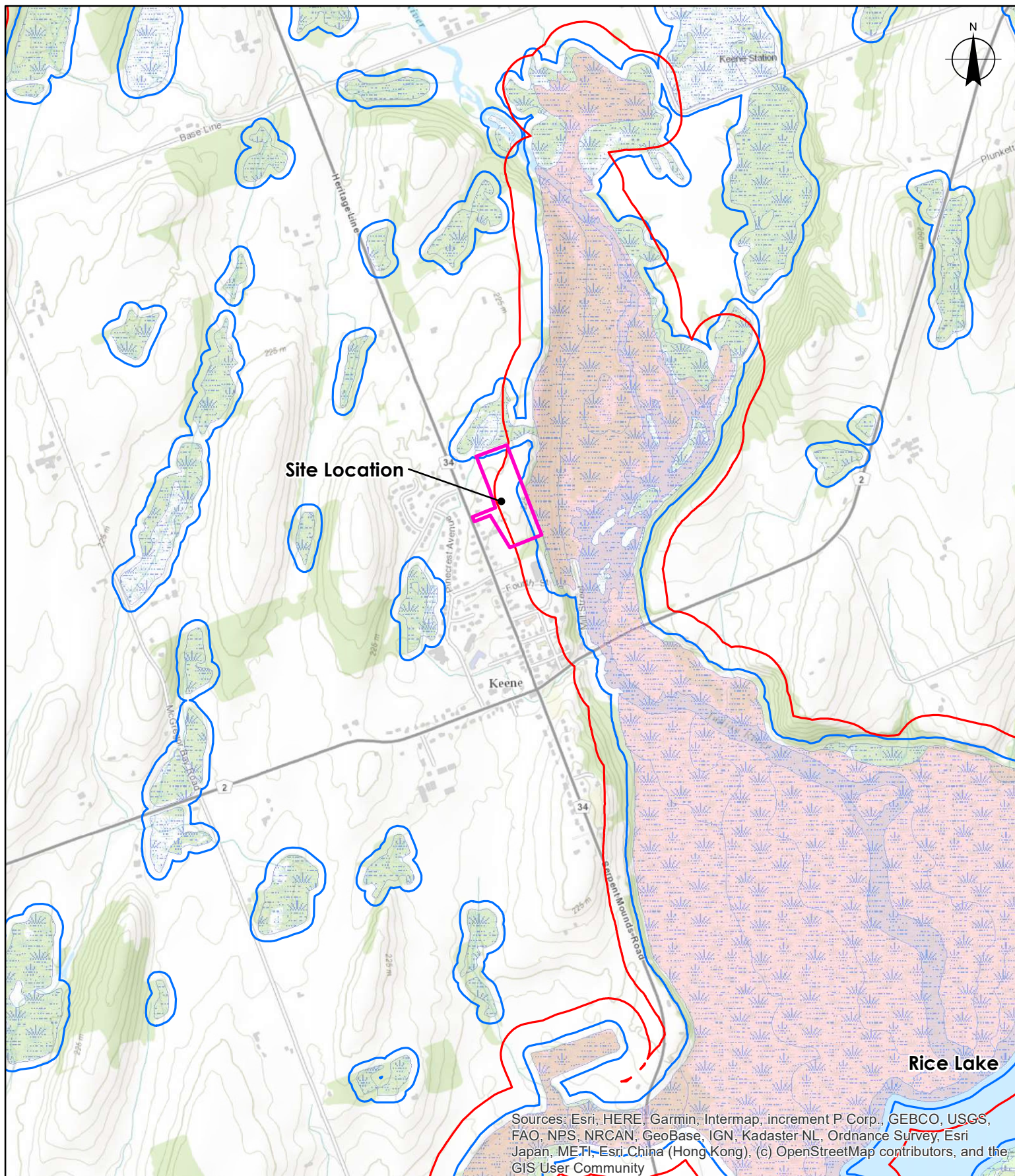
The purpose of this report is to evaluate the drainage characteristics of the existing site and proposed development, and to advance an integrated strategy for SWM that will permit the development to proceed with no adverse impacts to the receiving drainage system. A pre-consultation meeting was held March 4, 2021, to discuss the requirements for the Plan of Condominium and Zoning By-law Amendment for the development. It was determined that a Stormwater Management Plan would be required for review by the Otonabee Region Conservation Authority (ORCA) and the County of Peterborough (County).

## 2.0 Site Description

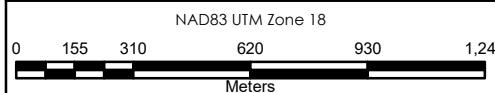
The subject property is located on Lot 14, Concession 6 in the municipality of Otonabee-South Monaghan, with frontage on Heritage Line in Keene, ON. The subject site is legally described as Parts of Lot 13 and 14, Concession 6 in the Township of Otonabee-South Monaghan within the County of Peterborough. The property is 5.64 ha in area and is bound by a private gravel road to the north, a provincially significant wetland to the east, residential lots and Heritage Line to the west, and residential lots and farmland type lots to the south. Indian River Mouth, a provincially significant wetland feature, abuts the east property boundary. The location of the site is shown on **Figure 1**.

The proposed residential subdivision consists of 16 units of residential condominiums containing a mix of single-family homes and townhouses. The subject development will be accessed from Heritage Line to the west, with two cul-de-sacs. The proposed buildings and roadway will alter the existing drainage patterns, which may have adverse impact to the receiving drainage systems.





**Figure - 01  
Location Plan**



D.M. Wills Associates Limited  
150 Jameson Drive  
Peterborough, Ontario  
K9J 0B9

P. 705.742.2297  
F. 705.741.3568  
E. wills@dmwills.com

| Legend                                            |                     |
|---------------------------------------------------|---------------------|
| <span style="border: 1px solid pink;"> </span>    | Property Limits     |
| Wetland                                           |                     |
| Provincial Significance                           |                     |
| <span style="background-color: #d3d3d3;"> </span> | UnEvaluated Wetland |
| Non-Provincially                                  |                     |
| <span style="background-color: #90ee90;"> </span> | Significant Wetland |
| <span style="background-color: #90ee90;"> </span> | Evaluated           |
| Provincially Significant                          |                     |
| <span style="background-color: #d3d3d3;"> </span> | Wetland Evaluated   |
| <span style="border: 2px solid blue;"> </span>    | Wetland_30mbuffer   |
| <span style="border: 2px solid red;"> </span>     | Wetland_120mbuffer  |

|                      |                               |
|----------------------|-------------------------------|
| Drawn by:<br>RC      | Scale (Horz.)<br><br>1:20,000 |
| Checked by:<br>CPB   |                               |
| Engineer:<br>RC/CPB  | Map Date<br>June 2021         |
| Project No.<br>19085 | Map File No.<br>10985-DP01    |



According to the Soil Survey Complex of Ontario, the subject site is primarily composed of Otonabee Loam, a typical soil type observed in this region. This type of surficial soil corresponds to Hydrologic Soils Group B, according to the SCS method of classifying soils.

A topographic survey was completed by Elliot and Parr Ltd. in April 2021 (Reference No. 21-19-079-00) and was used to determine existing elevations and the location of drainage features on the site. The Indian River Mouth Wetland was designated as provincially significant in 1984 by MNR (Ministry of Natural Resources) and the wetland boundary was obtained from the Land Information Ontario (LIO) database.

## 2.1 Geotechnical Investigation

PRI Engineering (PRI) and Wills conducted a detailed hydrogeological study in August 2021, which summarizes the expected soil profile and seasonal groundwater levels at the time of drilling. As a part of this study, 21 boreholes were drilled and the soil column was investigated. Wills in coordination with PRI selected 3 boreholes within the property limits for in-situ infiltration testing. The seasonal groundwater levels varies from 0.7 m to 4.6 m within the property. The following table summarizes the key findings that may influence the stormwater management design.

**Table 1 – In-situ Infiltration Testing Summary**

| Test Location ID | Borehole Depth (mbeg) | Infiltration Rate (mm/hr) | Groundwater Depth (m) | Groundwater Elevation (m) |
|------------------|-----------------------|---------------------------|-----------------------|---------------------------|
| MW-09            | 1.70                  | 20                        | 4.10                  | 220.90                    |
| MW-16            | 1.75                  | 30                        | 1.75                  | 221.06                    |
| BH-08            | 1.70                  | -                         | 2.70                  | 219.86                    |

As such, the native soil possesses acceptable infiltration rates for infiltration-based features but considerations should be given for areas with shallow ground water levels. The preliminary grading plan considered the groundwater depths to ensure that a minimum of 1.0 m separation is achieved between the bottom of any proposed Low Impact Design (LID) feature and the seasonally high groundwater table.

## 3.0 Methodology

The present hierarchy of watershed planning in Ontario can be described by the following in descending order: Watershed Plans, Sub-watershed Plans and individual SWM Plans.

The subject site is not covered by any Watershed or Sub-watershed Plans; therefore, this report has been prepared as an individual SWM plan.

On-site SWM facilities are typically required to provide both stormwater quantity and quality control for developments in accordance with municipal and provincial guidelines. In order to ensure that the flooding potential to downstream properties is not increased, stormwater quantity controls are typically required to control post-development peak flows to existing condition levels. To ensure that the development does not adversely impact water quality, stormwater quality controls are typically required to remove suspended sediments and other contaminants from stormwater runoff.

Although not always required within individual SWM plans, the proposed SWM strategy includes consideration for nitrate dilution to support the proposed septic works. Infiltration facilities are proposed, both within and around the perimeter of the development, in order to meet nitrate concentration targets. These infiltration facilities were assessed based on considerations for annual loading, rather than storm-based events, in an approach that is similar to a water balance analysis.

Stormwater quality control can be achieved using lot level controls, conveyance controls and end-of-pipe SWM facilities. There are also opportunities for the implementation of LID measures. Examples of end-of-pipe systems include wet ponds, wetlands, dry ponds, infiltration basins, infiltration trenches, filter strips, sand filters, and Oil-Grit Separators (OGS). The effectiveness and maintenance requirements of each method will vary depending on the nature of the proposed development. Water quality features are designed to achieve MOE Enhanced (Level 1) protection. This level of protection requires that permanent stormwater retention be provided for volumes in keeping with Table 3.2 (Page 3-10) of the MOE 2003 SWM Planning and Design Manual. To ensure proper winter operation, the preliminary design included a minimum of double the values suggested in Table 3.2. The most likely method for stormwater quality control for this development will be LID infiltration measures within the roadside ditches.

### 3.1 Catchment Characterization

#### 3.1.1 Existing Condition

The existing drainage patterns were determined based on the existing topographic survey prepared by Elliott and Parr Ltd. (Reference No. 21-19-079-00), and aerial photography. The site is delineated as three catchment areas for the existing condition as shown on **Figure 2**.

- Catchment **EX-100** is 2.18 ha in area and consists of the northern portion of the site. **EX-100** is conveyed as sheet flow to the north boundary of the site (OUT-1), discharging to a wetland area.
- Catchment **EX-200** is 1.76 ha in area and consists of the south-eastern portion of the site. **EX-200** is conveyed as sheet flow south-easterly to the Indian River Mouth Wetland (OUT-2).

- Catchment **EX-300** is 1.70 ha in area and consists of the central portion of the site. **EX-300** is conveyed as sheet flow to the south-west corner of the property (OUT-3).

### 3.1.2 Proposed Condition

The proposed condition has been delineated as five catchments as shown on **Figure 3**.

- Catchment **PR-100** is 0.24 ha in area and consists of the northern developed portion of the proposed development including the proposed roadway. In the proposed condition, stormwater runoff from **PR-100** will be collected and conveyed through an easement to **OUT-1**. Stormwater runoff from **PR-100** will be collected within the roadside ditches to meet quantity and quality targets and to support the nitrate concentration targets.
- Catchment **PR-101** is 1.28 ha in area and consists of the northern portion of the proposed development including the houses and northern uncontrolled landscape areas. In the proposed condition, stormwater runoff from **PR-101** will be collected and conveyed to **OUT-1**. Stormwater runoff from **PR-101** will be collected within perimeter swales and infiltration of common rainfall events will be facilitated to support the nitrate concentration targets only; no stormwater quantity or quality targets are proposed.
- Catchment **PR-200** is 2.14 ha in area and consists of the central portion of the proposed development. In the proposed condition, **PR-200** will be collected and conveyed through an easement into **PR-201** and **OUT-2**. Stormwater runoff from **PR-200** will be collected within the roadside ditches to meet quantity and quality targets and to support the nitrate concentration targets.
- Catchment **PR-201** is 0.74 ha in area and consists of the southern developed portion of the proposed development including the houses. In the proposed condition, stormwater runoff from **PR-201** will be collected and conveyed to **OUT-2**. **PR-201** will receive controlled flows from **PR-200**. Stormwater runoff from **PR-201** will be collected within perimeter swales and infiltration of common rainfall events will be facilitated to support the nitrate concentration targets only; no stormwater quantity or quality targets are proposed.
- Catchment **PR-202** is 0.93 ha in area and consists of the southeast portion of the proposed development. In the proposed condition, **PR-202** will be conveyed as uncontrolled overland flow to **OUT-2**.
- Catchment **PR-300** is 0.23 ha in area and consists of the south-western portion of the proposed development. In the proposed condition, **PR-300** will be conveyed as uncontrolled overland flow to **OUT-3**.

The existing and proposed runoff characteristics were analyzed using individual sub-catchments. Hydrologic parameters, land use and runoff response were determined based on literature review and satellite images. Topographic mapping and AutoCAD Civil 3D 2019 software were used to establish sub-watershed areas, land use and slope. On-site soils were assessed using the Ministry of Agriculture Agricultural Information Atlas.



The site was identified as containing a mixture of Otonabee Loam with a Hydrologic Soil Group of B.

The hydrologic parameters for each catchment are summarized in **Table 2** and documented in **Appendix A**.

**Table 2 – Existing and Proposed Hydrologic Parameters**

| Standhyd <sup>1</sup> |           |              |                  |                 |                     |                    |                       |                      |
|-----------------------|-----------|--------------|------------------|-----------------|---------------------|--------------------|-----------------------|----------------------|
| Catchment ID          | Area (ha) | Impervious % | CN* <sup>2</sup> | Ia <sup>3</sup> | Pervious Length (m) | Pervious Slope (%) | Impervious Length (m) | Impervious Slope (%) |
| PR-100                | 0.24      | 64           | 60.5             | 5.0             | 70                  | 3.0                | 32                    | 3.1                  |
| PR-200                | 2.14      | 43           | 60.5             | 5.0             | 215                 | 0.3                | 10                    | 1.5                  |

| Nashyd <sup>1</sup> |           |              |                  |                 |                       |
|---------------------|-----------|--------------|------------------|-----------------|-----------------------|
| Catchment ID        | Area (ha) | Impervious % | CN* <sup>2</sup> | Ia <sup>3</sup> | Tp <sup>4</sup> (hrs) |
| EX-100              | 2.18      | 0.0          | 67.7             | 8.2             | 0.36                  |
| EX-200              | 1.76      | 0.0          | 64.3             | 8.9             | 0.12                  |
| EX-300              | 1.70      | 1.2          | 68.8             | 8.0             | 0.51                  |
| PR-101              | 1.28      | 10.2         | 65.1             | 4.7             | 0.44                  |
| PR-201              | 0.74      | 8.1          | 64.2             | 4.8             | 0.17                  |
| PR-202              | 0.93      | 0.0          | 61.6             | 10.0            | 0.17                  |
| PR-300              | 0.23      | 13.0         | 66.5             | 4.6             | 0.27                  |

- Notes:
1. Command Line refers to the unit hydrograph used in the VO6 hydrologic model for the respective catchment area.
  2. CN\* refers to the modified CN number adjusted to Antecedent Moisture Conditions II. Excludes Impervious Area for Standhyd.
  3. Ia refers to Initial Abstraction. Excludes Impervious Area for Standhyd.
  4. Tp refers to Time of Peak.





EX-100

0.22 ha

CATCHMENT ID

CATCHMENT AREA

CATCHMENT BOUNDARY

OVERLAND FLOW DIRECTION

STORM SEWER FLOW DIRECTION

OUT

OUTLET LOCATION

WETLAND AREA

Sketch No.

FIGURE 2

HERITAGE LINE

PRE-DEVELOPMENT

DRAINAGE AREA PLAN

W

WILLS

D.M. Wills Associates Limited

150 Jameson Drive

Peterborough, Ontario

Canada K9J 0B9

P. 705.742.2297

F. 705.741.3568

E. wills@dmwills.com

Drawn By

RC

Designed By

RC

Checked By

CPB

Engineer

RC/CPB

Scale

1:1500

Plot Date

SEPT 2021

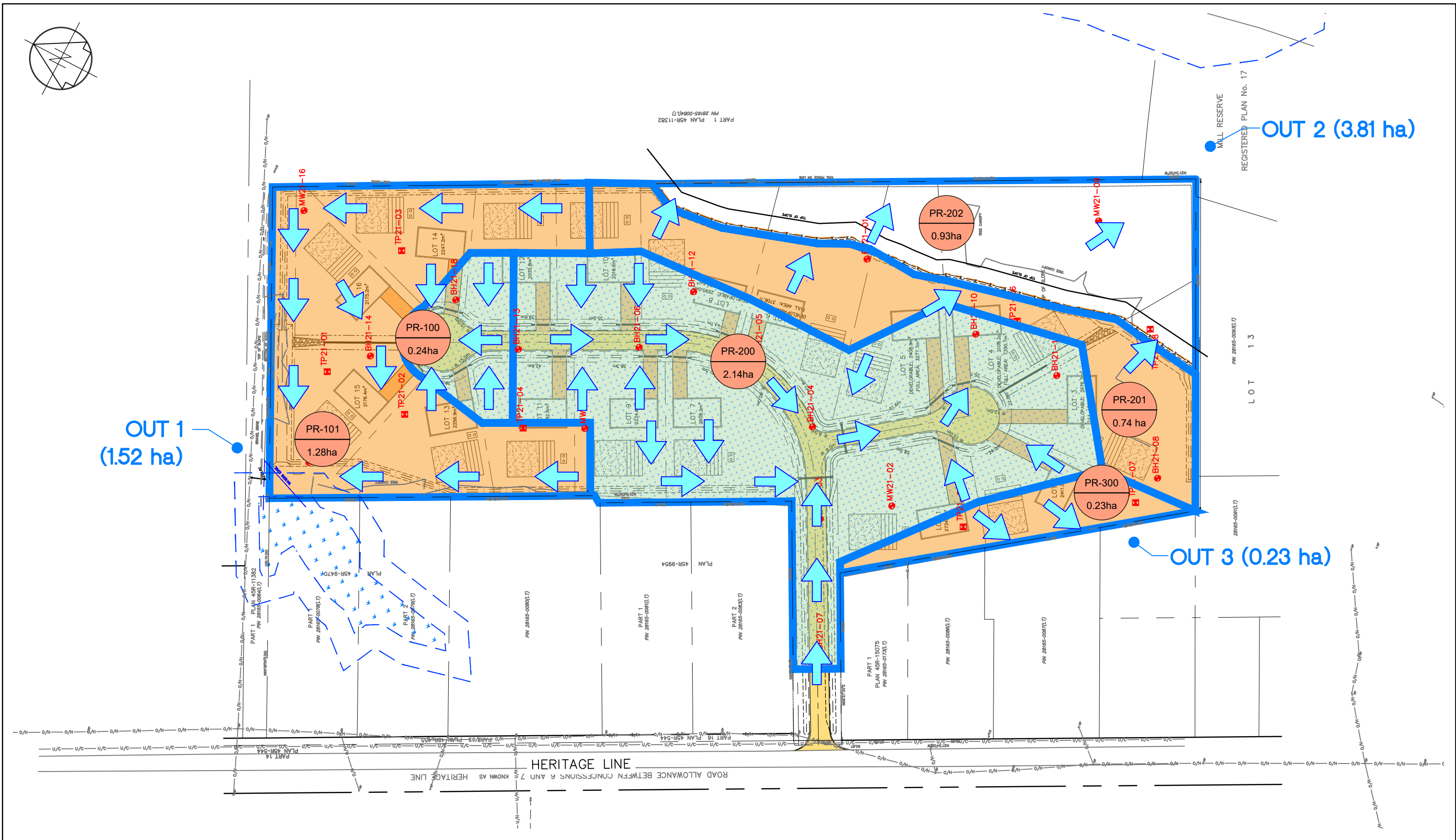
Project No.

21-10985

Drawing File No.

SWM FIGURE 2





## 4.0 Stormwater Management

### 4.1 Low Impact Development Design

As the practice of SWM has evolved, increasing emphasis has been placed on utilizing a treatment train approach to manage runoff as close to the source as possible. This design philosophy is often referred to as LID, where the ultimate goal is to maintain and mimic the natural hydrologic conditions. LID designs accomplish this by reducing the runoff volume generated by a site and implementing features that infiltrate, filter, evaporate, harvest and detain runoff, while also preventing pollution. The conservation authority encourages the use of LID features as part of the water quality design for a site and, therefore, opportunities to utilize these features have been investigated.

For infiltration based LID features, a minimum separation of 1.0 m is required from the bottom of feature to the seasonally high groundwater level. A Hydrogeological investigation was completed by Wills (report dated September 2021), with 21 boreholes completed on site. Four of the boreholes were outfitted as monitoring wells to facilitate groundwater level monitoring. The Hydrogeological Investigation observed groundwater at depths ranging from 0.7 m to 3.99 m below existing grade. A digital groundwater elevation model was generated in AutoCAD Civil 3D 2019, and the preliminary grading ensured sufficient groundwater separation to consider the use of infiltration based LID features for the proposed development.

The native site soils are generally described as silty sand topsoil variably underlain by silty sand, gravelly sand, and sandy silt, and a basal layer of gravelly to silty sand till material. For the purposes of the preliminary LID design, an assumed infiltration rate of 15 mm / hour with a safety factor of 2.5 was applied.

A variety of LID features were considered for the development and evaluated based on site constraints, capital cost, maintenance considerations and water quality benefits. The final design selected is the internal ditch network with stone filled infiltration trenches at the bottom for **PR-100 and PR-200**. The provided volume of the stone trench was calculated, assuming the trench filled with 50 mm clear stone with at least 40% porosity. Supporting calculations are provided in **Appendix C**.

Additional infiltration facilities are proposed at the outside edges of **PR-101** and **PR-201** in order to increase runoff capture from all areas of development and to facilitate appropriate dilution for nitrate loading. The volume of annual runoff that would be captured in a given year was assessed based on historic climate data, dating back to 1981. The summary of the expected performance, including total infiltration and nitrate dilution summaries, are included in **Appendix F**. The outcome of the assessment indicates that the total annual infiltration under developed conditions will exceed pre-development conditions, and that appropriate nitrate dilution is achieved for a development of 16 lots.



## 4.2 Stormwater Quality Control

The proposed industrial subdivision may cause additional pollutants to be conveyed off site. As such, the selection and sizing of the water quality measures are based on the procedures set out in the *Stormwater Management Planning and Design Manual* (MOE, March 2003) for Enhanced (Level 1) protection. SWM measures should be assessed in the following order:

- Stormwater lot level controls
- Stormwater conveyance controls
- End-of-pipe SWM facilities

Stormwater lot level controls represent measures that are implemented on an individual lot basis such as soak-a-way pits, flatter grading and reduction of the impervious footprint. For the proposed development, lot level controls such as reduced grading will be used to supplement the proposed SWM strategy; however, these are not intended to become the primary means for stormwater quality control.

Stormwater conveyance controls represent the conveyance systems used to transport stormwater runoff from the lots to the receiving waters such as pervious pipes, catchbasin treatment and grassed swales.

End-of-pipe SWM facilities represent the common urban SWM measures used to service numerous lots or whole subdivisions including wet ponds, wetlands, dry ponds, infiltration based facilities, Oil and Grit separators and filter systems.

### 4.2.1 Quality Control Summary

Table 3.2 of the MOE SWM Planning and Design Manual provides storage volume requirements to ensure Level 1 (Enhanced) protection for a given area and degree of imperviousness. Infiltration facilities can be constructed to capture and infiltrate the required volume of stormwater runoff to further enhance stormwater quality for the site. The ideal location of a facility would be within the roadside ditches throughout the development and along the outside perimeter.

The storage volume required for infiltration at various levels of impervious, along with the resulting storage requirements, are shown in Table 3.

**Table 3 – Stormwater Quality Volume Summary**

| Catchment | Area | % Imp | Volume Required<br>m <sup>3</sup> /ha | Total Volume Required<br>(m <sup>3</sup> ) | Volume Provided<br>(m <sup>3</sup> ) |
|-----------|------|-------|---------------------------------------|--------------------------------------------|--------------------------------------|
| PR-100    | 0.24 | 64.0  | 35                                    | 8.4                                        | <b>28</b>                            |
| PR-101    | 1.28 | 10.2  | 25                                    | 32.0                                       | <b>328</b>                           |
| PR-200    | 2.14 | 43.0  | 30                                    | 64.2                                       | <b>170</b>                           |
| PR-201    | 0.74 | 8.1   | 25                                    | 18.5                                       | <b>203</b>                           |

A review of **Table 3** indicates that the total volume provided for infiltration exceeds the requirement of the MOE SWM Planning and Design Manual. Given that infiltration may not be available in early spring during snowmelt conditions, a minimum factor of safety of 2.0 is provided.

Based on the assumed infiltration rate of 30 mm/hr at **PR-100** and 20mm/hr at **PR-200**, and with consideration to a factor of safety of 2.5, the infiltration trenches will drawdown in 25 hours and 37.5 hours, below the maximum of 48 hours as per the SWM Planning and Design Manual.

### 4.3 Stormwater Quantity Controls

### 4.4 Peak Flow Calculations

Peak flows were estimated using Visual Otthymo 6 (VO6) hydrologic modelling software for each of the 2, 5, 10, 25, 50 and 100-year storms at each outlet location (**OUT-1**, **OUT-2** and **OUT-3**). These calculations consider the rainfall data for the City of Peterborough 6-hour SCS storm distribution. The rainfall data is included in **Appendix A**.

Hydrologic parameters such as soil infiltration properties and runoff response were determined based on literature review and watershed areas, land use and slope were determined based on the topographic survey data. The hydrologic parameters are provided in **Appendix A** and the peak flow calculations for the existing and proposed catchments are provided in **Appendix B**.

**Table 4 – Existing and Proposed Uncontrolled Peak Flow Summary**

| Return Period | Peak Flow Rates (m <sup>3</sup> /s) |                  |                 |                  |                 |                  |
|---------------|-------------------------------------|------------------|-----------------|------------------|-----------------|------------------|
|               | OUT-1                               |                  | OUT-2           |                  | OUT-3           |                  |
|               | EX <sup>1</sup>                     | UNC <sup>2</sup> | EX <sup>1</sup> | UNC <sup>2</sup> | EX <sup>1</sup> | UNC <sup>2</sup> |
| 2-Year        | 0.028                               | <b>0.032</b>     | 0.040           | <b>0.147</b>     | 0.018           | 0.004            |
| 5-Year        | 0.056                               | 0.050            | 0.081           | <b>0.220</b>     | 0.036           | 0.008            |
| 10-Year       | 0.079                               | 0.062            | 0.114           | <b>0.273</b>     | 0.050           | 0.011            |
| 25-Year       | 0.110                               | 0.080            | 0.161           | <b>0.344</b>     | 0.070           | 0.015            |
| 50-Year       | 0.136                               | 0.094            | 0.199           | <b>0.401</b>     | 0.086           | 0.018            |
| 100-Year      | 0.164                               | 0.109            | 0.239           | <b>0.459</b>     | 0.103           | 0.022            |

A review of **Table 4** indicates the uncontrolled peak flow rates are less than existing conditions at **OUT-1** and **OUT-3**, with the exception of the 2-year storm for **OUT-1**. This is due to the reduction in total drainage area to these outlets. However, uncontrolled peak flow rates discharging at **OUT-2** are increased in comparison to the existing condition due to the increase in drainage area (3.88 ha > 1.76 ha) and increase in impervious area. As a result, stormwater quantity controls are required for **OUT-1** and **OUT-2**.

#### 4.5 Quantity Control Summary

A review of the preliminary hydrologic modelling indicates that quantity control will be required at **OUT-1** and **OUT-2**. In order to control the post-development peak flows to pre-development levels at **OUT-1** and **OUT-2**, flow control structures will be required within the roadside ditches in strategic locations. The preliminary layout of the outlet control structures are as follows:

- **OUT-1** – The outlet of the ditch system will connect to a swale located between the proposed residences at the north side of the development. At the outlet of the ditch to the swale, a raised berm will be constructed with a piped outlet control. The preliminary design of the outlet control envisions a 100 mm orifice plate within a short sewer pipe.
- **OUT-2** – The outlet of the ditch system will connect to a swale located between the proposed residences at the south side of the development. Due to the proposed grading around, the outlet control will be constructed adjacent to a driveway culvert at the mouth of the cul-de-sac. At this location, a raised berm will be constructed with perforated riser pipe. The riser will include four, 50mm orifices and will allow overflow at a depth of 0.30 m.

Other key consideration within the proposed quantity control strategy include:

- The maximum ponding within the ditch systems will be 0.60 m.
- The proposed roadside ditches will be flat. Nuisance ponding will be managed by the underground infiltration stone layer; most storm events will dissipate quickly into the stone.
- The estimated storage volumes within the ditches and stone infiltration layers will confirmed using Civil 3D software and are modelled as three-dimensional surfaces.
- The proposed infiltration component of the design was neglected when completing the hydrologic routing; given that the storage may be unavailable due to a previous rainfall event.

A review of preliminary grading plan determined a storage volume of 125 m<sup>3</sup> is available within **PR-100**; 79 m<sup>3</sup> is required as per the hydrologic modelling. A review of preliminary grading plan determined a storage volume of 661 m<sup>3</sup> is available within **PR-200**; 453 m<sup>3</sup> is required as per the hydrologic modelling. The preliminary design exceeds



the storage volume required for both outlets. Addition details pertaining to the outlet control structures will be provided during the detailed design phase.

#### 4.6 Proposed Release Rates

The proposed peak flow rates to each outlet location, including the controlled flows from **OUT-1**; **OUT-2**; and **OUT-3** are shown in **Table 5** below.

**Table 5 – Existing and Proposed Peak Flow Summary**

| Return Period | Peak Flow Rates (m <sup>3</sup> /s) |                 |                 |                 |                 |                 |
|---------------|-------------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|               | OUT-1                               |                 | OUT-2           |                 | OUT-3           |                 |
|               | EX <sup>1</sup>                     | PR <sup>2</sup> | EX <sup>1</sup> | PR <sup>2</sup> | EX <sup>1</sup> | PR <sup>2</sup> |
| 2-Year        | 0.028                               | 0.023           | 0.040           | 0.039           | 0.018           | 0.004           |
| 5-Year        | 0.056                               | 0.039           | 0.081           | 0.071           | 0.036           | 0.008           |
| 10-Year       | 0.079                               | 0.051           | 0.114           | 0.096           | 0.050           | 0.011           |
| 25-Year       | 0.110                               | 0.067           | 0.161           | 0.131           | 0.070           | 0.015           |
| 50-Year       | 0.136                               | 0.080           | 0.199           | 0.178           | 0.086           | 0.018           |
| 100-Year      | 0.164                               | 0.094           | 0.239           | 0.224           | 0.103           | 0.022           |

## 5.0 Conclusion

Without appropriate SWM controls, the development of the proposed Heritage Line Subdivision will alter existing drainage patterns, increase the impervious area of the site and increase off-site peak flow rates at **OUT-1** and **OUT-2**. As such, stormwater quality and quantity controls are necessary to mitigate potential adverse impacts to downstream properties and the natural environment.

Water quality controls have been provided in the form of a stone filled infiltration trenches to achieve "Enhanced" Level 1 protection as defined in the Stormwater Management Planning and Design Manual (March 2003).

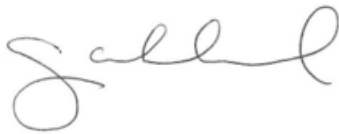
Additional LID features are included at the perimeter of the development to promote infiltration and to achieve appropriate nitrate dilution targets to support the proposed septic design.

Water quantity controls are provided in the form of a grassed swale basins and the runoff leaving the site will be regulated by outlet control structures to match existing levels.

Respectfully submitted,



Ken Smith, P.Eng.  
Manager, Water Resources



Sarah Ormel, EIT  
Engineer in Training

KS/SO/jh

### **Statement of Limitations**

This report has been prepared by D.M. Wills Associates Limited on behalf of 2564669/520039 Ontario Limited to provide a Preliminary Stormwater Management Plan for the proposed Heritage Line Subdivision.

The conclusions and recommendations in this report are based on available background documentation and discussions with applicable agencies at the time of preparation.

The report is intended to demonstrate the means whereby the existing site can be serviced with respect to stormwater management on a preliminary level. The report is applicable only to the project described in the text. The feasibility of this design has to be confirmed in accordance with appropriate studies and constructed substantially in accordance with the approved plans and details accompanying the storm water management report.

Any use which a third party makes of this report other than that of a preliminary stormwater management report for the Heritage Line subdivision development, is the responsibility of such third parties. D.M. Wills Associates Limited accepts no responsibility for damages, if any, suffered by a third party as a result of decisions made or actions taken based on using this report for purposes other than a preliminary stormwater management report for the Heritage Line Subdivision Development.

D.M. Wills Associates Limited is not responsible for any changes made to the stormwater management measures which are not in accordance with the design drawings. Any person(s) relying on the "as-constructed" stormwater measures should confirm that the field conditions are in accordance with the design drawings.



## Appendix A

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### Rainfall Data and Hydrology



6 Hour SCS Type II Intensity Hyetographs  
2006 Peterborough Airport Weather Station  
(mm/hr)

| Time<br>(min.) | 2 Year | 5 Year | 10 Year | 25 Year | 50 Year | 100 Year |
|----------------|--------|--------|---------|---------|---------|----------|
| 0              | 0      | 0      | 0       | 0       | 0       | 0        |
| 15             | 1.6    | 2.1    | 2.5     | 2.9     | 3.3     | 3.6      |
| 30             | 1.6    | 2.1    | 2.5     | 2.9     | 3.3     | 3.6      |
| 45             | 2.3    | 3.2    | 3.7     | 4.4     | 4.9     | 5.4      |
| 60             | 2.3    | 3.2    | 3.7     | 4.4     | 4.9     | 5.4      |
| 75             | 2.3    | 3.2    | 3.7     | 4.4     | 4.9     | 5.4      |
| 90             | 2.3    | 3.2    | 3.7     | 4.4     | 4.9     | 5.4      |
| 105            | 3.9    | 5.2    | 6.2     | 7.3     | 8.1     | 9.0      |
| 120            | 3.9    | 5.2    | 6.2     | 7.3     | 8.1     | 9.0      |
| 135            | 4.6    | 6.3    | 7.4     | 8.8     | 9.8     | 10.8     |
| 150            | 4.6    | 6.3    | 7.4     | 8.8     | 9.8     | 10.8     |
| 165            | 23.2   | 31.4   | 36.9    | 43.7    | 48.9    | 53.9     |
| 180            | 60.4   | 81.78  | 95.9    | 113.7   | 127.0   | 140.2    |
| 195            | 8.5    | 11.5   | 13.5    | 16.0    | 17.9    | 19.8     |
| 210            | 8.5    | 11.5   | 13.5    | 16.0    | 17.9    | 19.8     |
| 225            | 3.9    | 5.2    | 6.2     | 7.3     | 8.1     | 9.0      |
| 240            | 3.9    | 5.2    | 6.2     | 7.3     | 8.1     | 9.0      |
| 255            | 3.1    | 4.2    | 4.9     | 5.8     | 6.5     | 7.2      |
| 270            | 3.1    | 4.2    | 4.9     | 5.8     | 6.5     | 7.2      |
| 285            | 2.3    | 3.2    | 3.7     | 4.4     | 4.9     | 5.4      |
| 300            | 2.3    | 3.2    | 3.7     | 4.4     | 4.9     | 5.4      |
| 315            | 1.6    | 2.1    | 2.5     | 2.9     | 3.3     | 3.6      |
| 330            | 1.6    | 2.1    | 2.5     | 2.9     | 3.3     | 3.6      |
| 345            | 1.6    | 2.1    | 2.5     | 2.9     | 3.3     | 3.6      |
| 360            | 1.6    | 2.1    | 2.5     | 2.9     | 3.3     | 3.6      |

# Hydrologic Parameters for EX-100

Sheet 1 of 1



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: 10-May-22

| Land Use                                                                                                                                                                                                                                                                                                                          |  |  |  | Rainfall Data                                                      |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--------------------------------------------------------------------|--|--|--|
| <div><div>Agriculture0.00ha</div><div>Range1.99ha</div><div>Grass0.00ha</div><div>Woods0.19ha</div><div>Wetland0.00ha</div><div>Gravel0.00ha</div><div>Impervious0.00ha</div><div>SUM2.18</div></div> <div>Hydrologic Soil Group<sup>1</sup>B</div> <div>Soil TypeOtonobee Loam</div> <div>C0.21</div> <div>CN (Nashyd)64.4</div> |  |  |  | Gauging Station = Peterborough<br>12 hr, 100 Yr Rainfall = 90.4 mm |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | Drainage Area2.18ha                                                |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | Impervious Area0.00ha                                              |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | Percent Impervious0.0%                                             |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | Connected Impervious0.0%                                           |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | Pervious                                                           |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | Length230m                                                         |  |  |  |
| US Elev226.2m                                                                                                                                                                                                                                                                                                                     |  |  |  |                                                                    |  |  |  |
| DS Elev220.3m                                                                                                                                                                                                                                                                                                                     |  |  |  |                                                                    |  |  |  |
| Slope2.6%                                                                                                                                                                                                                                                                                                                         |  |  |  |                                                                    |  |  |  |
| Rolling                                                                                                                                                                                                                                                                                                                           |  |  |  |                                                                    |  |  |  |

| Parameter                             | Soil Group | Land Use    |       |       |       |         |        |         | Weighted Value       |                            |
|---------------------------------------|------------|-------------|-------|-------|-------|---------|--------|---------|----------------------|----------------------------|
|                                       |            | Agriculture | Range | Grass | Woods | Wetland | Gravel | Imperv. | Incl. Imperv. NASHYD | Not Incl. Imperv. STANDHYD |
| Runoff Coefficient <sup>2</sup> , C   | B          | 0.32        | 0.22  | 0.13  | 0.11  | 0.05    | 0.76   | 0.90    | 0.21                 | n.a.                       |
| SCS Curve No. <sup>3</sup> , CN       | B          | 74          | 65    | 61    | 58    | 50      | 85     | 98      | 64.4                 | 64.4                       |
| Initial Abstraction <sup>5</sup> , mm |            | 6.0         | 8.0   | 5.0   | 10.0  | 10.0    | 2.5    | 2.0     | 8.2                  | 8.2                        |

| Time of Concentration <sup>6</sup> |      |      |
|------------------------------------|------|------|
| Total Length                       | 230  | m    |
| Average Slope                      | 2.6  | %    |
| Airport                            | 32.1 | min. |
| Bransby - Williams                 | 10.0 | min. |
| Applicable Minimum <sup>7</sup>    | 10.0 | min. |
| Time to Peak                       | 21.5 | min. |
|                                    | 0.36 | hr.  |

| Composite Parameters                  |         |      |
|---------------------------------------|---------|------|
| Drainage Area                         | 2.18 ha |      |
| Runoff Coefficient                    | 0.21    |      |
| SCS Curve No.                         | 64.4    | 64.4 |
| Modified Curve No. <sup>4</sup> , CN* | 67.7    | 67.7 |
| Initial Abstraction.                  | 8.2     | 8.2  |

## Notes:

- Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
- Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
- SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
- The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents antecedent moisture conditions Type II
- Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
- Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
- Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
- All impervious areas have been assumed to be directly connected.

# Hydrologic Parameters for EX-200

Sheet 1 of 1



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: 10-May-22

| Land Use                                                                                                                                                                                              |  |  |  | Rainfall Data                    |  |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|----------------------------------|--|--|--|
| <div><div>Agriculture0.00ha</div><div>Range0.99ha</div><div>Grass0.00ha</div><div>Woods0.77ha</div><div>Wetland0.00ha</div><div>Gravel0.00ha</div><div>Impervious0.00ha</div><div>SUM1.76</div></div> |  |  |  | Gauging Station = Peterborough   |  |  |  |
|                                                                                                                                                                                                       |  |  |  | 12 hr, 100 Yr Rainfall = 90.4 mm |  |  |  |
|                                                                                                                                                                                                       |  |  |  |                                  |  |  |  |
|                                                                                                                                                                                                       |  |  |  | Drainage Area1.76ha              |  |  |  |
|                                                                                                                                                                                                       |  |  |  | Impervious Area0.00ha            |  |  |  |
|                                                                                                                                                                                                       |  |  |  | Percent Impervious0.0%           |  |  |  |
|                                                                                                                                                                                                       |  |  |  | Connected Impervious0.0%         |  |  |  |
|                                                                                                                                                                                                       |  |  |  |                                  |  |  |  |
| Pervious                                                                                                                                                                                              |  |  |  |                                  |  |  |  |
| Length100m                                                                                                                                                                                            |  |  |  |                                  |  |  |  |
| US Elev225.3m                                                                                                                                                                                         |  |  |  |                                  |  |  |  |
| DS Elev210.9m                                                                                                                                                                                         |  |  |  |                                  |  |  |  |
| Slope14.3%                                                                                                                                                                                            |  |  |  |                                  |  |  |  |
| Steep                                                                                                                                                                                                 |  |  |  |                                  |  |  |  |
|                                                                                                                                                                                                       |  |  |  |                                  |  |  |  |
| Hydrologic Soil Group <sup>1</sup> B                                                                                                                                                                  |  |  |  |                                  |  |  |  |
| Soil TypeOtonobee Loam                                                                                                                                                                                |  |  |  |                                  |  |  |  |
| C0.32                                                                                                                                                                                                 |  |  |  |                                  |  |  |  |
| CN (Nashyd)61.9                                                                                                                                                                                       |  |  |  |                                  |  |  |  |

| Parameter                             | Soil Group | Land Use    |       |       |       |         |        |         | Weighted Value       |                            |
|---------------------------------------|------------|-------------|-------|-------|-------|---------|--------|---------|----------------------|----------------------------|
|                                       |            | Agriculture | Range | Grass | Woods | Wetland | Gravel | Imperv. | Incl. Imperv. NASHYD | Not Incl. Imperv. STANDHYD |
| Runoff Coefficient <sup>2</sup> , C   | B          | 0.57        | 0.35  | 0.19  | 0.29  | 0.05    | 0.76   | 0.90    | 0.32                 | n.a.                       |
| SCS Curve No. <sup>3</sup> , CN       | B          | 74          | 65    | 61    | 58    | 50      | 85     | 98      | 61.9                 | 61.9                       |
| Initial Abstraction <sup>5</sup> , mm |            | 6.0         | 8.0   | 5.0   | 10.0  | 10.0    | 2.5    | 2.0     | 8.9                  | 8.9                        |

| Time of Concentration <sup>6</sup> |      |      |
|------------------------------------|------|------|
| Total Length                       | 100  | m    |
| Average Slope                      | 14.3 | %    |
| Airport                            | 10.5 | min. |
| Bransby - Williams                 | 3.2  | min. |
| Applicable Minimum <sup>7</sup>    | 10.0 | min. |
| Time to Peak                       | 7.0  | min. |
|                                    | 0.12 | hr.  |

| Composite Parameters                  |         |      |
|---------------------------------------|---------|------|
| Drainage Area                         | 1.76 ha |      |
| Runoff Coefficient                    | 0.32    |      |
| SCS Curve No.                         | 61.9    | 61.9 |
| Modified Curve No. <sup>4</sup> , CN* | 64.3    | 64.3 |
| Initial Abstraction.                  | 8.9     | 8.9  |

## Notes:

- Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
- Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
- SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
- The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents antecedent moisture conditions Type II
- Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
- Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
- Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
- All impervious areas have been assumed to be directly connected.



# Hydrologic Parameters for EX-300

Sheet 1 of 1



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: 10-May-22

| Land Use                             |             |    | Rainfall Data                    |  |  |
|--------------------------------------|-------------|----|----------------------------------|--|--|
| Agriculture                          | 0.00        | ha | Gauging Station = Peterborough   |  |  |
| Range                                | 1.63        | ha | 12 hr, 100 Yr Rainfall = 90.4 mm |  |  |
| Grass                                | 0.00        | ha |                                  |  |  |
| Woods                                | 0.05        | ha |                                  |  |  |
| Wetland                              | 0.00        | ha |                                  |  |  |
| Gravel                               | 0.00        | ha |                                  |  |  |
| Impervious                           | 0.02        | ha |                                  |  |  |
| <b>SUM</b>                           | <b>1.70</b> |    |                                  |  |  |
| Hydrologic Soil Group <sup>1</sup> B |             |    | Drainage Area 1.70 ha            |  |  |
| Soil Type Otonobee Loam              |             |    | Impervious Area 0.02 ha          |  |  |
| C 0.15                               |             |    | Percent Impervious 1.2%          |  |  |
| CN (Nashyd) 65.2                     |             |    | Connected Impervious 1.2%        |  |  |
|                                      |             |    | Pervious                         |  |  |
|                                      |             |    | Length 270 m                     |  |  |
|                                      |             |    | US Elev 226.2 m                  |  |  |
|                                      |             |    | DS Elev 222.4 m                  |  |  |
|                                      |             |    | Slope 1.4 %                      |  |  |
|                                      |             |    | Flat                             |  |  |

| Parameter                             | Soil Group | Land Use    |       |       |       |         |        |         | Weighted Value       |                            |
|---------------------------------------|------------|-------------|-------|-------|-------|---------|--------|---------|----------------------|----------------------------|
|                                       |            | Agriculture | Range | Grass | Woods | Wetland | Gravel | Imperv. | Incl. Imperv. NASHYD | Not Incl. Imperv. STANDHYD |
| Runoff Coefficient <sup>2</sup> , C   | B          | 0.26        | 0.14  | 0.08  | 0.08  | 0.05    | 0.76   | 0.90    | 0.15                 | n.a.                       |
| SCS Curve No. <sup>3</sup> , CN       | B          | 74          | 65    | 61    | 58    | 50      | 85     | 98      | 65.2                 | 64.8                       |
| Initial Abstraction <sup>5</sup> , mm |            | 6.0         | 8.0   | 5.0   | 10.0  | 10.0    | 2.5    | 2.0     | 8.0                  | 8.1                        |

| Time of Concentration <sup>6</sup> |      |      |
|------------------------------------|------|------|
| Total Length                       | 270  | m    |
| Average Slope                      | 1.4  | %    |
| Airport                            | 45.8 | min. |
| Bransby - Williams                 | 13.7 | min. |
| Applicable Minimum <sup>7</sup>    | 10.0 | min. |
| Time to Peak                       | 30.7 | min. |
|                                    | 0.51 | hr.  |

| Composite Parameters                  |         |      |
|---------------------------------------|---------|------|
| Drainage Area                         | 1.70 ha |      |
| Runoff Coefficient                    | 0.15    |      |
| SCS Curve No.                         | 65.2    | 64.8 |
| Modified Curve No. <sup>4</sup> , CN* | 68.8    | 68.2 |
| Initial Abstraction.                  | 8.0     | 8.1  |

## Notes:

- Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
- Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
- SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
- The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents antecedent moisture conditions Type II
- Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
- Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
- Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
- All impervious areas have been assumed to be directly connected.

| Hydrologic Parameters for PR-100                                                  |                                             | Sheet 1 of 1 |
|-----------------------------------------------------------------------------------|---------------------------------------------|--------------|
|  | Project No: 21-10985                        |              |
|                                                                                   | Project Name: Heritage Line Preliminary SWM |              |
|                                                                                   | Designed/Checked By: SO/KS                  |              |
|                                                                                   | Date: 10-May-22                             |              |

| Land Use                                                                                                                                             |  |  | Rainfall Data                                                                                                                                                                                                                                                                                                                                                |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| Agriculture 0.00 ha<br>Range 0.00 ha<br>Grass 0.09 ha<br>Woods 0.00 ha<br>Wetland 0.00 ha<br>Gravel 0.00 ha<br>Impervious 0.15 ha<br><b>SUM 0.24</b> |  |  | <b>Gauging Station =</b> Peterborough<br><b>12 hr, 100 Yr Rainfall =</b> 90.4 mm                                                                                                                                                                                                                                                                             |  |  |
| <b>Hydrologic Soil Group<sup>1</sup></b> B<br><b>Soil Type</b> Otonobee Loam<br><b>C</b> 0.61<br><b>CN (Nashyd)</b> 84.1                             |  |  | <b>Drainage Area</b> 0.24 ha<br><b>Impervious Area</b> 0.15 ha<br>Percent Impervious 62.5% Calculated<br>Connected Impervious 61.3% Modelled<br><b>Percent Impervious 64.0% Modelled</b><br><b>Pervious Impervious</b><br><b>Length</b> 70 32 m<br><b>US Elev</b> 226.3 227.1 m<br><b>DS Elev</b> 224.2 226.2 m<br><b>Slope</b> 3.0 3.1 %<br>Rolling Rolling |  |  |

| Parameter                             | Soil Group | Land Use    |       |       |       |         |        |         | Weighted Value       |                            |
|---------------------------------------|------------|-------------|-------|-------|-------|---------|--------|---------|----------------------|----------------------------|
|                                       |            | Agriculture | Range | Grass | Woods | Wetland | Gravel | Imperv. | Incl. Imperv. NASHYD | Not Incl. Imperv. STANDHYD |
| Runoff Coefficient <sup>2</sup> , C   | B          | 0.32        | 0.22  | 0.13  | 0.11  | 0.05    | 0.76   | 0.90    | 0.61                 | n.a.                       |
| SCS Curve No. <sup>3</sup> , CN       | B          | 74          | 65    | 61    | 58    | 50      | 85     | 98      | 84.1                 | 61.0                       |
| Initial Abstraction <sup>5</sup> , mm |            | 6.0         | 8.0   | 5.0   | 10.0  | 10.0    | 2.5    | 2.0     | 3.1                  | 5.0                        |

| Time of Concentration <sup>6</sup>    |             |      |
|---------------------------------------|-------------|------|
| <b>Total Length</b>                   | 102         | m    |
| <b>Average Slope</b>                  | 3.0         | %    |
| <b>Airport</b>                        | 10.9        | min. |
| <b>Bransby - Williams</b>             | 5.4         | min. |
| <b>Applicable Minimum<sup>7</sup></b> | <b>10.0</b> | min. |
| <b>Time to Peak</b>                   | 6.7         | min. |
|                                       | <b>0.11</b> | hr.  |

| Composite Parameters                       |         |             |
|--------------------------------------------|---------|-------------|
| <b>Drainage Area</b>                       | 0.24 ha |             |
| <b>Runoff Coefficient</b>                  | 0.62    |             |
| <b>SCS Curve No.</b>                       | 84.7    | 61.0        |
| <b>Modified Curve No.<sup>4</sup>, CN*</b> | 85.1    | <b>60.5</b> |
| <b>Initial Abstraction.</b>                | 3.1     | <b>5.0</b>  |

**Notes:**

- Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
- Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
- SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
- The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents antecedent moisture conditions Type II
- Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
- Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
- Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
- Connected Impervious does not include areas that discharge to pervious surfaces.

# Hydrologic Parameters for PR-101

Sheet 1 of 1



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: 10-May-22

| Land Use                                                                                                                                                                                                                                                                                                                          |  |  |  | Rainfall Data                                                                                                                                  |  |  |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| <div><div>Agriculture0.00ha</div><div>Range0.00ha</div><div>Grass1.15ha</div><div>Woods0.00ha</div><div>Wetland0.00ha</div><div>Gravel0.00ha</div><div>Impervious0.13ha</div><div>SUM1.28</div></div> <div>Hydrologic Soil Group<sup>1</sup>B</div> <div>Soil TypeOtonobee Loam</div> <div>C0.21</div> <div>CN (Nashyd)64.8</div> |  |  |  | Gauging Station = Peterborough<br>12 hr, 100 Yr Rainfall = 90.4 mm                                                                             |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | <div><div>Drainage Area1.28ha</div><div>Impervious Area0.13ha</div><div>Percent Impervious10.2%</div><div>Connected Impervious1.9%</div></div> |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | Pervious                                                                                                                                       |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | Length295m                                                                                                                                     |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | US Elev226.2m                                                                                                                                  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | DS Elev220.2m                                                                                                                                  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                   |  |  |  | Slope2.0%                                                                                                                                      |  |  |  |
| Rolling                                                                                                                                                                                                                                                                                                                           |  |  |  |                                                                                                                                                |  |  |  |

| Parameter                             | Soil Group | Land Use    |       |       |       |         |        |         | Weighted Value       |                            |
|---------------------------------------|------------|-------------|-------|-------|-------|---------|--------|---------|----------------------|----------------------------|
|                                       |            | Agriculture | Range | Grass | Woods | Wetland | Gravel | Imperv. | Incl. Imperv. NASHYD | Not Incl. Imperv. STANDHYD |
| Runoff Coefficient <sup>2</sup> , C   | B          | 0.32        | 0.22  | 0.13  | 0.11  | 0.05    | 0.76   | 0.90    | 0.21                 | n.a.                       |
| SCS Curve No. <sup>3</sup> , CN       | B          | 74          | 65    | 61    | 58    | 50      | 85     | 98      | 64.8                 | 61.0                       |
| Initial Abstraction <sup>5</sup> , mm |            | 6.0         | 8.0   | 5.0   | 10.0  | 10.0    | 2.5    | 2.0     | 4.7                  | 5.0                        |

| Time of Concentration <sup>6</sup> |      |      |
|------------------------------------|------|------|
| Total Length                       | 295  | m    |
| Average Slope                      | 2.0  | %    |
| Airport                            | 39.4 | min. |
| Bransby - Williams                 | 14.2 | min. |
| Applicable Minimum <sup>7</sup>    | 10.0 | min. |
| Time to Peak                       | 26.4 | min. |
|                                    | 0.44 | hr.  |

| Composite Parameters                  |         |      |
|---------------------------------------|---------|------|
| Drainage Area                         | 1.28 ha |      |
| Runoff Coefficient                    | 0.21    |      |
| SCS Curve No.                         | 64.8    | 61.0 |
| Modified Curve No. <sup>4</sup> , CN* | 65.1    | 60.5 |
| Initial Abstraction.                  | 4.7     | 5.0  |

## Notes:

- Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
- Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
- SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
- The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents antecedent moisture conditions Type II
- Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
- Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
- Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
- Connected Impervious does not include areas that discharge to pervious surfaces.

| Hydrologic Parameters for PR-200                                                  |                                             | Sheet 1 of 1 |
|-----------------------------------------------------------------------------------|---------------------------------------------|--------------|
|  | Project No: 21-10985                        |              |
|                                                                                   | Project Name: Heritage Line Preliminary SWM |              |
|                                                                                   | Designed/Checked By: SO/KS                  |              |
|                                                                                   | Date: 10-May-22                             |              |

| Land Use                                                                                                                                                                                                                                                  |                                                                    |            | Rainfall Data |   |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------|---------------|---|--|
| Agriculture 0.00 ha<br>Range 0.00 ha<br>Grass 1.25 ha<br>Woods 0.00 ha<br>Wetland 0.00 ha<br>Gravel 0.00 ha<br>Impervious 0.89 ha<br><b>SUM 2.14</b><br><br>Hydrologic Soil Group <sup>1</sup> B<br>Soil Type Otonobee Loam<br>C 0.42<br>CN (Nashyd) 76.4 | Gauging Station = Peterborough<br>12 hr, 100 Yr Rainfall = 90.4 mm |            |               |   |  |
|                                                                                                                                                                                                                                                           | Drainage Area                                                      | 2.14       | ha            |   |  |
|                                                                                                                                                                                                                                                           | Impervious Area                                                    | 0.89       | ha            |   |  |
|                                                                                                                                                                                                                                                           | Percent Impervious                                                 | 41.7%      | Calculated    |   |  |
|                                                                                                                                                                                                                                                           | Connected Impervious                                               | 33.0%      | Modelled      |   |  |
|                                                                                                                                                                                                                                                           | Percent Impervious                                                 | 43.0%      | Modelled      |   |  |
|                                                                                                                                                                                                                                                           | Pervious                                                           | Impervious |               |   |  |
|                                                                                                                                                                                                                                                           | Length                                                             | 215        | 10            | m |  |
|                                                                                                                                                                                                                                                           | US Elev                                                            | 226.2      | 226.2         | m |  |
|                                                                                                                                                                                                                                                           | DS Elev                                                            | 225.6      | 226.1         | m |  |
|                                                                                                                                                                                                                                                           | Slope                                                              | 0.3        | 1.5           | % |  |
|                                                                                                                                                                                                                                                           |                                                                    | Flat       | Flat          |   |  |

| Parameter                             | Soil Group | Land Use    |       |       |       |         |        |         | Weighted Value       |                            |
|---------------------------------------|------------|-------------|-------|-------|-------|---------|--------|---------|----------------------|----------------------------|
|                                       |            | Agriculture | Range | Grass | Woods | Wetland | Gravel | Imperv. | Incl. Imperv. NASHYD | Not Incl. Imperv. STANDHYD |
| Runoff Coefficient <sup>2</sup> , C   | B          | 0.26        | 0.14  | 0.08  | 0.08  | 0.05    | 0.76   | 0.90    | 0.42                 | n.a.                       |
| SCS Curve No. <sup>3</sup> , CN       | B          | 74          | 65    | 61    | 58    | 50      | 85     | 98      | 76.4                 | 61.0                       |
| Initial Abstraction <sup>5</sup> , mm |            | 6.0         | 8.0   | 5.0   | 10.0  | 10.0    | 2.5    | 2.0     | 3.7                  | 5.0                        |

| Time of Concentration <sup>6</sup> |      |      |
|------------------------------------|------|------|
| Total Length                       | 225  | m    |
| Average Slope                      | 0.3  | %    |
| Airport                            | 47.1 | min. |
| Bransby - Williams                 | 14.8 | min. |
| Applicable Minimum <sup>7</sup>    | 10.0 | min. |
| Time to Peak                       | 9.9  | min. |
|                                    | 0.17 | hr.  |

| Composite Parameters                  |         |      |
|---------------------------------------|---------|------|
| Drainage Area                         | 2.14 ha |      |
| Runoff Coefficient                    | 0.43    |      |
| SCS Curve No.                         | 76.9    | 61.0 |
| Modified Curve No. <sup>4</sup> , CN* | 77.1    | 60.5 |
| Initial Abstraction.                  | 3.7     | 5.0  |

**Notes:**

- Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
- Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
- SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
- The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents antecedent moisture conditions Type II
- Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
- Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
- Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
- Connected Impervious does not include areas that discharge to pervious surfaces.



# Hydrologic Parameters for PR-201

Sheet 1 of 1



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: 10-May-22

| Land Use                             |             |    | Rainfall Data                    |  |  |
|--------------------------------------|-------------|----|----------------------------------|--|--|
| Agriculture                          | 0.00        | ha | Gauging Station = Peterborough   |  |  |
| Range                                | 0.00        | ha | 12 hr, 100 Yr Rainfall = 90.4 mm |  |  |
| Grass                                | 0.68        | ha |                                  |  |  |
| Woods                                | 0.00        | ha |                                  |  |  |
| Wetland                              | 0.00        | ha |                                  |  |  |
| Gravel                               | 0.00        | ha |                                  |  |  |
| Impervious                           | 0.06        | ha |                                  |  |  |
| <b>SUM</b>                           | <b>0.74</b> |    |                                  |  |  |
|                                      |             |    |                                  |  |  |
| Hydrologic Soil Group <sup>1</sup> B |             |    | Drainage Area 0.74 ha            |  |  |
| Soil Type Otonobee                   |             |    | Impervious Area 0.06 ha          |  |  |
| C                                    |             |    | Percent Impervious 8.1%          |  |  |
| CN (Nashyd) 64.0                     |             |    | Connected Impervious 0.0%        |  |  |
|                                      |             |    |                                  |  |  |
|                                      |             |    | Pervious                         |  |  |
|                                      |             |    | Length 160 m                     |  |  |
|                                      |             |    | US Elev 226.5 m                  |  |  |
|                                      |             |    | DS Elev 208.0 m                  |  |  |
|                                      |             |    | Slope 11.6 %                     |  |  |
|                                      |             |    | Steep                            |  |  |

| Parameter                             | Soil Group | Land Use    |       |       |       |         |        |         | Weighted Value       |                            |
|---------------------------------------|------------|-------------|-------|-------|-------|---------|--------|---------|----------------------|----------------------------|
|                                       |            | Agriculture | Range | Grass | Woods | Wetland | Gravel | Imperv. | Incl. Imperv. NASHYD | Not Incl. Imperv. STANDHYD |
| Runoff Coefficient <sup>2</sup> , C   | B          | 0.57        | 0.35  | 0.19  | 0.29  | 0.05    | 0.76   | 0.90    | 0.25                 | n.a.                       |
| SCS Curve No. <sup>3</sup> , CN       | B          | 74          | 65    | 61    | 58    | 50      | 85     | 98      | 64.0                 | 61.0                       |
| Initial Abstraction <sup>5</sup> , mm |            | 6.0         | 8.0   | 5.0   | 10.0  | 10.0    | 2.5    | 2.0     | 4.8                  | 5.0                        |

| Time of Concentration <sup>6</sup> |      |      |
|------------------------------------|------|------|
| Total Length                       | 160  | m    |
| Average Slope                      | 11.6 | %    |
| Airport                            | 15.7 | min. |
| Bransby - Williams                 | 5.8  | min. |
| Applicable Minimum <sup>7</sup>    | 10.0 | min. |
| Time to Peak                       | 10.5 | min. |
|                                    | 0.17 | hr.  |

| Composite Parameters                  |         |      |
|---------------------------------------|---------|------|
| Drainage Area                         | 0.74 ha |      |
| Runoff Coefficient                    | 0.25    |      |
| SCS Curve No.                         | 64.0    | 61.0 |
| Modified Curve No. <sup>4</sup> , CN* | 64.2    | 60.5 |
| Initial Abstraction.                  | 4.8     | 5.0  |

## Notes:

- Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
- Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
- SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
- The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents antecedent moisture conditions Type II
- Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
- Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
- Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
- Connected Impervious does not include areas that discharge to pervious surfaces.

# Hydrologic Parameters for PR-202

Sheet 1 of 1



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: 10-May-22

| Land Use                             |             |    | Rainfall Data                    |  |  |
|--------------------------------------|-------------|----|----------------------------------|--|--|
| Agriculture                          | 0.00        | ha | Gauging Station = Peterborough   |  |  |
| Range                                | 0.00        | ha | 12 hr, 100 Yr Rainfall = 90.4 mm |  |  |
| Grass                                | 0.00        | ha |                                  |  |  |
| Woods                                | 0.93        | ha | Drainage Area 0.93 ha            |  |  |
| Wetland                              | 0.00        | ha | Impervious Area 0.00 ha          |  |  |
| Gravel                               | 0.00        | ha | Percent Impervious 0.0%          |  |  |
| Impervious                           | 0.00        | ha | Connected Impervious 0.0%        |  |  |
| <b>SUM</b>                           | <b>0.93</b> |    |                                  |  |  |
| Hydrologic Soil Group <sup>1</sup> B |             |    | Pervious                         |  |  |
| Soil Type Otonobee Loam              |             |    | Length 100 m                     |  |  |
| C 0.14                               |             |    | US Elev 220.0 m                  |  |  |
| CN (Nashyd) 58.0                     |             |    | DS Elev 210.9 m                  |  |  |
|                                      |             |    | Slope 9.1 %                      |  |  |
|                                      |             |    | Hilly                            |  |  |

| Parameter                             | Soil Group | Land Use    |       |       |       |         |        |         | Weighted Value       |                            |
|---------------------------------------|------------|-------------|-------|-------|-------|---------|--------|---------|----------------------|----------------------------|
|                                       |            | Agriculture | Range | Grass | Woods | Wetland | Gravel | Imperv. | Incl. Imperv. NASHYD | Not Incl. Imperv. STANDHYD |
| Runoff Coefficient <sup>2</sup> , C   | B          | 0.40        | 0.30  | 0.19  | 0.14  | 0.05    | 0.76   | 0.90    | 0.14                 | n.a.                       |
| SCS Curve No. <sup>3</sup> , CN       | B          | 74          | 65    | 61    | 58    | 50      | 85     | 98      | 58.0                 | 58.0                       |
| Initial Abstraction <sup>5</sup> , mm |            | 6.0         | 8.0   | 5.0   | 10.0  | 10.0    | 2.5    | 2.0     | 10.0                 | 10.0                       |

| Time of Concentration <sup>6</sup> |      |      |
|------------------------------------|------|------|
| Total Length                       | 100  | m    |
| Average Slope                      | 9.1  | %    |
| Airport                            | 15.1 | min. |
| Bransby - Williams                 | 3.7  | min. |
| Applicable Minimum <sup>7</sup>    | 10.0 | min. |
| Time to Peak                       | 10.1 | min. |
|                                    | 0.17 | hr.  |

| Composite Parameters                  |         |      |
|---------------------------------------|---------|------|
| Drainage Area                         | 0.93 ha |      |
| Runoff Coefficient                    | 0.14    |      |
| SCS Curve No.                         | 58.0    | 58.0 |
| Modified Curve No. <sup>4</sup> , CN* | 61.6    | 61.6 |
| Initial Abstraction.                  | 10.0    | 10.0 |

## Notes:

- Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
- Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
- SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
- The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents antecedent moisture conditions Type II
- Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
- Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
- Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
- Connected Impervious does not include areas that discharge to pervious surfaces.

# Hydrologic Parameters for PR-300

Sheet 1 of 1



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: 10-May-22

| Land Use                                                                                                                                                                                                                                                                                                                                  |  |  |  | Rainfall Data                                                                                                                                  |  |  |  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| <div><div>Agriculture0.00ha</div><div>Range0.00ha</div><div>Grass0.20ha</div><div>Woods0.00ha</div><div>Wetland0.00ha</div><div>Gravel0.00ha</div><div>Impervious0.03ha</div><div>SUM0.23</div></div> <div><div>Hydrologic Soil Group<sup>1</sup>B</div><div>Soil TypeOtonobee Loam</div><div>C0.19</div><div>CN (Nashyd)65.8</div></div> |  |  |  | Gauging Station = Peterborough<br>12 hr, 100 Yr Rainfall = 90.4 mm                                                                             |  |  |  |
|                                                                                                                                                                                                                                                                                                                                           |  |  |  | <div><div>Drainage Area0.23ha</div><div>Impervious Area0.03ha</div><div>Percent Impervious13.0%</div><div>Connected Impervious0.0%</div></div> |  |  |  |
|                                                                                                                                                                                                                                                                                                                                           |  |  |  | Pervious                                                                                                                                       |  |  |  |
|                                                                                                                                                                                                                                                                                                                                           |  |  |  | Length55m                                                                                                                                      |  |  |  |
|                                                                                                                                                                                                                                                                                                                                           |  |  |  | US Elev223.0m                                                                                                                                  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                           |  |  |  | DS Elev222.6m                                                                                                                                  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                           |  |  |  | Slope0.8%                                                                                                                                      |  |  |  |
| Flat                                                                                                                                                                                                                                                                                                                                      |  |  |  |                                                                                                                                                |  |  |  |

| Parameter                             | Soil Group | Land Use    |       |       |       |         |        |         | Weighted Value       |                            |
|---------------------------------------|------------|-------------|-------|-------|-------|---------|--------|---------|----------------------|----------------------------|
|                                       |            | Agriculture | Range | Grass | Woods | Wetland | Gravel | Imperv. | Incl. Imperv. NASHYD | Not Incl. Imperv. STANDHYD |
| Runoff Coefficient <sup>2</sup> , C   | B          | 0.26        | 0.14  | 0.08  | 0.08  | 0.05    | 0.76   | 0.90    | 0.19                 | n.a.                       |
| SCS Curve No. <sup>3</sup> , CN       | B          | 74          | 65    | 61    | 58    | 50      | 85     | 98      | 65.8                 | 61.0                       |
| Initial Abstraction <sup>5</sup> , mm |            | 6.0         | 8.0   | 5.0   | 10.0  | 10.0    | 2.5    | 2.0     | 4.6                  | 5.0                        |

| Time of Concentration <sup>6</sup> |      |      |
|------------------------------------|------|------|
| Total Length                       | 55   | m    |
| Average Slope                      | 0.8  | %    |
| Airport                            | 23.8 | min. |
| Bransby - Williams                 | 3.8  | min. |
| Applicable Minimum <sup>7</sup>    | 10.0 | min. |
| Time to Peak                       | 15.9 | min. |
|                                    | 0.27 | hr.  |

| Composite Parameters                  |         |      |
|---------------------------------------|---------|------|
| Drainage Area                         | 0.23 ha |      |
| Runoff Coefficient                    | 0.19    |      |
| SCS Curve No.                         | 65.8    | 61.0 |
| Modified Curve No. <sup>4</sup> , CN* | 66.5    | 60.5 |
| Initial Abstraction.                  | 4.6     | 5.0  |

## Notes:

- Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
- Runoff coefficient obtained from M.T.O. Design Chart 1.07, M.T.O. Drainage Management Manual, 1997, Hydrologic Analysis and Design, McCuen 2004 and New Jersey Technical Manual for Stream Encroachment, 1984.
- SCS Curve No. obtained from M.T.O. Design Chart 1.09, M.T.O. Drainage Management Manual, 1997, and Table 2-2a, TR-55, page 2-5.
- The modified curve number is adjusted as per Paul Wisner & Associates (1982) and represents antecedent moisture conditions Type II
- Initial Abstraction values taken from the Environmental and Engineering Services Department, The Corporation of the City of London, Dec 2005
- Use Airport Equation to calculate time of concentration for C <= 0.4, and Bransby-Williams for C > 0.4.
- Minimum Time of Concentration for use in the Rational Method and Hydrologic Model has been set to 10 minutes
- Connected Impervious does not include areas that discharge to pervious surfaces.

## Appendix B

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### Hydrologic Modelling



## VO6 Model Schematic

### Existing Conditions

EX-100  
AREA [ha] - 2.180  
PKFW [m<sup>3</sup>/s] - 0.028

EX-200  
AREA [ha] - 1.760  
PKFW [m<sup>3</sup>/s] - 0.040

EX-300  
AREA [ha] - 1.700  
PKFW [m<sup>3</sup>/s] - 0.018

### Proposed Conditions - Uncontrolled

PR-101  
AREA [ha] - 1.280  
PKFW [m<sup>3</sup>/s] - 0.016

OUT-1  
AREA [ha] - 1.520  
PKFW [m<sup>3</sup>/s] - 0.032

PR-100  
AREA [ha] - 0.240  
PKFW [m<sup>3</sup>/s] - 0.025

PR-200  
AREA [ha] - 2.140  
PKFW [m<sup>3</sup>/s] - 0.118

OUT-2  
AREA [ha] - 3.810  
PKFW [m<sup>3</sup>/s] - 0.147

PR-201  
AREA [ha] - 0.740  
PKFW [m<sup>3</sup>/s] - 0.017

PR-202  
AREA [ha] - 0.930  
PKFW [m<sup>3</sup>/s] - 0.014

PR-300  
AREA [ha] - 0.230  
PKFW [m<sup>3</sup>/s] - 0.004

### Proposed Conditions - Controlled

PR-101  
AREA [ha] - 1.280  
PKFW [m<sup>3</sup>/s] - 0.016

OUT-1  
AREA [ha] - 1.520  
PKFW [m<sup>3</sup>/s] - 0.023

PR-100  
AREA [ha] - 0.240  
PKFW [m<sup>3</sup>/s] - 0.025

PR-200  
AREA [ha] - 2.140  
PKFW [m<sup>3</sup>/s] - 0.118

OUT-2  
AREA [ha] - 3.810  
PKFW [m<sup>3</sup>/s] - 0.039

PR-201  
AREA [ha] - 0.740  
PKFW [m<sup>3</sup>/s] - 0.017

PR-202  
AREA [ha] - 0.930  
PKFW [m<sup>3</sup>/s] - 0.014



=====

```

V   V   I   SSSSS U   U   A   L           (v 6.2.2006)
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

```

```

000 TTTT TTTT H   H   Y   Y   M   M   000 TM
O   O   T   T   H   H   Y   Y   MM MM   O   O
O   O   T   T   H   H   Y   M   M   O   O
000 T   T   H   H   Y   M   M   000

```

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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\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\bf490  
533-048a-4542-a952-b85ac3b4306f\scena

Summary filename:

C:\Users\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\bf490  
533-048a-4542-a952-b85ac3b4306f\scena

DATE: 05/10/2022

TIME: 12:42:12

USER:

COMMENTS: \_\_\_\_\_

```

*****
** SIMULATION : Run 01          **
*****

```

May 10, 2022 12:56:02 PM

10985-V0 Output

|                  |                                                                                            |
|------------------|--------------------------------------------------------------------------------------------|
| READ STORM       | Filename: C:\Users\sormel\AppData\Local\Temp\2deb8561-d1e0-47f6-9eb6-5ad55f7cb9f2\See1e780 |
| Ptotal= 38.75 mm | Comments: 2-Year, 6 hour SCS Type II - City of Pet                                         |

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.25        | 1.60          | 1.75        | 3.90          | 3.25        | 8.50          | 4.75        | 2.30          |
| 0.50        | 1.60          | 2.00        | 3.90          | 3.50        | 8.50          | 5.00        | 2.30          |
| 0.75        | 2.30          | 2.25        | 4.60          | 3.75        | 3.90          | 5.25        | 1.60          |
| 1.00        | 2.30          | 2.50        | 4.60          | 4.00        | 3.90          | 5.50        | 1.60          |
| 1.25        | 2.30          | 2.75        | 23.20         | 4.25        | 3.10          | 5.75        | 1.60          |
| 1.50        | 2.30          | 3.00        | 60.40         | 4.50        | 3.10          | 6.00        | 1.60          |

|                   |                    |                           |
|-------------------|--------------------|---------------------------|
| CALIB             | Area (ha)= 2.18    | Curve Number (CN)= 67.7   |
| NASHYD ( 1100)    | Ia (mm)= 8.20      | # of Linear Res.(N)= 3.00 |
| ID= 1 DT= 5.0 min | U.H. Tp(hrs)= 0.36 |                           |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 1.60          | 1.583       | 3.90          | 3.083       | 8.50          | 4.58        | 2.30          |
| 0.167       | 1.60          | 1.667       | 3.90          | 3.167       | 8.50          | 4.67        | 2.30          |
| 0.250       | 1.60          | 1.750       | 3.90          | 3.250       | 8.50          | 4.75        | 2.30          |
| 0.333       | 1.60          | 1.833       | 3.90          | 3.333       | 8.50          | 4.83        | 2.30          |
| 0.417       | 1.60          | 1.917       | 3.90          | 3.417       | 8.50          | 4.92        | 2.30          |
| 0.500       | 1.60          | 2.000       | 3.90          | 3.500       | 8.50          | 5.00        | 2.30          |
| 0.583       | 2.30          | 2.083       | 4.60          | 3.583       | 3.90          | 5.08        | 1.60          |
| 0.667       | 2.30          | 2.167       | 4.60          | 3.667       | 3.90          | 5.17        | 1.60          |
| 0.750       | 2.30          | 2.250       | 4.60          | 3.750       | 3.90          | 5.25        | 1.60          |
| 0.833       | 2.30          | 2.333       | 4.60          | 3.833       | 3.90          | 5.33        | 1.60          |
| 0.917       | 2.30          | 2.417       | 4.60          | 3.917       | 3.90          | 5.42        | 1.60          |
| 1.000       | 2.30          | 2.500       | 4.60          | 4.000       | 3.90          | 5.50        | 1.60          |
| 1.083       | 2.30          | 2.583       | 23.20         | 4.083       | 3.10          | 5.58        | 1.60          |
| 1.167       | 2.30          | 2.667       | 23.20         | 4.167       | 3.10          | 5.67        | 1.60          |
| 1.250       | 2.30          | 2.750       | 23.20         | 4.250       | 3.10          | 5.75        | 1.60          |
| 1.333       | 2.30          | 2.833       | 60.40         | 4.333       | 3.10          | 5.83        | 1.60          |
| 1.417       | 2.30          | 2.917       | 60.40         | 4.417       | 3.10          | 5.92        | 1.60          |
| 1.500       | 2.30          | 3.000       | 60.40         | 4.500       | 3.10          | 6.00        | 1.60          |

Unit Hyd Qpeak (cms)= 0.231

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PEAK FLOW (cms)= 0.028 (i)  
 TIME TO PEAK (hrs)= 3.250  
 RUNOFF VOLUME (mm)= 6.149  
 TOTAL RAINFALL (mm)= 38.750  
 RUNOFF COEFFICIENT = 0.159

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

CALIB  
 NASHYD ( 1200) | Area (ha)= 1.76 Curve Number (CN)= 64.3  
 ID= 1 DT= 5.0 min | Ia (mm)= 8.90 # of Linear Res.(N)= 3.00  
 U.H. Tp(hrs)= 0.12

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                            | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167                            | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250                            | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333                            | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417                            | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500                            | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |
| 0.583                            | 2.30  | 2.083 | 4.60  | 3.583 | 3.90  | 5.08 | 1.60  |
| 0.667                            | 2.30  | 2.167 | 4.60  | 3.667 | 3.90  | 5.17 | 1.60  |
| 0.750                            | 2.30  | 2.250 | 4.60  | 3.750 | 3.90  | 5.25 | 1.60  |
| 0.833                            | 2.30  | 2.333 | 4.60  | 3.833 | 3.90  | 5.33 | 1.60  |
| 0.917                            | 2.30  | 2.417 | 4.60  | 3.917 | 3.90  | 5.42 | 1.60  |
| 1.000                            | 2.30  | 2.500 | 4.60  | 4.000 | 3.90  | 5.50 | 1.60  |
| 1.083                            | 2.30  | 2.583 | 23.20 | 4.083 | 3.10  | 5.58 | 1.60  |
| 1.167                            | 2.30  | 2.667 | 23.20 | 4.167 | 3.10  | 5.67 | 1.60  |
| 1.250                            | 2.30  | 2.750 | 23.20 | 4.250 | 3.10  | 5.75 | 1.60  |
| 1.333                            | 2.30  | 2.833 | 60.40 | 4.333 | 3.10  | 5.83 | 1.60  |
| 1.417                            | 2.30  | 2.917 | 60.40 | 4.417 | 3.10  | 5.92 | 1.60  |
| 1.500                            | 2.30  | 3.000 | 60.40 | 4.500 | 3.10  | 6.00 | 1.60  |

Unit Hyd Qpeak (cms)= 0.560

PEAK FLOW (cms)= 0.040 (i)  
 TIME TO PEAK (hrs)= 3.000  
 RUNOFF VOLUME (mm)= 5.145  
 TOTAL RAINFALL (mm)= 38.750  
 RUNOFF COEFFICIENT = 0.133

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

CALIB  
 NASHYD ( 1300) | Area (ha)= 1.70 Curve Number (CN)= 68.8  
 ID= 1 DT= 5.0 min | Ia (mm)= 8.00 # of Linear Res.(N)= 3.00  
 U.H. Tp(hrs)= 0.51

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                            | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167                            | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250                            | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333                            | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417                            | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500                            | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |
| 0.583                            | 2.30  | 2.083 | 4.60  | 3.583 | 3.90  | 5.08 | 1.60  |
| 0.667                            | 2.30  | 2.167 | 4.60  | 3.667 | 3.90  | 5.17 | 1.60  |
| 0.750                            | 2.30  | 2.250 | 4.60  | 3.750 | 3.90  | 5.25 | 1.60  |
| 0.833                            | 2.30  | 2.333 | 4.60  | 3.833 | 3.90  | 5.33 | 1.60  |
| 0.917                            | 2.30  | 2.417 | 4.60  | 3.917 | 3.90  | 5.42 | 1.60  |
| 1.000                            | 2.30  | 2.500 | 4.60  | 4.000 | 3.90  | 5.50 | 1.60  |
| 1.083                            | 2.30  | 2.583 | 23.20 | 4.083 | 3.10  | 5.58 | 1.60  |
| 1.167                            | 2.30  | 2.667 | 23.20 | 4.167 | 3.10  | 5.67 | 1.60  |
| 1.250                            | 2.30  | 2.750 | 23.20 | 4.250 | 3.10  | 5.75 | 1.60  |
| 1.333                            | 2.30  | 2.833 | 60.40 | 4.333 | 3.10  | 5.83 | 1.60  |
| 1.417                            | 2.30  | 2.917 | 60.40 | 4.417 | 3.10  | 5.92 | 1.60  |
| 1.500                            | 2.30  | 3.000 | 60.40 | 4.500 | 3.10  | 6.00 | 1.60  |

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.018 (i)  
 TIME TO PEAK (hrs)= 3.500  
 RUNOFF VOLUME (mm)= 6.478  
 TOTAL RAINFALL (mm)= 38.750  
 RUNOFF COEFFICIENT = 0.167

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

CALIB

NASHYD ( 2201) | Area (ha)= 0.74 Curve Number (CN)= 64.2  
 ID= 1 DT= 5.0 min | Ia (mm)= 4.80 # of Linear Res.(N)= 3.00  
 U.H. Tp(hrs)= 0.17

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                              | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167                              | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250                              | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333                              | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417                              | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500                              | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |
| 0.583                              | 2.30  | 2.083 | 4.60  | 3.583 | 3.90  | 5.08 | 1.60  |
| 0.667                              | 2.30  | 2.167 | 4.60  | 3.667 | 3.90  | 5.17 | 1.60  |
| 0.750                              | 2.30  | 2.250 | 4.60  | 3.750 | 3.90  | 5.25 | 1.60  |
| 0.833                              | 2.30  | 2.333 | 4.60  | 3.833 | 3.90  | 5.33 | 1.60  |
| 0.917                              | 2.30  | 2.417 | 4.60  | 3.917 | 3.90  | 5.42 | 1.60  |
| 1.000                              | 2.30  | 2.500 | 4.60  | 4.000 | 3.90  | 5.50 | 1.60  |
| 1.083                              | 2.30  | 2.583 | 23.20 | 4.083 | 3.10  | 5.58 | 1.60  |
| 1.167                              | 2.30  | 2.667 | 23.20 | 4.167 | 3.10  | 5.67 | 1.60  |
| 1.250                              | 2.30  | 2.750 | 23.20 | 4.250 | 3.10  | 5.75 | 1.60  |
| 1.333                              | 2.30  | 2.833 | 60.40 | 4.333 | 3.10  | 5.83 | 1.60  |
| 1.417                              | 2.30  | 2.917 | 60.40 | 4.417 | 3.10  | 5.92 | 1.60  |
| 1.500                              | 2.30  | 3.000 | 60.40 | 4.500 | 3.10  | 6.00 | 1.60  |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.017 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 6.540  
 TOTAL RAINFALL (mm)= 38.750  
 RUNOFF COEFFICIENT = 0.169

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

CALIB  
 NASHYD ( 0047) | Area (ha)= 0.93 Curve Number (CN)= 61.6  
 ID= 1 DT= 5.0 min | Ia (mm)= 10.00 # of Linear Res.(N)= 3.00  
 U.H. Tp(hrs)= 0.17

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                              | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167                              | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250                              | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333                              | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417                              | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500                              | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |
| 0.583                              | 2.30  | 2.083 | 4.60  | 3.583 | 3.90  | 5.08 | 1.60  |
| 0.667                              | 2.30  | 2.167 | 4.60  | 3.667 | 3.90  | 5.17 | 1.60  |
| 0.750                              | 2.30  | 2.250 | 4.60  | 3.750 | 3.90  | 5.25 | 1.60  |
| 0.833                              | 2.30  | 2.333 | 4.60  | 3.833 | 3.90  | 5.33 | 1.60  |
| 0.917                              | 2.30  | 2.417 | 4.60  | 3.917 | 3.90  | 5.42 | 1.60  |
| 1.000                              | 2.30  | 2.500 | 4.60  | 4.000 | 3.90  | 5.50 | 1.60  |
| 1.083                              | 2.30  | 2.583 | 23.20 | 4.083 | 3.10  | 5.58 | 1.60  |
| 1.167                              | 2.30  | 2.667 | 23.20 | 4.167 | 3.10  | 5.67 | 1.60  |
| 1.250                              | 2.30  | 2.750 | 23.20 | 4.250 | 3.10  | 5.75 | 1.60  |
| 1.333                              | 2.30  | 2.833 | 60.40 | 4.333 | 3.10  | 5.83 | 1.60  |
| 1.417                              | 2.30  | 2.917 | 60.40 | 4.417 | 3.10  | 5.92 | 1.60  |
| 1.500                              | 2.30  | 3.000 | 60.40 | 4.500 | 3.10  | 6.00 | 1.60  |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.014 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 4.402  
 TOTAL RAINFALL (mm)= 38.750  
 RUNOFF COEFFICIENT = 0.114

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

CALIB  
 STANDHYD ( 2200) | Area (ha)= 2.14  
 ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 33.00

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.92       | 1.22         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 1.50       | 0.27         |
| Length (m)=        | 119.44     | 215.00       |
| 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                            | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167                            | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250                            | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333                            | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417                            | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500                            | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |
| 0.583                            | 2.30  | 2.083 | 4.60  | 3.583 | 3.90  | 5.08 | 1.60  |
| 0.667                            | 2.30  | 2.167 | 4.60  | 3.667 | 3.90  | 5.17 | 1.60  |
| 0.750                            | 2.30  | 2.250 | 4.60  | 3.750 | 3.90  | 5.25 | 1.60  |
| 0.833                            | 2.30  | 2.333 | 4.60  | 3.833 | 3.90  | 5.33 | 1.60  |
| 0.917                            | 2.30  | 2.417 | 4.60  | 3.917 | 3.90  | 5.42 | 1.60  |
| 1.000                            | 2.30  | 2.500 | 4.60  | 4.000 | 3.90  | 5.50 | 1.60  |
| 1.083                            | 2.30  | 2.583 | 23.20 | 4.083 | 3.10  | 5.58 | 1.60  |
| 1.167                            | 2.30  | 2.667 | 23.20 | 4.167 | 3.10  | 5.67 | 1.60  |
| 1.250                            | 2.30  | 2.750 | 23.20 | 4.250 | 3.10  | 5.75 | 1.60  |
| 1.333                            | 2.30  | 2.833 | 60.40 | 4.333 | 3.10  | 5.83 | 1.60  |
| 1.417                            | 2.30  | 2.917 | 60.40 | 4.417 | 3.10  | 5.92 | 1.60  |
| 1.500                            | 2.30  | 3.000 | 60.40 | 4.500 | 3.10  | 6.00 | 1.60  |

Max.Eff.Inten.(mm/hr)= 60.40 5.46  
over (min) 5.00 120.00  
Storage Coeff. (min)= 3.08 (ii) 116.03 (ii)  
Unit Hyd. Tpeak (min)= 5.00 120.00  
Unit Hyd. peak (cms)= 0.27 0.01

## \*TOTALS\*

PEAK FLOW (cms)= 0.12 0.01 0.118 (iii)  
TIME TO PEAK (hrs)= 3.00 4.92 3.00  
RUNOFF VOLUME (mm)= 37.75 6.78 16.97  
TOTAL RAINFALL (mm)= 38.75 38.75 38.75  
RUNOFF COEFFICIENT = 0.97 0.17 0.44

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 60.5 Ia = Dep. Storage (Above)  
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.  
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----  
| ADD HYD ( 0009) |  
| 1 + 2 = 3 |

AREA QPEAK TPEAK R.V.

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-----  
(ha) (cms) (hrs) (mm)  
ID1= 1 ( 2200): 2.14 0.118 3.00 16.97  
+ ID2= 2 ( 2201): 0.74 0.017 3.08 6.54  
=====

ID = 3 ( 0009): 2.88 0.135 3.00 14.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----  
| ADD HYD ( 0009) |  
| 3 + 2 = 1 |

AREA QPEAK TPEAK R.V.  
(ha) (cms) (hrs) (mm)  
ID1= 3 ( 0009): 2.88 0.135 3.00 14.29  
+ ID2= 2 ( 0047): 0.93 0.014 3.08 4.40  
=====

ID = 1 ( 0009): 3.81 0.147 3.00 11.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----  
| CALIB  
| NASHYD ( 2101) |

Area (ha)= 1.28 Curve Number (CN)= 65.1  
ID= 1 DT= 5.0 min | Ia (mm)= 4.70 # of Linear Res.(N)= 3.00  
U.H. Tp(hrs)= 0.44

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                            | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167                            | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250                            | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333                            | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417                            | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500                            | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |
| 0.583                            | 2.30  | 2.083 | 4.60  | 3.583 | 3.90  | 5.08 | 1.60  |
| 0.667                            | 2.30  | 2.167 | 4.60  | 3.667 | 3.90  | 5.17 | 1.60  |
| 0.750                            | 2.30  | 2.250 | 4.60  | 3.750 | 3.90  | 5.25 | 1.60  |
| 0.833                            | 2.30  | 2.333 | 4.60  | 3.833 | 3.90  | 5.33 | 1.60  |
| 0.917                            | 2.30  | 2.417 | 4.60  | 3.917 | 3.90  | 5.42 | 1.60  |
| 1.000                            | 2.30  | 2.500 | 4.60  | 4.000 | 3.90  | 5.50 | 1.60  |
| 1.083                            | 2.30  | 2.583 | 23.20 | 4.083 | 3.10  | 5.58 | 1.60  |
| 1.167                            | 2.30  | 2.667 | 23.20 | 4.167 | 3.10  | 5.67 | 1.60  |
| 1.250                            | 2.30  | 2.750 | 23.20 | 4.250 | 3.10  | 5.75 | 1.60  |
| 1.333                            | 2.30  | 2.833 | 60.40 | 4.333 | 3.10  | 5.83 | 1.60  |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 1.417 | 2.30 | 2.917 | 60.40 | 4.417 | 3.10 | 5.92 | 1.60 |
| 1.500 | 2.30 | 3.000 | 60.40 | 4.500 | 3.10 | 6.00 | 1.60 |

Unit Hyd Qpeak (cms)= 0.111

PEAK FLOW (cms)= 0.016 (i)  
 TIME TO PEAK (hrs)= 3.333  
 RUNOFF VOLUME (mm)= 6.810  
 TOTAL RAINFALL (mm)= 38.750  
 RUNOFF COEFFICIENT = 0.176

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

|                   |                      |
|-------------------|----------------------|
| CALIB             | Area (ha)= 0.24      |
| STANDHYD ( 2100)  | Total Imp(%)= 64.00  |
| ID= 1 DT= 5.0 min | Dir. Conn.(%)= 60.00 |

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.15       | 0.09         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 3.10       | 3.00         |
| Length (m)=        | 40.00      | 70.00        |
| 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                            | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167                            | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250                            | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333                            | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417                            | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500                            | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |
| 0.583                            | 2.30  | 2.083 | 4.60  | 3.583 | 3.90  | 5.08 | 1.60  |
| 0.667                            | 2.30  | 2.167 | 4.60  | 3.667 | 3.90  | 5.17 | 1.60  |
| 0.750                            | 2.30  | 2.250 | 4.60  | 3.750 | 3.90  | 5.25 | 1.60  |
| 0.833                            | 2.30  | 2.333 | 4.60  | 3.833 | 3.90  | 5.33 | 1.60  |
| 0.917                            | 2.30  | 2.417 | 4.60  | 3.917 | 3.90  | 5.42 | 1.60  |
| 1.000                            | 2.30  | 2.500 | 4.60  | 4.000 | 3.90  | 5.50 | 1.60  |
| 1.083                            | 2.30  | 2.583 | 23.20 | 4.083 | 3.10  | 5.58 | 1.60  |
| 1.167                            | 2.30  | 2.667 | 23.20 | 4.167 | 3.10  | 5.67 | 1.60  |
| 1.250                            | 2.30  | 2.750 | 23.20 | 4.250 | 3.10  | 5.75 | 1.60  |
| 1.333                            | 2.30  | 2.833 | 60.40 | 4.333 | 3.10  | 5.83 | 1.60  |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 1.417 | 2.30 | 2.917 | 60.40 | 4.417 | 3.10 | 5.92 | 1.60 |
| 1.500 | 2.30 | 3.000 | 60.40 | 4.500 | 3.10 | 6.00 | 1.60 |

Max.Eff.Inten.(mm/hr)= 60.40 8.42  
 over (min) 5.00 25.00  
 Storage Coeff. (min)= 1.28 (ii) 24.81 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 25.00  
 Unit Hyd. peak (cms)= 0.33 0.05

\*TOTALS\*

|                      |       |       |             |
|----------------------|-------|-------|-------------|
| PEAK FLOW (cms)=     | 0.02  | 0.00  | 0.025 (iii) |
| TIME TO PEAK (hrs)=  | 3.00  | 3.33  | 3.00        |
| RUNOFF VOLUME (mm)=  | 37.75 | 6.39  | 25.15       |
| TOTAL RAINFALL (mm)= | 38.75 | 38.75 | 38.75       |
| RUNOFF COEFFICIENT = | 0.97  | 0.16  | 0.65        |

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. Storage (Above)  
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.  
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ADD HYD ( 0006)   |      |       |       |       |
|-------------------|------|-------|-------|-------|
| 1 + 2 = 3         |      |       |       |       |
|                   | AREA | QPEAK | TPEAK | R.V.  |
|                   | (ha) | (cms) | (hrs) | (mm)  |
| ID1= 1 ( 2100):   | 0.24 | 0.025 | 3.00  | 25.15 |
| + ID2= 2 ( 2101): | 1.28 | 0.016 | 3.33  | 6.81  |
| =====             |      |       |       |       |
| ID = 3 ( 0006):   | 1.52 | 0.032 | 3.00  | 9.71  |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

|                   |                    |                           |
|-------------------|--------------------|---------------------------|
| CALIB             | Area (ha)= 0.23    | Curve Number (CN)= 66.5   |
| NASHYD ( 2300)    | Ia (mm)= 4.60      | # of Linear Res.(N)= 3.00 |
| ID= 1 DT= 5.0 min | U.H. Tp(hrs)= 0.27 |                           |

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                            | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167                            | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250                            | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333                            | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417                            | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500                            | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |
| 0.583                            | 2.30  | 2.083 | 4.60  | 3.583 | 3.90  | 5.08 | 1.60  |
| 0.667                            | 2.30  | 2.167 | 4.60  | 3.667 | 3.90  | 5.17 | 1.60  |
| 0.750                            | 2.30  | 2.250 | 4.60  | 3.750 | 3.90  | 5.25 | 1.60  |
| 0.833                            | 2.30  | 2.333 | 4.60  | 3.833 | 3.90  | 5.33 | 1.60  |
| 0.917                            | 2.30  | 2.417 | 4.60  | 3.917 | 3.90  | 5.42 | 1.60  |
| 1.000                            | 2.30  | 2.500 | 4.60  | 4.000 | 3.90  | 5.50 | 1.60  |
| 1.083                            | 2.30  | 2.583 | 23.20 | 4.083 | 3.10  | 5.58 | 1.60  |
| 1.167                            | 2.30  | 2.667 | 23.20 | 4.167 | 3.10  | 5.67 | 1.60  |
| 1.250                            | 2.30  | 2.750 | 23.20 | 4.250 | 3.10  | 5.75 | 1.60  |
| 1.333                            | 2.30  | 2.833 | 60.40 | 4.333 | 3.10  | 5.83 | 1.60  |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 0.083 | 1.60 | 1.583 | 3.90  | 3.083 | 8.50 | 4.58 | 2.30 |
| 0.167 | 1.60 | 1.667 | 3.90  | 3.167 | 8.50 | 4.67 | 2.30 |
| 0.250 | 1.60 | 1.750 | 3.90  | 3.250 | 8.50 | 4.75 | 2.30 |
| 0.333 | 1.60 | 1.833 | 3.90  | 3.333 | 8.50 | 4.83 | 2.30 |
| 0.417 | 1.60 | 1.917 | 3.90  | 3.417 | 8.50 | 4.92 | 2.30 |
| 0.500 | 1.60 | 2.000 | 3.90  | 3.500 | 8.50 | 5.00 | 2.30 |
| 0.583 | 2.30 | 2.083 | 4.60  | 3.583 | 3.90 | 5.08 | 1.60 |
| 0.667 | 2.30 | 2.167 | 4.60  | 3.667 | 3.90 | 5.17 | 1.60 |
| 0.750 | 2.30 | 2.250 | 4.60  | 3.750 | 3.90 | 5.25 | 1.60 |
| 0.833 | 2.30 | 2.333 | 4.60  | 3.833 | 3.90 | 5.33 | 1.60 |
| 0.917 | 2.30 | 2.417 | 4.60  | 3.917 | 3.90 | 5.42 | 1.60 |
| 1.000 | 2.30 | 2.500 | 4.60  | 4.000 | 3.90 | 5.50 | 1.60 |
| 1.083 | 2.30 | 2.583 | 23.20 | 4.083 | 3.10 | 5.58 | 1.60 |
| 1.167 | 2.30 | 2.667 | 23.20 | 4.167 | 3.10 | 5.67 | 1.60 |
| 1.250 | 2.30 | 2.750 | 23.20 | 4.250 | 3.10 | 5.75 | 1.60 |
| 1.333 | 2.30 | 2.833 | 60.40 | 4.333 | 3.10 | 5.83 | 1.60 |
| 1.417 | 2.30 | 2.917 | 60.40 | 4.417 | 3.10 | 5.92 | 1.60 |
| 1.500 | 2.30 | 3.000 | 60.40 | 4.500 | 3.10 | 6.00 | 1.60 |

|                    |        |           |
|--------------------|--------|-----------|
| PEAK FLOW          | (cms)= | 0.004 (i) |
| TIME TO PEAK       | (hrs)= | 3.167     |
| RUNOFF VOLUME      | (mm)=  | 7.188     |
| TOTAL RAINFALL     | (mm)=  | 38.750    |
| RUNOFF COEFFICIENT | =      | 0.185     |

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NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

| TIME  | RAIN  | TIME  | RAIN  | TIME  | RAIN  | TIME | RAIN  |
|-------|-------|-------|-------|-------|-------|------|-------|
| hrs   | mm/hr | hrs   | mm/hr | hrs   | mm/hr | hrs  | mm/hr |
| 0.083 | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167 | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250 | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333 | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417 | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500 | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 0.583 | 2.30 | 2.083 | 4.60  | 3.583 | 3.90 | 5.08 | 1.60 |
| 0.667 | 2.30 | 2.167 | 4.60  | 3.667 | 3.90 | 5.17 | 1.60 |
| 0.750 | 2.30 | 2.250 | 4.60  | 3.750 | 3.90 | 5.25 | 1.60 |
| 0.833 | 2.30 | 2.333 | 4.60  | 3.833 | 3.90 | 5.33 | 1.60 |
| 0.917 | 2.30 | 2.417 | 4.60  | 3.917 | 3.90 | 5.42 | 1.60 |
| 1.000 | 2.30 | 2.500 | 4.60  | 4.000 | 3.90 | 5.50 | 1.60 |
| 1.083 | 2.30 | 2.583 | 23.20 | 4.083 | 3.10 | 5.58 | 1.60 |
| 1.167 | 2.30 | 2.667 | 23.20 | 4.167 | 3.10 | 5.67 | 1.60 |
| 1.250 | 2.30 | 2.750 | 23.20 | 4.250 | 3.10 | 5.75 | 1.60 |
| 1.333 | 2.30 | 2.833 | 60.40 | 4.333 | 3.10 | 5.83 | 1.60 |
| 1.417 | 2.30 | 2.917 | 60.40 | 4.417 | 3.10 | 5.92 | 1.60 |
| 1.500 | 2.30 | 3.000 | 60.40 | 4.500 | 3.10 | 6.00 | 1.60 |

|                    |        |           |
|--------------------|--------|-----------|
| PEAK FLOW          | (cms)= | 0.016 (i) |
| TIME TO PEAK       | (hrs)= | 3.333     |
| RUNOFF VOLUME      | (mm)=  | 6.810     |
| TOTAL RAINFALL     | (mm)=  | 38.750    |
| RUNOFF COEFFICIENT | =      | 0.176     |

---

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

| TIME  | RAIN  | TIME  | RAIN  | TIME  | RAIN  | TIME | RAIN  |
|-------|-------|-------|-------|-------|-------|------|-------|
| hrs   | mm/hr | hrs   | mm/hr | hrs   | mm/hr | hrs  | mm/hr |
| 0.083 | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167 | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250 | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333 | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417 | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500 | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 0.583 | 2.30 | 2.083 | 4.60  | 3.583 | 3.90 | 5.08 | 1.60 |
| 0.667 | 2.30 | 2.167 | 4.60  | 3.667 | 3.90 | 5.17 | 1.60 |
| 0.750 | 2.30 | 2.250 | 4.60  | 3.750 | 3.90 | 5.25 | 1.60 |
| 0.833 | 2.30 | 2.333 | 4.60  | 3.833 | 3.90 | 5.33 | 1.60 |
| 0.917 | 2.30 | 2.417 | 4.60  | 3.917 | 3.90 | 5.42 | 1.60 |
| 1.000 | 2.30 | 2.500 | 4.60  | 4.000 | 3.90 | 5.50 | 1.60 |
| 1.083 | 2.30 | 2.583 | 23.20 | 4.083 | 3.10 | 5.58 | 1.60 |
| 1.167 | 2.30 | 2.667 | 23.20 | 4.167 | 3.10 | 5.67 | 1.60 |
| 1.250 | 2.30 | 2.750 | 23.20 | 4.250 | 3.10 | 5.75 | 1.60 |
| 1.333 | 2.30 | 2.833 | 60.40 | 4.333 | 3.10 | 5.83 | 1.60 |
| 1.417 | 2.30 | 2.917 | 60.40 | 4.417 | 3.10 | 5.92 | 1.60 |
| 1.500 | 2.30 | 3.000 | 60.40 | 4.500 | 3.10 | 6.00 | 1.60 |

Max.Eff.Inten.(mm/hr)= 60.40 8.42  
over (min) 5.00 25.00  
Storage Coeff. (min)= 1.28 (ii) 24.81 (ii)  
Unit Hyd. Tpeak (min)= 5.00 25.00  
Unit Hyd. peak (cms)= 0.33 0.05

\*TOTALS\*

PEAK FLOW (cms)= 0.02 0.00 0.025 (iii)  
TIME TO PEAK (hrs)= 3.00 3.33 3.00  
RUNOFF VOLUME (mm)= 37.75 6.39 25.15  
TOTAL RAINFALL (mm)= 38.75 38.75 38.75  
RUNOFF COEFFICIENT = 0.97 0.16 0.65

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 60.5 Ia = Dep. 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( 0042)  
IN= 2--> OUT= 1  
DT= 5.0 min

OVERFLOW IS OFF

| OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) | OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) |
|------------------|--------------------|------------------|--------------------|
| 0.0000           | 0.0000             | 0.0116           | 0.0080             |
| 0.0023           | 0.0007             | 0.0127           | 0.0102             |
| 0.0055           | 0.0017             | 0.0137           | 0.0127             |
| 0.0075           | 0.0029             | 0.0146           | 0.0153             |
| 0.0091           | 0.0044             | 0.0155           | 0.0183             |
| 0.0104           | 0.0061             | 0.0000           | 0.0000             |

| AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|--------------|----------------|----------------|--------------|
|--------------|----------------|----------------|--------------|

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INFLOW : ID= 2 ( 0039) 0.240 0.025 3.00 25.15  
OUTFLOW: ID= 1 ( 0042) 0.240 0.007 3.08 24.85

PEAK FLOW REDUCTION [Qout/Qin](%)= 29.03  
TIME SHIFT OF PEAK FLOW (min)= 5.00  
MAXIMUM STORAGE USED (ha.m.)= 0.0027

ADD HYD ( 0040)  
1 + 2 = 3

|                   | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|-------------------|--------------|----------------|----------------|--------------|
| ID1= 1 ( 0041):   | 1.28         | 0.016          | 3.33           | 6.81         |
| + ID2= 2 ( 0042): | 0.24         | 0.007          | 3.08           | 24.85        |
| ID = 3 ( 0040):   | 1.52         | 0.023          | 3.33           | 9.66         |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB  
NASHYD ( 0043)  
ID= 1 DT= 5.0 min

Area (ha)= 0.74 Curve Number (CN)= 64.2  
Ia (mm)= 4.80 # of Linear Res.(N)= 3.00  
U.H. Tp(hrs)= 0.17

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

--- TRANSFORMED HYETOGRAPH ---

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 1.60          | 1.583       | 3.90          | 3.083       | 8.50          | 4.58        | 2.30          |
| 0.167       | 1.60          | 1.667       | 3.90          | 3.167       | 8.50          | 4.67        | 2.30          |
| 0.250       | 1.60          | 1.750       | 3.90          | 3.250       | 8.50          | 4.75        | 2.30          |
| 0.333       | 1.60          | 1.833       | 3.90          | 3.333       | 8.50          | 4.83        | 2.30          |
| 0.417       | 1.60          | 1.917       | 3.90          | 3.417       | 8.50          | 4.92        | 2.30          |
| 0.500       | 1.60          | 2.000       | 3.90          | 3.500       | 8.50          | 5.00        | 2.30          |
| 0.583       | 2.30          | 2.083       | 4.60          | 3.583       | 3.90          | 5.08        | 1.60          |
| 0.667       | 2.30          | 2.167       | 4.60          | 3.667       | 3.90          | 5.17        | 1.60          |
| 0.750       | 2.30          | 2.250       | 4.60          | 3.750       | 3.90          | 5.25        | 1.60          |
| 0.833       | 2.30          | 2.333       | 4.60          | 3.833       | 3.90          | 5.33        | 1.60          |
| 0.917       | 2.30          | 2.417       | 4.60          | 3.917       | 3.90          | 5.42        | 1.60          |
| 1.000       | 2.30          | 2.500       | 4.60          | 4.000       | 3.90          | 5.50        | 1.60          |
| 1.083       | 2.30          | 2.583       | 23.20         | 4.083       | 3.10          | 5.58        | 1.60          |
| 1.167       | 2.30          | 2.667       | 23.20         | 4.167       | 3.10          | 5.67        | 1.60          |
| 1.250       | 2.30          | 2.750       | 23.20         | 4.250       | 3.10          | 5.75        | 1.60          |
| 1.333       | 2.30          | 2.833       | 60.40         | 4.333       | 3.10          | 5.83        | 1.60          |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 1.417 | 2.30 | 2.917 | 60.40 | 4.417 | 3.10 | 5.92 | 1.60 |
| 1.500 | 2.30 | 3.000 | 60.40 | 4.500 | 3.10 | 6.00 | 1.60 |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.017 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 6.540  
 TOTAL RAINFALL (mm)= 38.750  
 RUNOFF COEFFICIENT = 0.169

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

|                   |                    |                           |  |
|-------------------|--------------------|---------------------------|--|
| CALIB             |                    |                           |  |
| NASHYD ( 0048)    | Area (ha)= 0.93    | Curve Number (CN)= 61.6   |  |
| ID= 1 DT= 5.0 min | Ia (mm)= 10.00     | # of Linear Res.(N)= 3.00 |  |
|                   | U.H. Tp(hrs)= 0.17 |                           |  |

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 | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167 | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250 | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333 | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417 | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500 | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |
| 0.583 | 2.30  | 2.083 | 4.60  | 3.583 | 3.90  | 5.08 | 1.60  |
| 0.667 | 2.30  | 2.167 | 4.60  | 3.667 | 3.90  | 5.17 | 1.60  |
| 0.750 | 2.30  | 2.250 | 4.60  | 3.750 | 3.90  | 5.25 | 1.60  |
| 0.833 | 2.30  | 2.333 | 4.60  | 3.833 | 3.90  | 5.33 | 1.60  |
| 0.917 | 2.30  | 2.417 | 4.60  | 3.917 | 3.90  | 5.42 | 1.60  |
| 1.000 | 2.30  | 2.500 | 4.60  | 4.000 | 3.90  | 5.50 | 1.60  |
| 1.083 | 2.30  | 2.583 | 23.20 | 4.083 | 3.10  | 5.58 | 1.60  |
| 1.167 | 2.30  | 2.667 | 23.20 | 4.167 | 3.10  | 5.67 | 1.60  |
| 1.250 | 2.30  | 2.750 | 23.20 | 4.250 | 3.10  | 5.75 | 1.60  |
| 1.333 | 2.30  | 2.833 | 60.40 | 4.333 | 3.10  | 5.83 | 1.60  |
| 1.417 | 2.30  | 2.917 | 60.40 | 4.417 | 3.10  | 5.92 | 1.60  |
| 1.500 | 2.30  | 3.000 | 60.40 | 4.500 | 3.10  | 6.00 | 1.60  |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.014 (i)

TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 4.402  
 TOTAL RAINFALL (mm)= 38.750  
 RUNOFF COEFFICIENT = 0.114

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

|                   |           |             |             |           |
|-------------------|-----------|-------------|-------------|-----------|
| ADD HYD ( 0049)   |           |             |             |           |
| 1 + 2 = 3         | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
| ID1= 1 ( 0043):   | 0.74      | 0.017       | 3.08        | 6.54      |
| + ID2= 2 ( 0048): | 0.93      | 0.014       | 3.08        | 4.40      |
| ID = 3 ( 0049):   | 1.67      | 0.031       | 3.08        | 5.35      |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

|                   |                     |                      |  |
|-------------------|---------------------|----------------------|--|
| CALIB             |                     |                      |  |
| STANDHYD ( 0044)  | Area (ha)= 2.14     |                      |  |
| ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 | Dir. Conn.(%)= 33.00 |  |

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.92       | 1.22         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 1.50       | 0.27         |
| Length (m)=        | 119.44     | 215.00       |
| 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 | 1.60  | 1.583 | 3.90  | 3.083 | 8.50  | 4.58 | 2.30  |
| 0.167 | 1.60  | 1.667 | 3.90  | 3.167 | 8.50  | 4.67 | 2.30  |
| 0.250 | 1.60  | 1.750 | 3.90  | 3.250 | 8.50  | 4.75 | 2.30  |
| 0.333 | 1.60  | 1.833 | 3.90  | 3.333 | 8.50  | 4.83 | 2.30  |
| 0.417 | 1.60  | 1.917 | 3.90  | 3.417 | 8.50  | 4.92 | 2.30  |
| 0.500 | 1.60  | 2.000 | 3.90  | 3.500 | 8.50  | 5.00 | 2.30  |
| 0.583 | 2.30  | 2.083 | 4.60  | 3.583 | 3.90  | 5.08 | 1.60  |
| 0.667 | 2.30  | 2.167 | 4.60  | 3.667 | 3.90  | 5.17 | 1.60  |
| 0.750 | 2.30  | 2.250 | 4.60  | 3.750 | 3.90  | 5.25 | 1.60  |
| 0.833 | 2.30  | 2.333 | 4.60  | 3.833 | 3.90  | 5.33 | 1.60  |

|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 0.917 | 2.30 | 2.417 | 4.60  | 3.917 | 3.90 | 5.42 | 1.60 |
| 1.000 | 2.30 | 2.500 | 4.60  | 4.000 | 3.90 | 5.50 | 1.60 |
| 1.083 | 2.30 | 2.583 | 23.20 | 4.083 | 3.10 | 5.58 | 1.60 |
| 1.167 | 2.30 | 2.667 | 23.20 | 4.167 | 3.10 | 5.67 | 1.60 |
| 1.250 | 2.30 | 2.750 | 23.20 | 4.250 | 3.10 | 5.75 | 1.60 |
| 1.333 | 2.30 | 2.833 | 60.40 | 4.333 | 3.10 | 5.83 | 1.60 |
| 1.417 | 2.30 | 2.917 | 60.40 | 4.417 | 3.10 | 5.92 | 1.60 |
| 1.500 | 2.30 | 3.000 | 60.40 | 4.500 | 3.10 | 6.00 | 1.60 |

Max.Eff.Inten.(mm/hr)= 60.40 5.46  
over (min) 5.00 120.00  
Storage Coeff. (min)= 3.08 (ii) 116.03 (ii)  
Unit Hyd. Tpeak (min)= 5.00 120.00  
Unit Hyd. peak (cms)= 0.27 0.01

\*TOTALS\*

PEAK FLOW (cms)= 0.12 0.01 0.118 (iii)  
TIME TO PEAK (hrs)= 3.00 4.92 3.00  
RUNOFF VOLUME (mm)= 37.75 6.78 16.97  
TOTAL RAINFALL (mm)= 38.75 38.75 38.75  
RUNOFF COEFFICIENT = 0.97 0.17 0.44

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 60.5 Ia = Dep. Storage (Above)  
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.  
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR( 0046)  
IN= 2---> OUT= 1  
DT= 5.0 min

OVERFLOW IS OFF

| OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) | OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) |
|------------------|--------------------|------------------|--------------------|
| 0.0000           | 0.0000             | 0.0581           | 0.0439             |
| 0.0039           | 0.0043             | 0.0782           | 0.0554             |
| 0.0064           | 0.0099             | 0.0938           | 0.0681             |
| 0.0082           | 0.0166             | 0.1070           | 0.0819             |
| 0.0097           | 0.0245             | 0.1187           | 0.0970             |
| 0.0110           | 0.0336             | 0.0000           | 0.0000             |

|                        | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|------------------------|--------------|----------------|----------------|--------------|
| INFLOW : ID= 2 ( 0044) | 2.140        | 0.118          | 3.00           | 16.97        |
| OUTFLOW: ID= 1 ( 0046) | 2.140        | 0.009          | 5.83           | 16.84        |

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.51

TIME SHIFT OF PEAK FLOW (min)=170.00  
MAXIMUM STORAGE USED (ha.m.)= 0.0202

|                   | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|-------------------|--------------|----------------|----------------|--------------|
| ID1= 1 ( 0046):   | 2.14         | 0.009          | 5.83           | 16.84        |
| + ID2= 2 ( 0049): | 1.67         | 0.031          | 3.08           | 5.35         |
| ID = 3 ( 0045):   | 3.81         | 0.039          | 3.08           | 11.80        |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

V V I SSSS U U A L (v 6.2.2006)  
V V I SS U U A A L  
V V I SS U U A A A A L  
V V I SS U U A A L  
VV I SSSS UUUU A A LLLLL

000 TTTT TTTT H H Y Y M M 000 TM  
O O T T H H Y Y MM MM O O  
O O T T H H Y M M O O  
000 T T H H Y M M 000

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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\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\acddb  
f87-b865-42cb-a5b0-d7c0d22824d6\sena

Summary filename:

C:\Users\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\acddb  
f87-b865-42cb-a5b0-d7c0d22824d6\sena

DATE: 05/10/2022

TIME: 12:42:12

USER:

COMMENTS: \_\_\_\_\_

\*\*\*\*\*  
 \*\* SIMULATION : Run 02 \*\*  
 \*\*\*\*\*

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.25        | 2.10          | 1.75        | 5.20          | 3.25        | 11.50         | 4.75        | 3.20          |
| 0.50        | 2.10          | 2.00        | 5.20          | 3.50        | 11.50         | 5.00        | 3.20          |
| 0.75        | 3.20          | 2.25        | 6.30          | 3.75        | 5.20          | 5.25        | 2.10          |
| 1.00        | 3.20          | 2.50        | 6.30          | 4.00        | 5.20          | 5.50        | 2.10          |
| 1.25        | 3.20          | 2.75        | 31.40         | 4.25        | 4.20          | 5.75        | 2.10          |
| 1.50        | 3.20          | 3.00        | 81.80         | 4.50        | 4.20          | 6.00        | 2.10          |

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 2.10          | 1.583       | 5.20          | 3.083       | 11.50         | 4.58        | 3.20          |
| 0.167       | 2.10          | 1.667       | 5.20          | 3.167       | 11.50         | 4.67        | 3.20          |
| 0.250       | 2.10          | 1.750       | 5.20          | 3.250       | 11.50         | 4.75        | 3.20          |
| 0.333       | 2.10          | 1.833       | 5.20          | 3.333       | 11.50         | 4.83        | 3.20          |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

## ---- TRANSFORMED HYETOGRAPH ----

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 2.10          | 1.583       | 5.20          | 3.083       | 11.50         | 4.58        | 3.20          |
| 0.167       | 2.10          | 1.667       | 5.20          | 3.167       | 11.50         | 4.67        | 3.20          |
| 0.250       | 2.10          | 1.750       | 5.20          | 3.250       | 11.50         | 4.75        | 3.20          |
| 0.333       | 2.10          | 1.833       | 5.20          | 3.333       | 11.50         | 4.83        | 3.20          |

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.417       | 2.10          | 1.917       | 5.20          | 3.417       | 11.50         | 4.92        | 3.20          |
| 0.500       | 2.10          | 2.000       | 5.20          | 3.500       | 11.50         | 5.00        | 3.20          |
| 0.583       | 3.20          | 2.083       | 6.30          | 3.583       | 5.20          | 5.08        | 2.10          |
| 0.667       | 3.20          | 2.167       | 6.30          | 3.667       | 5.20          | 5.17        | 2.10          |
| 0.750       | 3.20          | 2.250       | 6.30          | 3.750       | 5.20          | 5.25        | 2.10          |
| 0.833       | 3.20          | 2.333       | 6.30          | 3.833       | 5.20          | 5.33        | 2.10          |
| 0.917       | 3.20          | 2.417       | 6.30          | 3.917       | 5.20          | 5.42        | 2.10          |
| 1.000       | 3.20          | 2.500       | 6.30          | 4.000       | 5.20          | 5.50        | 2.10          |
| 1.083       | 3.20          | 2.583       | 31.40         | 4.083       | 4.20          | 5.58        | 2.10          |
| 1.167       | 3.20          | 2.667       | 31.40         | 4.167       | 4.20          | 5.67        | 2.10          |
| 1.250       | 3.20          | 2.750       | 31.40         | 4.250       | 4.20          | 5.75        | 2.10          |
| 1.333       | 3.20          | 2.833       | 81.80         | 4.333       | 4.20          | 5.83        | 2.10          |
| 1.417       | 3.20          | 2.917       | 81.80         | 4.417       | 4.20          | 5.92        | 2.10          |
| 1.500       | 3.20          | 3.000       | 81.80         | 4.500       | 4.20          | 6.00        | 2.10          |

Unit Hyd Qpeak (cms)= 0.231

PEAK FLOW (cms)= 0.056 (i)  
 TIME TO PEAK (hrs)= 3.250  
 RUNOFF VOLUME (mm)= 11.833  
 TOTAL RAINFALL (mm)= 52.450  
 RUNOFF COEFFICIENT = 0.226

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

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 2.10          | 1.583       | 5.20          | 3.083       | 11.50         | 4.58        | 3.20          |
| 0.167       | 2.10          | 1.667       | 5.20          | 3.167       | 11.50         | 4.67        | 3.20          |
| 0.250       | 2.10          | 1.750       | 5.20          | 3.250       | 11.50         | 4.75        | 3.20          |
| 0.333       | 2.10          | 1.833       | 5.20          | 3.333       | 11.50         | 4.83        | 3.20          |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

## ---- TRANSFORMED HYETOGRAPH ----

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 2.10          | 1.583       | 5.20          | 3.083       | 11.50         | 4.58        | 3.20          |
| 0.167       | 2.10          | 1.667       | 5.20          | 3.167       | 11.50         | 4.67        | 3.20          |
| 0.250       | 2.10          | 1.750       | 5.20          | 3.250       | 11.50         | 4.75        | 3.20          |
| 0.333       | 2.10          | 1.833       | 5.20          | 3.333       | 11.50         | 4.83        | 3.20          |
| 0.417       | 2.10          | 1.917       | 5.20          | 3.417       | 11.50         | 4.92        | 3.20          |
| 0.500       | 2.10          | 2.000       | 5.20          | 3.500       | 11.50         | 5.00        | 3.20          |
| 0.583       | 3.20          | 2.083       | 6.30          | 3.583       | 5.20          | 5.08        | 2.10          |
| 0.667       | 3.20          | 2.167       | 6.30          | 3.667       | 5.20          | 5.17        | 2.10          |
| 0.750       | 3.20          | 2.250       | 6.30          | 3.750       | 5.20          | 5.25        | 2.10          |
| 0.833       | 3.20          | 2.333       | 6.30          | 3.833       | 5.20          | 5.33        | 2.10          |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 0.917 | 3.20 | 2.417 | 6.30  | 3.917 | 5.20 | 5.42 | 2.10 |
| 1.000 | 3.20 | 2.500 | 6.30  | 4.000 | 5.20 | 5.50 | 2.10 |
| 1.083 | 3.20 | 2.583 | 31.40 | 4.083 | 4.20 | 5.58 | 2.10 |
| 1.167 | 3.20 | 2.667 | 31.40 | 4.167 | 4.20 | 5.67 | 2.10 |
| 1.250 | 3.20 | 2.750 | 31.40 | 4.250 | 4.20 | 5.75 | 2.10 |
| 1.333 | 3.20 | 2.833 | 81.80 | 4.333 | 4.20 | 5.83 | 2.10 |
| 1.417 | 3.20 | 2.917 | 81.80 | 4.417 | 4.20 | 5.92 | 2.10 |
| 1.500 | 3.20 | 3.000 | 81.80 | 4.500 | 4.20 | 6.00 | 2.10 |

Unit Hyd Qpeak (cms)= 0.560

PEAK FLOW (cms)= 0.081 (i)  
TIME TO PEAK (hrs)= 3.000  
RUNOFF VOLUME (mm)= 10.138  
TOTAL RAINFALL (mm)= 52.450  
RUNOFF COEFFICIENT = 0.193

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

-----  
| CALIB |  
| NASHYD ( 1300) | Area (ha)= 1.70 Curve Number (CN)= 68.8  
| ID= 1 DT= 5.0 min | Ia (mm)= 8.00 # of Linear Res.(N)= 3.00  
-----  
U.H. Tp(hrs)= 0.51

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 | 2.10  | 1.583 | 5.20  | 3.083 | 11.50 | 4.58 | 3.20  |
| 0.167 | 2.10  | 1.667 | 5.20  | 3.167 | 11.50 | 4.67 | 3.20  |
| 0.250 | 2.10  | 1.750 | 5.20  | 3.250 | 11.50 | 4.75 | 3.20  |
| 0.333 | 2.10  | 1.833 | 5.20  | 3.333 | 11.50 | 4.83 | 3.20  |
| 0.417 | 2.10  | 1.917 | 5.20  | 3.417 | 11.50 | 4.92 | 3.20  |
| 0.500 | 2.10  | 2.000 | 5.20  | 3.500 | 11.50 | 5.00 | 3.20  |
| 0.583 | 3.20  | 2.083 | 6.30  | 3.583 | 5.20  | 5.08 | 2.10  |
| 0.667 | 3.20  | 2.167 | 6.30  | 3.667 | 5.20  | 5.17 | 2.10  |
| 0.750 | 3.20  | 2.250 | 6.30  | 3.750 | 5.20  | 5.25 | 2.10  |
| 0.833 | 3.20  | 2.333 | 6.30  | 3.833 | 5.20  | 5.33 | 2.10  |
| 0.917 | 3.20  | 2.417 | 6.30  | 3.917 | 5.20  | 5.42 | 2.10  |
| 1.000 | 3.20  | 2.500 | 6.30  | 4.000 | 5.20  | 5.50 | 2.10  |
| 1.083 | 3.20  | 2.583 | 31.40 | 4.083 | 4.20  | 5.58 | 2.10  |
| 1.167 | 3.20  | 2.667 | 31.40 | 4.167 | 4.20  | 5.67 | 2.10  |
| 1.250 | 3.20  | 2.750 | 31.40 | 4.250 | 4.20  | 5.75 | 2.10  |
| 1.333 | 3.20  | 2.833 | 81.80 | 4.333 | 4.20  | 5.83 | 2.10  |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 1.417 | 3.20 | 2.917 | 81.80 | 4.417 | 4.20 | 5.92 | 2.10 |
| 1.500 | 3.20 | 3.000 | 81.80 | 4.500 | 4.20 | 6.00 | 2.10 |

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.036 (i)  
TIME TO PEAK (hrs)= 3.500  
RUNOFF VOLUME (mm)= 12.376  
TOTAL RAINFALL (mm)= 52.450  
RUNOFF COEFFICIENT = 0.236

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

-----  
| CALIB |  
| NASHYD ( 2201) | Area (ha)= 0.74 Curve Number (CN)= 64.2  
| ID= 1 DT= 5.0 min | Ia (mm)= 4.80 # of Linear Res.(N)= 3.00  
-----  
U.H. Tp(hrs)= 0.17

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 | 2.10  | 1.583 | 5.20  | 3.083 | 11.50 | 4.58 | 3.20  |
| 0.167 | 2.10  | 1.667 | 5.20  | 3.167 | 11.50 | 4.67 | 3.20  |
| 0.250 | 2.10  | 1.750 | 5.20  | 3.250 | 11.50 | 4.75 | 3.20  |
| 0.333 | 2.10  | 1.833 | 5.20  | 3.333 | 11.50 | 4.83 | 3.20  |
| 0.417 | 2.10  | 1.917 | 5.20  | 3.417 | 11.50 | 4.92 | 3.20  |
| 0.500 | 2.10  | 2.000 | 5.20  | 3.500 | 11.50 | 5.00 | 3.20  |
| 0.583 | 3.20  | 2.083 | 6.30  | 3.583 | 5.20  | 5.08 | 2.10  |
| 0.667 | 3.20  | 2.167 | 6.30  | 3.667 | 5.20  | 5.17 | 2.10  |
| 0.750 | 3.20  | 2.250 | 6.30  | 3.750 | 5.20  | 5.25 | 2.10  |
| 0.833 | 3.20  | 2.333 | 6.30  | 3.833 | 5.20  | 5.33 | 2.10  |
| 0.917 | 3.20  | 2.417 | 6.30  | 3.917 | 5.20  | 5.42 | 2.10  |
| 1.000 | 3.20  | 2.500 | 6.30  | 4.000 | 5.20  | 5.50 | 2.10  |
| 1.083 | 3.20  | 2.583 | 31.40 | 4.083 | 4.20  | 5.58 | 2.10  |
| 1.167 | 3.20  | 2.667 | 31.40 | 4.167 | 4.20  | 5.67 | 2.10  |
| 1.250 | 3.20  | 2.750 | 31.40 | 4.250 | 4.20  | 5.75 | 2.10  |
| 1.333 | 3.20  | 2.833 | 81.80 | 4.333 | 4.20  | 5.83 | 2.10  |
| 1.417 | 3.20  | 2.917 | 81.80 | 4.417 | 4.20  | 5.92 | 2.10  |
| 1.500 | 3.20  | 3.000 | 81.80 | 4.500 | 4.20  | 6.00 | 2.10  |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.032 (i)



TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 11.952  
 TOTAL RAINFALL (mm)= 52.450  
 RUNOFF COEFFICIENT = 0.228

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

-----  
 | CALIB |  
 | NASHYD ( 0047) | Area (ha)= 0.93 Curve Number (CN)= 61.6  
 | ID= 1 DT= 5.0 min | Ia (mm)= 10.00 # of Linear Res.(N)= 3.00  
 -----  
 U.H. Tp(hrs)= 0.17

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 2.10          | 1.583       | 5.20          | 3.083       | 11.50         | 4.58        | 3.20          |
| 0.167       | 2.10          | 1.667       | 5.20          | 3.167       | 11.50         | 4.67        | 3.20          |
| 0.250       | 2.10          | 1.750       | 5.20          | 3.250       | 11.50         | 4.75        | 3.20          |
| 0.333       | 2.10          | 1.833       | 5.20          | 3.333       | 11.50         | 4.83        | 3.20          |
| 0.417       | 2.10          | 1.917       | 5.20          | 3.417       | 11.50         | 4.92        | 3.20          |
| 0.500       | 2.10          | 2.000       | 5.20          | 3.500       | 11.50         | 5.00        | 3.20          |
| 0.583       | 3.20          | 2.083       | 6.30          | 3.583       | 5.20          | 5.08        | 2.10          |
| 0.667       | 3.20          | 2.167       | 6.30          | 3.667       | 5.20          | 5.17        | 2.10          |
| 0.750       | 3.20          | 2.250       | 6.30          | 3.750       | 5.20          | 5.25        | 2.10          |
| 0.833       | 3.20          | 2.333       | 6.30          | 3.833       | 5.20          | 5.33        | 2.10          |
| 0.917       | 3.20          | 2.417       | 6.30          | 3.917       | 5.20          | 5.42        | 2.10          |
| 1.000       | 3.20          | 2.500       | 6.30          | 4.000       | 5.20          | 5.50        | 2.10          |
| 1.083       | 3.20          | 2.583       | 31.40         | 4.083       | 4.20          | 5.58        | 2.10          |
| 1.167       | 3.20          | 2.667       | 31.40         | 4.167       | 4.20          | 5.67        | 2.10          |
| 1.250       | 3.20          | 2.750       | 31.40         | 4.250       | 4.20          | 5.75        | 2.10          |
| 1.333       | 3.20          | 2.833       | 81.80         | 4.333       | 4.20          | 5.83        | 2.10          |
| 1.417       | 3.20          | 2.917       | 81.80         | 4.417       | 4.20          | 5.92        | 2.10          |
| 1.500       | 3.20          | 3.000       | 81.80         | 4.500       | 4.20          | 6.00        | 2.10          |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.030 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 8.942  
 TOTAL RAINFALL (mm)= 52.450  
 RUNOFF COEFFICIENT = 0.170

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

-----  
 | CALIB |  
 | STANDHYD ( 2200) | Area (ha)= 2.14  
 | ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 33.00  
 -----

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.92       | 1.22         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 1.50       | 0.27         |
| Length (m)=        | 119.44     | 215.00       |
| Mannings n =       | 0.013      | 0.250        |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 2.10          | 1.583       | 5.20          | 3.083       | 11.50         | 4.58        | 3.20          |
| 0.167       | 2.10          | 1.667       | 5.20          | 3.167       | 11.50         | 4.67        | 3.20          |
| 0.250       | 2.10          | 1.750       | 5.20          | 3.250       | 11.50         | 4.75        | 3.20          |
| 0.333       | 2.10          | 1.833       | 5.20          | 3.333       | 11.50         | 4.83        | 3.20          |
| 0.417       | 2.10          | 1.917       | 5.20          | 3.417       | 11.50         | 4.92        | 3.20          |
| 0.500       | 2.10          | 2.000       | 5.20          | 3.500       | 11.50         | 5.00        | 3.20          |
| 0.583       | 3.20          | 2.083       | 6.30          | 3.583       | 5.20          | 5.08        | 2.10          |
| 0.667       | 3.20          | 2.167       | 6.30          | 3.667       | 5.20          | 5.17        | 2.10          |
| 0.750       | 3.20          | 2.250       | 6.30          | 3.750       | 5.20          | 5.25        | 2.10          |
| 0.833       | 3.20          | 2.333       | 6.30          | 3.833       | 5.20          | 5.33        | 2.10          |
| 0.917       | 3.20          | 2.417       | 6.30          | 3.917       | 5.20          | 5.42        | 2.10          |
| 1.000       | 3.20          | 2.500       | 6.30          | 4.000       | 5.20          | 5.50        | 2.10          |
| 1.083       | 3.20          | 2.583       | 31.40         | 4.083       | 4.20          | 5.58        | 2.10          |
| 1.167       | 3.20          | 2.667       | 31.40         | 4.167       | 4.20          | 5.67        | 2.10          |
| 1.250       | 3.20          | 2.750       | 31.40         | 4.250       | 4.20          | 5.75        | 2.10          |
| 1.333       | 3.20          | 2.833       | 81.80         | 4.333       | 4.20          | 5.83        | 2.10          |
| 1.417       | 3.20          | 2.917       | 81.80         | 4.417       | 4.20          | 5.92        | 2.10          |
| 1.500       | 3.20          | 3.000       | 81.80         | 4.500       | 4.20          | 6.00        | 2.10          |

Max.Eff.Inten.(mm/hr)= 81.80 10.03  
 over (min) 5.00 95.00  
 Storage Coeff. (min)= 2.73 (ii) 91.30 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 95.00  
 Unit Hyd. peak (cms)= 0.29 0.01

PEAK FLOW (cms)= 0.16 0.01 0.162 (iii)  
 TIME TO PEAK (hrs)= 3.00 4.50 3.00  
 RUNOFF VOLUME (mm)= 51.45 12.27 25.18

\*TOTALS\*

TOTAL RAINFALL (mm)= 52.45 52.45 52.45  
 RUNOFF COEFFICIENT = 0.98 0.23 0.48

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. Storage (Above)  
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.  
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0009) |
| 1 + 2 = 3 |
-----
      AREA   QPEAK   TPEAK   R.V.
      (ha)   (cms)   (hrs)   (mm)
ID1= 1 ( 2200):  2.14  0.162  3.00  25.18
+ ID2= 2 ( 2201):  0.74  0.032  3.08  11.95
=====
ID = 3 ( 0009):  2.88  0.193  3.00  21.78
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0009) |
| 3 + 2 = 1 |
-----
      AREA   QPEAK   TPEAK   R.V.
      (ha)   (cms)   (hrs)   (mm)
ID1= 3 ( 0009):  2.88  0.193  3.00  21.78
+ ID2= 2 ( 0047):  0.93  0.030  3.08  8.94
=====
ID = 1 ( 0009):  3.81  0.220  3.00  18.64
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB
| NASHYD ( 2101) | Area (ha)= 1.28 Curve Number (CN)= 65.1
| ID= 1 DT= 5.0 min | Ia (mm)= 4.70 # of Linear Res.(N)= 3.00
-----
      U.H. Tp(hrs)= 0.44
  
```

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
  
```

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```

0.083  2.10 | 1.583  5.20 | 3.083  11.50 | 4.58  3.20
0.167  2.10 | 1.667  5.20 | 3.167  11.50 | 4.67  3.20
0.250  2.10 | 1.750  5.20 | 3.250  11.50 | 4.75  3.20
0.333  2.10 | 1.833  5.20 | 3.333  11.50 | 4.83  3.20
0.417  2.10 | 1.917  5.20 | 3.417  11.50 | 4.92  3.20
0.500  2.10 | 2.000  5.20 | 3.500  11.50 | 5.00  3.20
0.583  3.20 | 2.083  6.30 | 3.583  5.20 | 5.08  2.10
0.667  3.20 | 2.167  6.30 | 3.667  5.20 | 5.17  2.10
0.750  3.20 | 2.250  6.30 | 3.750  5.20 | 5.25  2.10
0.833  3.20 | 2.333  6.30 | 3.833  5.20 | 5.33  2.10
0.917  3.20 | 2.417  6.30 | 3.917  5.20 | 5.42  2.10
1.000  3.20 | 2.500  6.30 | 4.000  5.20 | 5.50  2.10
1.083  3.20 | 2.583  31.40 | 4.083  4.20 | 5.58  2.10
1.167  3.20 | 2.667  31.40 | 4.167  4.20 | 5.67  2.10
1.250  3.20 | 2.750  31.40 | 4.250  4.20 | 5.75  2.10
1.333  3.20 | 2.833  81.80 | 4.333  4.20 | 5.83  2.10
1.417  3.20 | 2.917  81.80 | 4.417  4.20 | 5.92  2.10
1.500  3.20 | 3.000  81.80 | 4.500  4.20 | 6.00  2.10
  
```

Unit Hyd Qpeak (cms)= 0.111

PEAK FLOW (cms)= 0.030 (i)  
 TIME TO PEAK (hrs)= 3.333  
 RUNOFF VOLUME (mm)= 12.395  
 TOTAL RAINFALL (mm)= 52.450  
 RUNOFF COEFFICIENT = 0.236

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

```

-----
| CALIB
| STANDHYD ( 2100) | Area (ha)= 0.24
| ID= 1 DT= 5.0 min | Total Imp(%)= 64.00 Dir. Conn.(%)= 60.00
  
```

```

      IMPERVIOUS   PERVIOUS (i)
Surface Area (ha)= 0.15 0.09
Dep. Storage (mm)= 1.00 5.00
Average Slope (%)= 3.10 3.00
Length (m)= 40.00 70.00
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
  
```

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10985-V0 Output

|       |      |       |       |       |       |      |      |
|-------|------|-------|-------|-------|-------|------|------|
| 0.083 | 2.10 | 1.583 | 5.20  | 3.083 | 11.50 | 4.58 | 3.20 |
| 0.167 | 2.10 | 1.667 | 5.20  | 3.167 | 11.50 | 4.67 | 3.20 |
| 0.250 | 2.10 | 1.750 | 5.20  | 3.250 | 11.50 | 4.75 | 3.20 |
| 0.333 | 2.10 | 1.833 | 5.20  | 3.333 | 11.50 | 4.83 | 3.20 |
| 0.417 | 2.10 | 1.917 | 5.20  | 3.417 | 11.50 | 4.92 | 3.20 |
| 0.500 | 2.10 | 2.000 | 5.20  | 3.500 | 11.50 | 5.00 | 3.20 |
| 0.583 | 3.20 | 2.083 | 6.30  | 3.583 | 5.20  | 5.08 | 2.10 |
| 0.667 | 3.20 | 2.167 | 6.30  | 3.667 | 5.20  | 5.17 | 2.10 |
| 0.750 | 3.20 | 2.250 | 6.30  | 3.750 | 5.20  | 5.25 | 2.10 |
| 0.833 | 3.20 | 2.333 | 6.30  | 3.833 | 5.20  | 5.33 | 2.10 |
| 0.917 | 3.20 | 2.417 | 6.30  | 3.917 | 5.20  | 5.42 | 2.10 |
| 1.000 | 3.20 | 2.500 | 6.30  | 4.000 | 5.20  | 5.50 | 2.10 |
| 1.083 | 3.20 | 2.583 | 31.40 | 4.083 | 4.20  | 5.58 | 2.10 |
| 1.167 | 3.20 | 2.667 | 31.40 | 4.167 | 4.20  | 5.67 | 2.10 |
| 1.250 | 3.20 | 2.750 | 31.40 | 4.250 | 4.20  | 5.75 | 2.10 |
| 1.333 | 3.20 | 2.833 | 81.80 | 4.333 | 4.20  | 5.83 | 2.10 |
| 1.417 | 3.20 | 2.917 | 81.80 | 4.417 | 4.20  | 5.92 | 2.10 |
| 1.500 | 3.20 | 3.000 | 81.80 | 4.500 | 4.20  | 6.00 | 2.10 |

Max.Eff.Inten.(mm/hr)= 81.80 18.40  
over (min) 5.00 20.00  
Storage Coeff. (min)= 1.14 (ii) 18.34 (ii)  
Unit Hyd. Tpeak (min)= 5.00 20.00  
Unit Hyd. peak (cms)= 0.34 0.06

\*TOTALS\*

PEAK FLOW (cms)= 0.03 0.00 0.034 (iii)  
TIME TO PEAK (hrs)= 3.00 3.25 3.00  
RUNOFF VOLUME (mm)= 51.45 11.66 35.49  
TOTAL RAINFALL (mm)= 52.45 52.45 52.45  
RUNOFF COEFFICIENT = 0.98 0.22 0.68

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 60.5 Ia = Dep. Storage (Above)  
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.  
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----  
| ADD HYD ( 0006) |  
| 1 + 2 = 3 |  
-----  
ID1= 1 ( 2100): 0.24 0.034 3.00 35.49  
+ ID2= 2 ( 2101): 1.28 0.030 3.33 12.40  
=====

ID = 3 ( 0006): 1.52 0.050 3.00 16.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----  
| CALIB |  
| NASHYD ( 2300) | Area (ha)= 0.23 Curve Number (CN)= 66.5  
| ID= 1 DT= 5.0 min | Ia (mm)= 4.60 # of Linear Res.(N)= 3.00  
-----  
U.H. Tp(hrs)= 0.27

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                              | 2.10  | 1.583 | 5.20  | 3.083 | 11.50 | 4.58 | 3.20  |
| 0.167                              | 2.10  | 1.667 | 5.20  | 3.167 | 11.50 | 4.67 | 3.20  |
| 0.250                              | 2.10  | 1.750 | 5.20  | 3.250 | 11.50 | 4.75 | 3.20  |
| 0.333                              | 2.10  | 1.833 | 5.20  | 3.333 | 11.50 | 4.83 | 3.20  |
| 0.417                              | 2.10  | 1.917 | 5.20  | 3.417 | 11.50 | 4.92 | 3.20  |
| 0.500                              | 2.10  | 2.000 | 5.20  | 3.500 | 11.50 | 5.00 | 3.20  |
| 0.583                              | 3.20  | 2.083 | 6.30  | 3.583 | 5.20  | 5.08 | 2.10  |
| 0.667                              | 3.20  | 2.167 | 6.30  | 3.667 | 5.20  | 5.17 | 2.10  |
| 0.750                              | 3.20  | 2.250 | 6.30  | 3.750 | 5.20  | 5.25 | 2.10  |
| 0.833                              | 3.20  | 2.333 | 6.30  | 3.833 | 5.20  | 5.33 | 2.10  |
| 0.917                              | 3.20  | 2.417 | 6.30  | 3.917 | 5.20  | 5.42 | 2.10  |
| 1.000                              | 3.20  | 2.500 | 6.30  | 4.000 | 5.20  | 5.50 | 2.10  |
| 1.083                              | 3.20  | 2.583 | 31.40 | 4.083 | 4.20  | 5.58 | 2.10  |
| 1.167                              | 3.20  | 2.667 | 31.40 | 4.167 | 4.20  | 5.67 | 2.10  |
| 1.250                              | 3.20  | 2.750 | 31.40 | 4.250 | 4.20  | 5.75 | 2.10  |
| 1.333                              | 3.20  | 2.833 | 81.80 | 4.333 | 4.20  | 5.83 | 2.10  |
| 1.417                              | 3.20  | 2.917 | 81.80 | 4.417 | 4.20  | 5.92 | 2.10  |
| 1.500                              | 3.20  | 3.000 | 81.80 | 4.500 | 4.20  | 6.00 | 2.10  |

Unit Hyd Qpeak (cms)= 0.033

PEAK FLOW (cms)= 0.008 (i)  
TIME TO PEAK (hrs)= 3.167  
RUNOFF VOLUME (mm)= 13.014  
TOTAL RAINFALL (mm)= 52.450  
RUNOFF COEFFICIENT = 0.248

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

-----  
| CALIB |  
-----

NASHYD ( 0041) | Area (ha)= 1.28 Curve Number (CN)= 65.1  
 ID= 1 DT= 5.0 min | Ia (mm)= 4.70 # of Linear Res.(N)= 3.00  
 ----- U.H. Tp(hrs)= 0.44

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                            | 2.10  | 1.583 | 5.20  | 3.083 | 11.50 | 4.58 | 3.20  |
| 0.167                            | 2.10  | 1.667 | 5.20  | 3.167 | 11.50 | 4.67 | 3.20  |
| 0.250                            | 2.10  | 1.750 | 5.20  | 3.250 | 11.50 | 4.75 | 3.20  |
| 0.333                            | 2.10  | 1.833 | 5.20  | 3.333 | 11.50 | 4.83 | 3.20  |
| 0.417                            | 2.10  | 1.917 | 5.20  | 3.417 | 11.50 | 4.92 | 3.20  |
| 0.500                            | 2.10  | 2.000 | 5.20  | 3.500 | 11.50 | 5.00 | 3.20  |
| 0.583                            | 3.20  | 2.083 | 6.30  | 3.583 | 5.20  | 5.08 | 2.10  |
| 0.667                            | 3.20  | 2.167 | 6.30  | 3.667 | 5.20  | 5.17 | 2.10  |
| 0.750                            | 3.20  | 2.250 | 6.30  | 3.750 | 5.20  | 5.25 | 2.10  |
| 0.833                            | 3.20  | 2.333 | 6.30  | 3.833 | 5.20  | 5.33 | 2.10  |
| 0.917                            | 3.20  | 2.417 | 6.30  | 3.917 | 5.20  | 5.42 | 2.10  |
| 1.000                            | 3.20  | 2.500 | 6.30  | 4.000 | 5.20  | 5.50 | 2.10  |
| 1.083                            | 3.20  | 2.583 | 31.40 | 4.083 | 4.20  | 5.58 | 2.10  |
| 1.167                            | 3.20  | 2.667 | 31.40 | 4.167 | 4.20  | 5.67 | 2.10  |
| 1.250                            | 3.20  | 2.750 | 31.40 | 4.250 | 4.20  | 5.75 | 2.10  |
| 1.333                            | 3.20  | 2.833 | 81.80 | 4.333 | 4.20  | 5.83 | 2.10  |
| 1.417                            | 3.20  | 2.917 | 81.80 | 4.417 | 4.20  | 5.92 | 2.10  |
| 1.500                            | 3.20  | 3.000 | 81.80 | 4.500 | 4.20  | 6.00 | 2.10  |

Unit Hyd Qpeak (cms)= 0.111

PEAK FLOW (cms)= 0.030 (i)  
 TIME TO PEAK (hrs)= 3.333  
 RUNOFF VOLUME (mm)= 12.395  
 TOTAL RAINFALL (mm)= 52.450  
 RUNOFF COEFFICIENT = 0.236

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

-----  
 CALIB  
 STANDHYD ( 0039) | Area (ha)= 0.24  
 ID= 1 DT= 5.0 min | Total Imp(%)= 64.00 Dir. Conn.(%)= 60.00

IMPERVIOUS Pervious (i)  
 Surface Area (ha)= 0.15 0.09  
 Dep. Storage (mm)= 1.00 5.00

Average Slope (%)= 3.10 3.00  
 Length (m)= 40.00 70.00  
 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                            | 2.10  | 1.583 | 5.20  | 3.083 | 11.50 | 4.58 | 3.20  |
| 0.167                            | 2.10  | 1.667 | 5.20  | 3.167 | 11.50 | 4.67 | 3.20  |
| 0.250                            | 2.10  | 1.750 | 5.20  | 3.250 | 11.50 | 4.75 | 3.20  |
| 0.333                            | 2.10  | 1.833 | 5.20  | 3.333 | 11.50 | 4.83 | 3.20  |
| 0.417                            | 2.10  | 1.917 | 5.20  | 3.417 | 11.50 | 4.92 | 3.20  |
| 0.500                            | 2.10  | 2.000 | 5.20  | 3.500 | 11.50 | 5.00 | 3.20  |
| 0.583                            | 3.20  | 2.083 | 6.30  | 3.583 | 5.20  | 5.08 | 2.10  |
| 0.667                            | 3.20  | 2.167 | 6.30  | 3.667 | 5.20  | 5.17 | 2.10  |
| 0.750                            | 3.20  | 2.250 | 6.30  | 3.750 | 5.20  | 5.25 | 2.10  |
| 0.833                            | 3.20  | 2.333 | 6.30  | 3.833 | 5.20  | 5.33 | 2.10  |
| 0.917                            | 3.20  | 2.417 | 6.30  | 3.917 | 5.20  | 5.42 | 2.10  |
| 1.000                            | 3.20  | 2.500 | 6.30  | 4.000 | 5.20  | 5.50 | 2.10  |
| 1.083                            | 3.20  | 2.583 | 31.40 | 4.083 | 4.20  | 5.58 | 2.10  |
| 1.167                            | 3.20  | 2.667 | 31.40 | 4.167 | 4.20  | 5.67 | 2.10  |
| 1.250                            | 3.20  | 2.750 | 31.40 | 4.250 | 4.20  | 5.75 | 2.10  |
| 1.333                            | 3.20  | 2.833 | 81.80 | 4.333 | 4.20  | 5.83 | 2.10  |
| 1.417                            | 3.20  | 2.917 | 81.80 | 4.417 | 4.20  | 5.92 | 2.10  |
| 1.500                            | 3.20  | 3.000 | 81.80 | 4.500 | 4.20  | 6.00 | 2.10  |

Max.Eff.Inten.(mm/hr)= 81.80 18.40  
 over (min) 5.00 20.00  
 Storage Coeff. (min)= 1.14 (ii) 18.34 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 20.00  
 Unit Hyd. peak (cms)= 0.34 0.06

\*TOTALS\*

PEAK FLOW (cms)= 0.03 0.00 0.034 (iii)  
 TIME TO PEAK (hrs)= 3.00 3.25 3.00  
 RUNOFF VOLUME (mm)= 51.45 11.66 35.49  
 TOTAL RAINFALL (mm)= 52.45 52.45 52.45  
 RUNOFF COEFFICIENT = 0.98 0.22 0.68

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

(i) CN PROCEDURE SELECTED FOR Pervious LOSSES:  
 CN\* = 60.5 Ia = Dep. 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( 0042)                         |         |         |         |       |
| IN= 2--> OUT= 1                          |         |         |         |       |
| DT= 5.0 min                              |         |         |         |       |
| -----                                    |         |         |         |       |
| OVERFLOW IS OFF                          |         |         |         |       |
| OUTFLOW                                  | STORAGE | OUTFLOW | STORAGE |       |
| (cms)                                    | (ha.m.) | (cms)   | (ha.m.) |       |
| 0.0000                                   | 0.0000  | 0.0116  | 0.0080  |       |
| 0.0023                                   | 0.0007  | 0.0127  | 0.0102  |       |
| 0.0055                                   | 0.0017  | 0.0137  | 0.0127  |       |
| 0.0075                                   | 0.0029  | 0.0146  | 0.0153  |       |
| 0.0091                                   | 0.0044  | 0.0155  | 0.0183  |       |
| 0.0104                                   | 0.0061  | 0.0000  | 0.0000  |       |
| AREA                                     | QPEAK   | TPEAK   | R.V.    |       |
| (ha)                                     | (cms)   | (hrs)   | (mm)    |       |
| INFLOW : ID= 2 ( 0039)                   | 0.240   | 0.034   | 3.00    | 35.49 |
| OUTFLOW: ID= 1 ( 0042)                   | 0.240   | 0.009   | 3.08    | 35.18 |
| PEAK FLOW REDUCTION [Qout/Qin](%)= 24.65 |         |         |         |       |
| TIME SHIFT OF PEAK FLOW (min)= 5.00      |         |         |         |       |
| MAXIMUM STORAGE USED (ha.m.)= 0.0038     |         |         |         |       |
| -----                                    |         |         |         |       |

|                   |      |       |      |       |
|-------------------|------|-------|------|-------|
| ADD HYD ( 0040)   |      |       |      |       |
| 1 + 2 = 3         |      |       |      |       |
| -----             |      |       |      |       |
| ID1= 1 ( 0041):   | 1.28 | 0.030 | 3.33 | 12.40 |
| + ID2= 2 ( 0042): | 0.24 | 0.009 | 3.08 | 35.18 |
| =====             |      |       |      |       |
| ID = 3 ( 0040):   | 1.52 | 0.039 | 3.33 | 15.99 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

|                   |      |                      |      |  |
|-------------------|------|----------------------|------|--|
| CALIB             |      |                      |      |  |
| NASHYD ( 0043)    |      |                      |      |  |
| ID= 1 DT= 5.0 min |      |                      |      |  |
| -----             |      |                      |      |  |
| Area (ha)=        | 0.74 | Curve Number (CN)=   | 64.2 |  |
| Ia (mm)=          | 4.80 | # of Linear Res.(N)= | 3.00 |  |
| U.H. Tp(hrs)=     | 0.17 |                      |      |  |

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 | 2.10 | 1.583 | 5.20  | 3.083 | 11.50 | 4.58 | 3.20 |
| 0.167 | 2.10 | 1.667 | 5.20  | 3.167 | 11.50 | 4.67 | 3.20 |
| 0.250 | 2.10 | 1.750 | 5.20  | 3.250 | 11.50 | 4.75 | 3.20 |
| 0.333 | 2.10 | 1.833 | 5.20  | 3.333 | 11.50 | 4.83 | 3.20 |
| 0.417 | 2.10 | 1.917 | 5.20  | 3.417 | 11.50 | 4.92 | 3.20 |
| 0.500 | 2.10 | 2.000 | 5.20  | 3.500 | 11.50 | 5.00 | 3.20 |
| 0.583 | 3.20 | 2.083 | 6.30  | 3.583 | 5.20  | 5.08 | 2.10 |
| 0.667 | 3.20 | 2.167 | 6.30  | 3.667 | 5.20  | 5.17 | 2.10 |
| 0.750 | 3.20 | 2.250 | 6.30  | 3.750 | 5.20  | 5.25 | 2.10 |
| 0.833 | 3.20 | 2.333 | 6.30  | 3.833 | 5.20  | 5.33 | 2.10 |
| 0.917 | 3.20 | 2.417 | 6.30  | 3.917 | 5.20  | 5.42 | 2.10 |
| 1.000 | 3.20 | 2.500 | 6.30  | 4.000 | 5.20  | 5.50 | 2.10 |
| 1.083 | 3.20 | 2.583 | 31.40 | 4.083 | 4.20  | 5.58 | 2.10 |
| 1.167 | 3.20 | 2.667 | 31.40 | 4.167 | 4.20  | 5.67 | 2.10 |
| 1.250 | 3.20 | 2.750 | 31.40 | 4.250 | 4.20  | 5.75 | 2.10 |
| 1.333 | 3.20 | 2.833 | 81.80 | 4.333 | 4.20  | 5.83 | 2.10 |
| 1.417 | 3.20 | 2.917 | 81.80 | 4.417 | 4.20  | 5.92 | 2.10 |
| 1.500 | 3.20 | 3.000 | 81.80 | 4.500 | 4.20  | 6.00 | 2.10 |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.032 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 11.952  
 TOTAL RAINFALL (mm)= 52.450  
 RUNOFF COEFFICIENT = 0.228

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

|                   |       |                      |      |
|-------------------|-------|----------------------|------|
| CALIB             |       |                      |      |
| NASHYD ( 0048)    |       |                      |      |
| ID= 1 DT= 5.0 min |       |                      |      |
| -----             |       |                      |      |
| Area (ha)=        | 0.93  | Curve Number (CN)=   | 61.6 |
| Ia (mm)=          | 10.00 | # of Linear Res.(N)= | 3.00 |
| U.H. Tp(hrs)=     | 0.17  |                      |      |

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                              | 2.10  | 1.583 | 5.20  | 3.083 | 11.50 | 4.58 | 3.20  |
| 0.167                              | 2.10  | 1.667 | 5.20  | 3.167 | 11.50 | 4.67 | 3.20  |
| 0.250                              | 2.10  | 1.750 | 5.20  | 3.250 | 11.50 | 4.75 | 3.20  |
| 0.333                              | 2.10  | 1.833 | 5.20  | 3.333 | 11.50 | 4.83 | 3.20  |
| 0.417                              | 2.10  | 1.917 | 5.20  | 3.417 | 11.50 | 4.92 | 3.20  |
| 0.500                              | 2.10  | 2.000 | 5.20  | 3.500 | 11.50 | 5.00 | 3.20  |

|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 0.583 | 3.20 | 2.083 | 6.30  | 3.583 | 5.20 | 5.08 | 2.10 |
| 0.667 | 3.20 | 2.167 | 6.30  | 3.667 | 5.20 | 5.17 | 2.10 |
| 0.750 | 3.20 | 2.250 | 6.30  | 3.750 | 5.20 | 5.25 | 2.10 |
| 0.833 | 3.20 | 2.333 | 6.30  | 3.833 | 5.20 | 5.33 | 2.10 |
| 0.917 | 3.20 | 2.417 | 6.30  | 3.917 | 5.20 | 5.42 | 2.10 |
| 1.000 | 3.20 | 2.500 | 6.30  | 4.000 | 5.20 | 5.50 | 2.10 |
| 1.083 | 3.20 | 2.583 | 31.40 | 4.083 | 4.20 | 5.58 | 2.10 |
| 1.167 | 3.20 | 2.667 | 31.40 | 4.167 | 4.20 | 5.67 | 2.10 |
| 1.250 | 3.20 | 2.750 | 31.40 | 4.250 | 4.20 | 5.75 | 2.10 |
| 1.333 | 3.20 | 2.833 | 81.80 | 4.333 | 4.20 | 5.83 | 2.10 |
| 1.417 | 3.20 | 2.917 | 81.80 | 4.417 | 4.20 | 5.92 | 2.10 |
| 1.500 | 3.20 | 3.000 | 81.80 | 4.500 | 4.20 | 6.00 | 2.10 |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.030 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 8.942  
 TOTAL RAINFALL (mm)= 52.450  
 RUNOFF COEFFICIENT = 0.170

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

| ADD HYD ( 0049)   |              |                |                |              |
|-------------------|--------------|----------------|----------------|--------------|
| 1 + 2 = 3         |              |                |                |              |
|                   | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
| ID1= 1 ( 0043):   | 0.74         | 0.032          | 3.08           | 11.95        |
| + ID2= 2 ( 0048): | 0.93         | 0.030          | 3.08           | 8.94         |
| =====             |              |                |                |              |
| ID = 3 ( 0049):   | 1.67         | 0.062          | 3.08           | 10.28        |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| CALIB              |               |              |                      |
|--------------------|---------------|--------------|----------------------|
| STANDHYD ( 0044)   |               |              |                      |
| ID= 1 DT= 5.0 min  |               |              |                      |
|                    | Area (ha)=    | 2.14         |                      |
|                    | Total Imp(%)= | 43.00        | Dir. Conn.(%)= 33.00 |
|                    | =====         |              |                      |
|                    | IMPERVIOUS    | PERVIOUS (i) |                      |
| Surface Area (ha)= | 0.92          | 1.22         |                      |
| Dep. Storage (mm)= | 1.00          | 5.00         |                      |
| Average Slope (%)= | 1.50          | 0.27         |                      |
| Length (m)=        | 119.44        | 215.00       |                      |
| 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                            | 2.10  | 1.583 | 5.20  | 3.083 | 11.50 | 4.58 | 3.20  |
| 0.167                            | 2.10  | 1.667 | 5.20  | 3.167 | 11.50 | 4.67 | 3.20  |
| 0.250                            | 2.10  | 1.750 | 5.20  | 3.250 | 11.50 | 4.75 | 3.20  |
| 0.333                            | 2.10  | 1.833 | 5.20  | 3.333 | 11.50 | 4.83 | 3.20  |
| 0.417                            | 2.10  | 1.917 | 5.20  | 3.417 | 11.50 | 4.92 | 3.20  |
| 0.500                            | 2.10  | 2.000 | 5.20  | 3.500 | 11.50 | 5.00 | 3.20  |
| 0.583                            | 3.20  | 2.083 | 6.30  | 3.583 | 5.20  | 5.08 | 2.10  |
| 0.667                            | 3.20  | 2.167 | 6.30  | 3.667 | 5.20  | 5.17 | 2.10  |
| 0.750                            | 3.20  | 2.250 | 6.30  | 3.750 | 5.20  | 5.25 | 2.10  |
| 0.833                            | 3.20  | 2.333 | 6.30  | 3.833 | 5.20  | 5.33 | 2.10  |
| 0.917                            | 3.20  | 2.417 | 6.30  | 3.917 | 5.20  | 5.42 | 2.10  |
| 1.000                            | 3.20  | 2.500 | 6.30  | 4.000 | 5.20  | 5.50 | 2.10  |
| 1.083                            | 3.20  | 2.583 | 31.40 | 4.083 | 4.20  | 5.58 | 2.10  |
| 1.167                            | 3.20  | 2.667 | 31.40 | 4.167 | 4.20  | 5.67 | 2.10  |
| 1.250                            | 3.20  | 2.750 | 31.40 | 4.250 | 4.20  | 5.75 | 2.10  |
| 1.333                            | 3.20  | 2.833 | 81.80 | 4.333 | 4.20  | 5.83 | 2.10  |
| 1.417                            | 3.20  | 2.917 | 81.80 | 4.417 | 4.20  | 5.92 | 2.10  |
| 1.500                            | 3.20  | 3.000 | 81.80 | 4.500 | 4.20  | 6.00 | 2.10  |

Max.Eff.Inten.(mm/hr)= 81.80 10.03  
 over (min) 5.00 95.00  
 Storage Coeff. (min)= 2.73 (ii) 91.30 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 95.00  
 Unit Hyd. peak (cms)= 0.29 0.01

\*TOTALS\*

PEAK FLOW (cms)= 0.16 0.01 0.162 (iii)  
 TIME TO PEAK (hrs)= 3.00 4.50 3.00  
 RUNOFF VOLUME (mm)= 51.45 12.27 25.18  
 TOTAL RAINFALL (mm)= 52.45 52.45 52.45  
 RUNOFF COEFFICIENT = 0.98 0.23 0.48

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. Storage (Above)  
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.  
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| RESERVOIR( 0046) | OVERFLOW IS OFF

IN= 2--> OUT= 1  
DT= 5.0 min

| OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) | OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) |
|------------------|--------------------|------------------|--------------------|
| 0.0000           | 0.0000             | 0.0581           | 0.0439             |
| 0.0039           | 0.0043             | 0.0782           | 0.0554             |
| 0.0064           | 0.0099             | 0.0938           | 0.0681             |
| 0.0082           | 0.0166             | 0.1070           | 0.0819             |
| 0.0097           | 0.0245             | 0.1187           | 0.0970             |
| 0.0110           | 0.0336             | 0.0000           | 0.0000             |

|                        | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|------------------------|--------------|----------------|----------------|--------------|
| INFLOW : ID= 2 ( 0044) | 2.140        | 0.162          | 3.00           | 25.18        |
| OUTFLOW: ID= 1 ( 0046) | 2.140        | 0.011          | 6.08           | 25.05        |

PEAK FLOW REDUCTION [Qout/Qin](%)= 7.10  
TIME SHIFT OF PEAK FLOW (min)=185.00  
MAXIMUM STORAGE USED (ha.m.)= 0.0337

ADD HYD ( 0045)  
1 + 2 = 3

|                   | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|-------------------|--------------|----------------|----------------|--------------|
| ID1= 1 ( 0046):   | 2.14         | 0.011          | 6.08           | 25.05        |
| + ID2= 2 ( 0049): | 1.67         | 0.062          | 3.08           | 10.28        |
| ID = 3 ( 0045):   | 3.81         | 0.071          | 3.08           | 18.57        |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

V V I SSSS U U A L (v 6.2.2006)  
V V I SS U U A A L  
V V I SS U U A A A L  
V V I SSSS UUUU A A LLLL  
VV I SSSS UUUU A A LLLL  
000 TTTT TTTT H H Y Y M M 000 TM  
O O T T H H Y Y M M O O  
O O T T H H Y Y M M O O  
000 T T H H Y Y M M 000

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May 10, 2022 12:56:02 PM

10985-V0 Output

# \*\*\*\*\* 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\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\1ce868e1-d547-4ea4-8d4f-93d580a58f6f\scena

Summary filename:  
C:\Users\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\1ce868e1-d547-4ea4-8d4f-93d580a58f6f\scena

DATE: 05/10/2022

TIME: 12:42:06

USER:

COMMENTS:

\*\*\*\*\*  
\*\* SIMULATION : Run 03 \*\*  
\*\*\*\*\*

| READ STORM       | Filename: C:\Users\sormel\AppData\Local\Temp\2deb8561-d1e0-47f6-9eb6-5ad55f7cb9f2\26a968e7 |
|------------------|--------------------------------------------------------------------------------------------|
| Ptotal= 61.60 mm | Comments: 10-Year, 6 hour SCS Type II - City of Pe                                         |

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.25        | 2.50          | 1.75        | 6.20          | 3.25        | 13.50         | 4.75        | 3.70          |
| 0.50        | 2.50          | 2.00        | 6.20          | 3.50        | 13.50         | 5.00        | 3.70          |
| 0.75        | 3.70          | 2.25        | 7.40          | 3.75        | 6.20          | 5.25        | 2.50          |
| 1.00        | 3.70          | 2.50        | 7.40          | 4.00        | 6.20          | 5.50        | 2.50          |
| 1.25        | 3.70          | 2.75        | 36.90         | 4.25        | 4.90          | 5.75        | 2.50          |
| 1.50        | 3.70          | 3.00        | 95.90         | 4.50        | 4.90          | 6.00        | 2.50          |

May 10, 2022 12:56:02 PM

10985-V0 Output



```

-----
| CALIB |
| NASHYD ( 1100) | Area (ha)= 2.18 Curve Number (CN)= 67.7
| ID= 1 DT= 5.0 min | Ia (mm)= 8.20 # of Linear Res.(N)= 3.00
-----
U.H. Tp(hrs)= 0.36

```

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 2.50 1.583 6.20 3.083 13.50 4.58 3.70
0.167 2.50 1.667 6.20 3.167 13.50 4.67 3.70
0.250 2.50 1.750 6.20 3.250 13.50 4.75 3.70
0.333 2.50 1.833 6.20 3.333 13.50 4.83 3.70
0.417 2.50 1.917 6.20 3.417 13.50 4.92 3.70
0.500 2.50 2.000 6.20 3.500 13.50 5.00 3.70
0.583 3.70 2.083 7.40 3.583 6.20 5.08 2.50
0.667 3.70 2.167 7.40 3.667 6.20 5.17 2.50
0.750 3.70 2.250 7.40 3.750 6.20 5.25 2.50
0.833 3.70 2.333 7.40 3.833 6.20 5.33 2.50
0.917 3.70 2.417 7.40 3.917 6.20 5.42 2.50
1.000 3.70 2.500 7.40 4.000 6.20 5.50 2.50
1.083 3.70 2.583 36.90 4.083 4.90 5.58 2.50
1.167 3.70 2.667 36.90 4.167 4.90 5.67 2.50
1.250 3.70 2.750 36.90 4.250 4.90 5.75 2.50
1.333 3.70 2.833 95.90 4.333 4.90 5.83 2.50
1.417 3.70 2.917 95.90 4.417 4.90 5.92 2.50
1.500 3.70 3.000 95.90 4.500 4.90 6.00 2.50

```

Unit Hyd Qpeak (cms)= 0.231

```

PEAK FLOW (cms)= 0.079 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 16.330
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.265

```

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

```

-----
| CALIB |
| NASHYD ( 1200) | Area (ha)= 1.76 Curve Number (CN)= 64.3
| ID= 1 DT= 5.0 min | Ia (mm)= 8.90 # of Linear Res.(N)= 3.00
-----
U.H. Tp(hrs)= 0.12

```

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 2.50 1.583 6.20 3.083 13.50 4.58 3.70
0.167 2.50 1.667 6.20 3.167 13.50 4.67 3.70
0.250 2.50 1.750 6.20 3.250 13.50 4.75 3.70
0.333 2.50 1.833 6.20 3.333 13.50 4.83 3.70
0.417 2.50 1.917 6.20 3.417 13.50 4.92 3.70
0.500 2.50 2.000 6.20 3.500 13.50 5.00 3.70
0.583 3.70 2.083 7.40 3.583 6.20 5.08 2.50
0.667 3.70 2.167 7.40 3.667 6.20 5.17 2.50
0.750 3.70 2.250 7.40 3.750 6.20 5.25 2.50
0.833 3.70 2.333 7.40 3.833 6.20 5.33 2.50
0.917 3.70 2.417 7.40 3.917 6.20 5.42 2.50
1.000 3.70 2.500 7.40 4.000 6.20 5.50 2.50
1.083 3.70 2.583 36.90 4.083 4.90 5.58 2.50
1.167 3.70 2.667 36.90 4.167 4.90 5.67 2.50
1.250 3.70 2.750 36.90 4.250 4.90 5.75 2.50
1.333 3.70 2.833 95.90 4.333 4.90 5.83 2.50
1.417 3.70 2.917 95.90 4.417 4.90 5.92 2.50
1.500 3.70 3.000 95.90 4.500 4.90 6.00 2.50

```

Unit Hyd Qpeak (cms)= 0.560

```

PEAK FLOW (cms)= 0.114 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 14.145
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.230

```

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

```

-----
| CALIB |
| NASHYD ( 1300) | Area (ha)= 1.70 Curve Number (CN)= 68.8
| ID= 1 DT= 5.0 min | Ia (mm)= 8.00 # of Linear Res.(N)= 3.00
-----
U.H. Tp(hrs)= 0.51

```

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

```

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|       |      |       |       |       |       |      |      |
|-------|------|-------|-------|-------|-------|------|------|
| 0.083 | 2.50 | 1.583 | 6.20  | 3.083 | 13.50 | 4.58 | 3.70 |
| 0.167 | 2.50 | 1.667 | 6.20  | 3.167 | 13.50 | 4.67 | 3.70 |
| 0.250 | 2.50 | 1.750 | 6.20  | 3.250 | 13.50 | 4.75 | 3.70 |
| 0.333 | 2.50 | 1.833 | 6.20  | 3.333 | 13.50 | 4.83 | 3.70 |
| 0.417 | 2.50 | 1.917 | 6.20  | 3.417 | 13.50 | 4.92 | 3.70 |
| 0.500 | 2.50 | 2.000 | 6.20  | 3.500 | 13.50 | 5.00 | 3.70 |
| 0.583 | 3.70 | 2.083 | 7.40  | 3.583 | 6.20  | 5.08 | 2.50 |
| 0.667 | 3.70 | 2.167 | 7.40  | 3.667 | 6.20  | 5.17 | 2.50 |
| 0.750 | 3.70 | 2.250 | 7.40  | 3.750 | 6.20  | 5.25 | 2.50 |
| 0.833 | 3.70 | 2.333 | 7.40  | 3.833 | 6.20  | 5.33 | 2.50 |
| 0.917 | 3.70 | 2.417 | 7.40  | 3.917 | 6.20  | 5.42 | 2.50 |
| 1.000 | 3.70 | 2.500 | 7.40  | 4.000 | 6.20  | 5.50 | 2.50 |
| 1.083 | 3.70 | 2.583 | 36.90 | 4.083 | 4.90  | 5.58 | 2.50 |
| 1.167 | 3.70 | 2.667 | 36.90 | 4.167 | 4.90  | 5.67 | 2.50 |
| 1.250 | 3.70 | 2.750 | 36.90 | 4.250 | 4.90  | 5.75 | 2.50 |
| 1.333 | 3.70 | 2.833 | 95.90 | 4.333 | 4.90  | 5.83 | 2.50 |
| 1.417 | 3.70 | 2.917 | 95.90 | 4.417 | 4.90  | 5.92 | 2.50 |
| 1.500 | 3.70 | 3.000 | 95.90 | 4.500 | 4.90  | 6.00 | 2.50 |

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.050 (i)  
 TIME TO PEAK (hrs)= 3.500  
 RUNOFF VOLUME (mm)= 17.020  
 TOTAL RAINFALL (mm)= 61.600  
 RUNOFF COEFFICIENT = 0.276

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

|                   |               |      |                      |      |  |  |  |
|-------------------|---------------|------|----------------------|------|--|--|--|
| CALIB             |               |      |                      |      |  |  |  |
| NASHYD ( 2201)    | Area (ha)=    | 0.74 | Curve Number (CN)=   | 64.2 |  |  |  |
| ID= 1 DT= 5.0 min | Ia (mm)=      | 4.80 | # of Linear Res.(N)= | 3.00 |  |  |  |
|                   | U.H. Tp(hrs)= | 0.17 |                      |      |  |  |  |

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                              | 2.50  | 1.583 | 6.20  | 3.083 | 13.50 | 4.58 | 3.70  |
| 0.167                              | 2.50  | 1.667 | 6.20  | 3.167 | 13.50 | 4.67 | 3.70  |
| 0.250                              | 2.50  | 1.750 | 6.20  | 3.250 | 13.50 | 4.75 | 3.70  |
| 0.333                              | 2.50  | 1.833 | 6.20  | 3.333 | 13.50 | 4.83 | 3.70  |
| 0.417                              | 2.50  | 1.917 | 6.20  | 3.417 | 13.50 | 4.92 | 3.70  |
| 0.500                              | 2.50  | 2.000 | 6.20  | 3.500 | 13.50 | 5.00 | 3.70  |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 0.583 | 3.70 | 2.083 | 7.40  | 3.583 | 6.20 | 5.08 | 2.50 |
| 0.667 | 3.70 | 2.167 | 7.40  | 3.667 | 6.20 | 5.17 | 2.50 |
| 0.750 | 3.70 | 2.250 | 7.40  | 3.750 | 6.20 | 5.25 | 2.50 |
| 0.833 | 3.70 | 2.333 | 7.40  | 3.833 | 6.20 | 5.33 | 2.50 |
| 0.917 | 3.70 | 2.417 | 7.40  | 3.917 | 6.20 | 5.42 | 2.50 |
| 1.000 | 3.70 | 2.500 | 7.40  | 4.000 | 6.20 | 5.50 | 2.50 |
| 1.083 | 3.70 | 2.583 | 36.90 | 4.083 | 4.90 | 5.58 | 2.50 |
| 1.167 | 3.70 | 2.667 | 36.90 | 4.167 | 4.90 | 5.67 | 2.50 |
| 1.250 | 3.70 | 2.750 | 36.90 | 4.250 | 4.90 | 5.75 | 2.50 |
| 1.333 | 3.70 | 2.833 | 95.90 | 4.333 | 4.90 | 5.83 | 2.50 |
| 1.417 | 3.70 | 2.917 | 95.90 | 4.417 | 4.90 | 5.92 | 2.50 |
| 1.500 | 3.70 | 3.000 | 95.90 | 4.500 | 4.90 | 6.00 | 2.50 |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.043 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 16.200  
 TOTAL RAINFALL (mm)= 61.600  
 RUNOFF COEFFICIENT = 0.263

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

|                   |               |       |                      |      |  |  |  |
|-------------------|---------------|-------|----------------------|------|--|--|--|
| CALIB             |               |       |                      |      |  |  |  |
| NASHYD ( 0047)    | Area (ha)=    | 0.93  | Curve Number (CN)=   | 61.6 |  |  |  |
| ID= 1 DT= 5.0 min | Ia (mm)=      | 10.00 | # of Linear Res.(N)= | 3.00 |  |  |  |
|                   | U.H. Tp(hrs)= | 0.17  |                      |      |  |  |  |

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                              | 2.50  | 1.583 | 6.20  | 3.083 | 13.50 | 4.58 | 3.70  |
| 0.167                              | 2.50  | 1.667 | 6.20  | 3.167 | 13.50 | 4.67 | 3.70  |
| 0.250                              | 2.50  | 1.750 | 6.20  | 3.250 | 13.50 | 4.75 | 3.70  |
| 0.333                              | 2.50  | 1.833 | 6.20  | 3.333 | 13.50 | 4.83 | 3.70  |
| 0.417                              | 2.50  | 1.917 | 6.20  | 3.417 | 13.50 | 4.92 | 3.70  |
| 0.500                              | 2.50  | 2.000 | 6.20  | 3.500 | 13.50 | 5.00 | 3.70  |
| 0.583                              | 3.70  | 2.083 | 7.40  | 3.583 | 6.20  | 5.08 | 2.50  |
| 0.667                              | 3.70  | 2.167 | 7.40  | 3.667 | 6.20  | 5.17 | 2.50  |
| 0.750                              | 3.70  | 2.250 | 7.40  | 3.750 | 6.20  | 5.25 | 2.50  |
| 0.833                              | 3.70  | 2.333 | 7.40  | 3.833 | 6.20  | 5.33 | 2.50  |
| 0.917                              | 3.70  | 2.417 | 7.40  | 3.917 | 6.20  | 5.42 | 2.50  |
| 1.000                              | 3.70  | 2.500 | 7.40  | 4.000 | 6.20  | 5.50 | 2.50  |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 1.083 | 3.70 | 2.583 | 36.90 | 4.083 | 4.90 | 5.58 | 2.50 |
| 1.167 | 3.70 | 2.667 | 36.90 | 4.167 | 4.90 | 5.67 | 2.50 |
| 1.250 | 3.70 | 2.750 | 36.90 | 4.250 | 4.90 | 5.75 | 2.50 |
| 1.333 | 3.70 | 2.833 | 95.90 | 4.333 | 4.90 | 5.83 | 2.50 |
| 1.417 | 3.70 | 2.917 | 95.90 | 4.417 | 4.90 | 5.92 | 2.50 |
| 1.500 | 3.70 | 3.000 | 95.90 | 4.500 | 4.90 | 6.00 | 2.50 |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.042 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 12.637  
 TOTAL RAINFALL (mm)= 61.600  
 RUNOFF COEFFICIENT = 0.205

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

| CALIB             |                 |                     |                      |
|-------------------|-----------------|---------------------|----------------------|
| STANDHYD ( 2200)  |                 |                     |                      |
| ID= 1 DT= 5.0 min | Area (ha)= 2.14 | Total Imp(%)= 43.00 | Dir. Conn.(%)= 33.00 |

| IMPERVIOUS         |        | PERVIOUS (i) |        |
|--------------------|--------|--------------|--------|
| Surface Area (ha)= | 0.92   |              | 1.22   |
| Dep. Storage (mm)= | 1.00   |              | 5.00   |
| Average Slope (%)= | 1.50   |              | 0.27   |
| Length (m)=        | 119.44 |              | 215.00 |
| 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                            | 2.50  | 1.583 | 6.20  | 3.083 | 13.50 | 4.58 | 3.70  |
| 0.167                            | 2.50  | 1.667 | 6.20  | 3.167 | 13.50 | 4.67 | 3.70  |
| 0.250                            | 2.50  | 1.750 | 6.20  | 3.250 | 13.50 | 4.75 | 3.70  |
| 0.333                            | 2.50  | 1.833 | 6.20  | 3.333 | 13.50 | 4.83 | 3.70  |
| 0.417                            | 2.50  | 1.917 | 6.20  | 3.417 | 13.50 | 4.92 | 3.70  |
| 0.500                            | 2.50  | 2.000 | 6.20  | 3.500 | 13.50 | 5.00 | 3.70  |
| 0.583                            | 3.70  | 2.083 | 7.40  | 3.583 | 6.20  | 5.08 | 2.50  |
| 0.667                            | 3.70  | 2.167 | 7.40  | 3.667 | 6.20  | 5.17 | 2.50  |
| 0.750                            | 3.70  | 2.250 | 7.40  | 3.750 | 6.20  | 5.25 | 2.50  |
| 0.833                            | 3.70  | 2.333 | 7.40  | 3.833 | 6.20  | 5.33 | 2.50  |
| 0.917                            | 3.70  | 2.417 | 7.40  | 3.917 | 6.20  | 5.42 | 2.50  |
| 1.000                            | 3.70  | 2.500 | 7.40  | 4.000 | 6.20  | 5.50 | 2.50  |

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|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 1.083 | 3.70 | 2.583 | 36.90 | 4.083 | 4.90 | 5.58 | 2.50 |
| 1.167 | 3.70 | 2.667 | 36.90 | 4.167 | 4.90 | 5.67 | 2.50 |
| 1.250 | 3.70 | 2.750 | 36.90 | 4.250 | 4.90 | 5.75 | 2.50 |
| 1.333 | 3.70 | 2.833 | 95.90 | 4.333 | 4.90 | 5.83 | 2.50 |
| 1.417 | 3.70 | 2.917 | 95.90 | 4.417 | 4.90 | 5.92 | 2.50 |
| 1.500 | 3.70 | 3.000 | 95.90 | 4.500 | 4.90 | 6.00 | 2.50 |

Max.Eff.Inten.(mm/hr)= 95.90 13.59  
 over (min) 5.00 85.00  
 Storage Coeff. (min)= 2.56 (ii) 80.99 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 85.00  
 Unit Hyd. peak (cms)= 0.29 0.01

\*TOTALS\*

PEAK FLOW (cms)= 0.19 0.02 0.191 (iii)  
 TIME TO PEAK (hrs)= 3.00 4.33 3.00  
 RUNOFF VOLUME (mm)= 60.60 16.57 31.08  
 TOTAL RAINFALL (mm)= 61.60 61.60 61.60  
 RUNOFF COEFFICIENT = 0.98 0.27 0.50

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. Storage (Above)  
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.  
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ADD HYD ( 0009)   |      |       |       |       |
|-------------------|------|-------|-------|-------|
| 1 + 2 = 3         |      |       |       |       |
|                   | AREA | QPEAK | TPEAK | R.V.  |
|                   | (ha) | (cms) | (hrs) | (mm)  |
| ID1= 1 ( 2200):   | 2.14 | 0.191 | 3.00  | 31.08 |
| + ID2= 2 ( 2201): | 0.74 | 0.043 | 3.08  | 16.20 |
| =====             |      |       |       |       |
| ID = 3 ( 0009):   | 2.88 | 0.233 | 3.00  | 27.26 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD ( 0009)   |      |       |       |       |
|-------------------|------|-------|-------|-------|
| 3 + 2 = 1         |      |       |       |       |
|                   | AREA | QPEAK | TPEAK | R.V.  |
|                   | (ha) | (cms) | (hrs) | (mm)  |
| ID1= 3 ( 0009):   | 2.88 | 0.233 | 3.00  | 27.26 |
| + ID2= 2 ( 0047): | 0.93 | 0.042 | 3.08  | 12.64 |
| =====             |      |       |       |       |

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ID = 1 ( 0009): 3.81 0.273 3.00 23.69

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB |
| NASHYD ( 2101) | Area (ha)= 1.28 Curve Number (CN)= 65.1
| ID= 1 DT= 5.0 min | Ia (mm)= 4.70 # of Linear Res.(N)= 3.00
-----
| U.H. Tp(hrs)= 0.44

```

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 2.50 | 1.583 6.20 | 3.083 13.50 | 4.58 3.70
0.167 2.50 | 1.667 6.20 | 3.167 13.50 | 4.67 3.70
0.250 2.50 | 1.750 6.20 | 3.250 13.50 | 4.75 3.70
0.333 2.50 | 1.833 6.20 | 3.333 13.50 | 4.83 3.70
0.417 2.50 | 1.917 6.20 | 3.417 13.50 | 4.92 3.70
0.500 2.50 | 2.000 6.20 | 3.500 13.50 | 5.00 3.70
0.583 3.70 | 2.083 7.40 | 3.583 6.20 | 5.08 2.50
0.667 3.70 | 2.167 7.40 | 3.667 6.20 | 5.17 2.50
0.750 3.70 | 2.250 7.40 | 3.750 6.20 | 5.25 2.50
0.833 3.70 | 2.333 7.40 | 3.833 6.20 | 5.33 2.50
0.917 3.70 | 2.417 7.40 | 3.917 6.20 | 5.42 2.50
1.000 3.70 | 2.500 7.40 | 4.000 6.20 | 5.50 2.50
1.083 3.70 | 2.583 36.90 | 4.083 4.90 | 5.58 2.50
1.167 3.70 | 2.667 36.90 | 4.167 4.90 | 5.67 2.50
1.250 3.70 | 2.750 36.90 | 4.250 4.90 | 5.75 2.50
1.333 3.70 | 2.833 95.90 | 4.333 4.90 | 5.83 2.50
1.417 3.70 | 2.917 95.90 | 4.417 4.90 | 5.92 2.50
1.500 3.70 | 3.000 95.90 | 4.500 4.90 | 6.00 2.50

```

Unit Hyd Qpeak (cms)= 0.111

```

PEAK FLOW (cms)= 0.041 (i)
TIME TO PEAK (hrs)= 3.333
RUNOFF VOLUME (mm)= 16.767
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.272

```

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

```

-----
| CALIB |

```

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```

| STANDHYD ( 2100) | Area (ha)= 0.24
| ID= 1 DT= 5.0 min | Total Imp(%)= 64.00 Dir. Conn.(%)= 60.00
-----

```

```

IMPervIOUS PervIOUS (i)
Surface Area (ha)= 0.15 0.09
Dep. Storage (mm)= 1.00 5.00
Average Slope (%)= 3.10 3.00
Length (m)= 40.00 70.00
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 2.50 | 1.583 6.20 | 3.083 13.50 | 4.58 3.70
0.167 2.50 | 1.667 6.20 | 3.167 13.50 | 4.67 3.70
0.250 2.50 | 1.750 6.20 | 3.250 13.50 | 4.75 3.70
0.333 2.50 | 1.833 6.20 | 3.333 13.50 | 4.83 3.70
0.417 2.50 | 1.917 6.20 | 3.417 13.50 | 4.92 3.70
0.500 2.50 | 2.000 6.20 | 3.500 13.50 | 5.00 3.70
0.583 3.70 | 2.083 7.40 | 3.583 6.20 | 5.08 2.50
0.667 3.70 | 2.167 7.40 | 3.667 6.20 | 5.17 2.50
0.750 3.70 | 2.250 7.40 | 3.750 6.20 | 5.25 2.50
0.833 3.70 | 2.333 7.40 | 3.833 6.20 | 5.33 2.50
0.917 3.70 | 2.417 7.40 | 3.917 6.20 | 5.42 2.50
1.000 3.70 | 2.500 7.40 | 4.000 6.20 | 5.50 2.50
1.083 3.70 | 2.583 36.90 | 4.083 4.90 | 5.58 2.50
1.167 3.70 | 2.667 36.90 | 4.167 4.90 | 5.67 2.50
1.250 3.70 | 2.750 36.90 | 4.250 4.90 | 5.75 2.50
1.333 3.70 | 2.833 95.90 | 4.333 4.90 | 5.83 2.50
1.417 3.70 | 2.917 95.90 | 4.417 4.90 | 5.92 2.50
1.500 3.70 | 3.000 95.90 | 4.500 4.90 | 6.00 2.50

```

```

Max.Eff.Inten.(mm/hr)= 95.90 31.05
over (min) = 5.00 20.00
Storage Coeff. (min)= 1.07 (ii) 15.03 (ii)
Unit Hyd. Tpeak (min)= 5.00 20.00
Unit Hyd. peak (cms)= 0.34 0.07

```

```

PEAK FLOW (cms)= 0.04 0.00 0.041 (iii)
TIME TO PEAK (hrs)= 3.00 3.17 3.00
RUNOFF VOLUME (mm)= 60.60 15.80 42.64
TOTAL RAINFALL (mm)= 61.60 61.60 61.60
RUNOFF COEFFICIENT = 0.98 0.26 0.69

```

\*TOTALS\*

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

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- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. Storage (Above)  
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.  
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ADD HYD ( 0006)   |              |                |                |              |
|-------------------|--------------|----------------|----------------|--------------|
| 1 + 2 = 3         |              |                |                |              |
|                   | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
| ID1= 1 ( 2100):   | 0.24         | 0.041          | 3.00           | 42.64        |
| + ID2= 2 ( 2101): | 1.28         | 0.041          | 3.33           | 16.77        |
| =====             |              |                |                |              |
| ID = 3 ( 0006):   | 1.52         | 0.062          | 3.00           | 20.85        |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| CALIB             |               |            |                      |                     |
|-------------------|---------------|------------|----------------------|---------------------|
| NASHYD ( 2300)    |               |            |                      |                     |
| ID= 1 DT= 5.0 min |               |            |                      |                     |
|                   | Area<br>(ha)  | Ia<br>(mm) | Curve Number<br>(CN) | # of Linear Res.(N) |
|                   | 0.23          | 4.60       | 66.5                 | 3.00                |
|                   | U.H. Tp(hrs)= | 0.27       |                      |                     |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

| ---- TRANSFORMED HYETOGRAPH ---- |               |             |               |             |               |             |               |
|----------------------------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| TIME<br>hrs                      | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
| 0.083                            | 2.50          | 1.583       | 6.20          | 3.083       | 13.50         | 4.58        | 3.70          |
| 0.167                            | 2.50          | 1.667       | 6.20          | 3.167       | 13.50         | 4.67        | 3.70          |
| 0.250                            | 2.50          | 1.750       | 6.20          | 3.250       | 13.50         | 4.75        | 3.70          |
| 0.333                            | 2.50          | 1.833       | 6.20          | 3.333       | 13.50         | 4.83        | 3.70          |
| 0.417                            | 2.50          | 1.917       | 6.20          | 3.417       | 13.50         | 4.92        | 3.70          |
| 0.500                            | 2.50          | 2.000       | 6.20          | 3.500       | 13.50         | 5.00        | 3.70          |
| 0.583                            | 3.70          | 2.083       | 7.40          | 3.583       | 6.20          | 5.08        | 2.50          |
| 0.667                            | 3.70          | 2.167       | 7.40          | 3.667       | 6.20          | 5.17        | 2.50          |
| 0.750                            | 3.70          | 2.250       | 7.40          | 3.750       | 6.20          | 5.25        | 2.50          |
| 0.833                            | 3.70          | 2.333       | 7.40          | 3.833       | 6.20          | 5.33        | 2.50          |
| 0.917                            | 3.70          | 2.417       | 7.40          | 3.917       | 6.20          | 5.42        | 2.50          |
| 1.000                            | 3.70          | 2.500       | 7.40          | 4.000       | 6.20          | 5.50        | 2.50          |
| 1.083                            | 3.70          | 2.583       | 36.90         | 4.083       | 4.90          | 5.58        | 2.50          |
| 1.167                            | 3.70          | 2.667       | 36.90         | 4.167       | 4.90          | 5.67        | 2.50          |
| 1.250                            | 3.70          | 2.750       | 36.90         | 4.250       | 4.90          | 5.75        | 2.50          |
| 1.333                            | 3.70          | 2.833       | 95.90         | 4.333       | 4.90          | 5.83        | 2.50          |

|       |      |       |       |       |      |      |      |
|-------|------|-------|-------|-------|------|------|------|
| 1.417 | 3.70 | 2.917 | 95.90 | 4.417 | 4.90 | 5.92 | 2.50 |
| 1.500 | 3.70 | 3.000 | 95.90 | 4.500 | 4.90 | 6.00 | 2.50 |

Unit Hyd Qpeak (cms)= 0.033

PEAK FLOW (cms)= 0.011 (i)  
 TIME TO PEAK (hrs)= 3.167  
 RUNOFF VOLUME (mm)= 17.553  
 TOTAL RAINFALL (mm)= 61.600  
 RUNOFF COEFFICIENT = 0.285

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

| CALIB             |               |            |                      |                     |
|-------------------|---------------|------------|----------------------|---------------------|
| NASHYD ( 0041)    |               |            |                      |                     |
| ID= 1 DT= 5.0 min |               |            |                      |                     |
|                   | Area<br>(ha)  | Ia<br>(mm) | Curve Number<br>(CN) | # of Linear Res.(N) |
|                   | 1.28          | 4.70       | 65.1                 | 3.00                |
|                   | U.H. Tp(hrs)= | 0.44       |                      |                     |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

| ---- TRANSFORMED HYETOGRAPH ---- |               |             |               |             |               |             |               |
|----------------------------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| TIME<br>hrs                      | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
| 0.083                            | 2.50          | 1.583       | 6.20          | 3.083       | 13.50         | 4.58        | 3.70          |
| 0.167                            | 2.50          | 1.667       | 6.20          | 3.167       | 13.50         | 4.67        | 3.70          |
| 0.250                            | 2.50          | 1.750       | 6.20          | 3.250       | 13.50         | 4.75        | 3.70          |
| 0.333                            | 2.50          | 1.833       | 6.20          | 3.333       | 13.50         | 4.83        | 3.70          |
| 0.417                            | 2.50          | 1.917       | 6.20          | 3.417       | 13.50         | 4.92        | 3.70          |
| 0.500                            | 2.50          | 2.000       | 6.20          | 3.500       | 13.50         | 5.00        | 3.70          |
| 0.583                            | 3.70          | 2.083       | 7.40          | 3.583       | 6.20          | 5.08        | 2.50          |
| 0.667                            | 3.70          | 2.167       | 7.40          | 3.667       | 6.20          | 5.17        | 2.50          |
| 0.750                            | 3.70          | 2.250       | 7.40          | 3.750       | 6.20          | 5.25        | 2.50          |
| 0.833                            | 3.70          | 2.333       | 7.40          | 3.833       | 6.20          | 5.33        | 2.50          |
| 0.917                            | 3.70          | 2.417       | 7.40          | 3.917       | 6.20          | 5.42        | 2.50          |
| 1.000                            | 3.70          | 2.500       | 7.40          | 4.000       | 6.20          | 5.50        | 2.50          |
| 1.083                            | 3.70          | 2.583       | 36.90         | 4.083       | 4.90          | 5.58        | 2.50          |
| 1.167                            | 3.70          | 2.667       | 36.90         | 4.167       | 4.90          | 5.67        | 2.50          |
| 1.250                            | 3.70          | 2.750       | 36.90         | 4.250       | 4.90          | 5.75        | 2.50          |
| 1.333                            | 3.70          | 2.833       | 95.90         | 4.333       | 4.90          | 5.83        | 2.50          |
| 1.417                            | 3.70          | 2.917       | 95.90         | 4.417       | 4.90          | 5.92        | 2.50          |
| 1.500                            | 3.70          | 3.000       | 95.90         | 4.500       | 4.90          | 6.00        | 2.50          |

Unit Hyd Qpeak (cms)= 0.111

PEAK FLOW (cms)= 0.041 (i)

TIME TO PEAK (hrs)= 3.333  
 RUNOFF VOLUME (mm)= 16.767  
 TOTAL RAINFALL (mm)= 61.600  
 RUNOFF COEFFICIENT = 0.272

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

-----  
 | CALIB |  
 | STANDHYD ( 0039) | Area (ha)= 0.24  
 | ID= 1 DT= 5.0 min | Total Imp(%)= 64.00 Dir. Conn.(%)= 60.00  
 -----

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.15       | 0.09         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 3.10       | 3.00         |
| Length (m)=        | 40.00      | 70.00        |
| 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 | 2.50  | 1.583 | 6.20  | 3.083 | 13.50 | 4.58 | 3.70  |
| 0.167 | 2.50  | 1.667 | 6.20  | 3.167 | 13.50 | 4.67 | 3.70  |
| 0.250 | 2.50  | 1.750 | 6.20  | 3.250 | 13.50 | 4.75 | 3.70  |
| 0.333 | 2.50  | 1.833 | 6.20  | 3.333 | 13.50 | 4.83 | 3.70  |
| 0.417 | 2.50  | 1.917 | 6.20  | 3.417 | 13.50 | 4.92 | 3.70  |
| 0.500 | 2.50  | 2.000 | 6.20  | 3.500 | 13.50 | 5.00 | 3.70  |
| 0.583 | 3.70  | 2.083 | 7.40  | 3.583 | 6.20  | 5.08 | 2.50  |
| 0.667 | 3.70  | 2.167 | 7.40  | 3.667 | 6.20  | 5.17 | 2.50  |
| 0.750 | 3.70  | 2.250 | 7.40  | 3.750 | 6.20  | 5.25 | 2.50  |
| 0.833 | 3.70  | 2.333 | 7.40  | 3.833 | 6.20  | 5.33 | 2.50  |
| 0.917 | 3.70  | 2.417 | 7.40  | 3.917 | 6.20  | 5.42 | 2.50  |
| 1.000 | 3.70  | 2.500 | 7.40  | 4.000 | 6.20  | 5.50 | 2.50  |
| 1.083 | 3.70  | 2.583 | 36.90 | 4.083 | 4.90  | 5.58 | 2.50  |
| 1.167 | 3.70  | 2.667 | 36.90 | 4.167 | 4.90  | 5.67 | 2.50  |
| 1.250 | 3.70  | 2.750 | 36.90 | 4.250 | 4.90  | 5.75 | 2.50  |
| 1.333 | 3.70  | 2.833 | 95.90 | 4.333 | 4.90  | 5.83 | 2.50  |
| 1.417 | 3.70  | 2.917 | 95.90 | 4.417 | 4.90  | 5.92 | 2.50  |
| 1.500 | 3.70  | 3.000 | 95.90 | 4.500 | 4.90  | 6.00 | 2.50  |

Max.Eff.Inten.(mm/hr)= 95.90 31.05  
 over (min) 5.00 20.00  
 Storage Coeff. (min)= 1.07 (ii) 15.03 (ii)

|                        |       |       |
|------------------------|-------|-------|
| Unit Hyd. Tpeak (min)= | 5.00  | 20.00 |
| Unit Hyd. peak (cms)=  | 0.34  | 0.07  |
| *TOTALS*               |       |       |
| PEAK FLOW (cms)=       | 0.04  | 0.00  |
| TIME TO PEAK (hrs)=    | 3.00  | 3.17  |
| RUNOFF VOLUME (mm)=    | 60.60 | 15.80 |
| TOTAL RAINFALL (mm)=   | 61.60 | 61.60 |
| RUNOFF COEFFICIENT =   | 0.98  | 0.26  |
|                        |       | 0.69  |

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. 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( 0042) | 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          | 0.0116        | 0.0080          |
| 0.0023        | 0.0007          | 0.0127        | 0.0102          |
| 0.0055        | 0.0017          | 0.0137        | 0.0127          |
| 0.0075        | 0.0029          | 0.0146        | 0.0153          |
| 0.0091        | 0.0044          | 0.0155        | 0.0183          |
| 0.0104        | 0.0061          | 0.0000        | 0.0000          |

|                        | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|------------------------|-----------|-------------|-------------|-----------|
| INFLOW : ID= 2 ( 0039) | 0.240     | 0.041       | 3.00        | 42.64     |
| OUTFLOW: ID= 1 ( 0042) | 0.240     | 0.009       | 3.25        | 42.36     |

PEAK FLOW REDUCTION [Qout/Qin](%)= 22.60  
 TIME SHIFT OF PEAK FLOW (min)= 15.00  
 MAXIMUM STORAGE USED (ha.m.)= 0.0046

-----  
 | ADD HYD ( 0040) |  
 | 1 + 2 = 3 |  
 -----

|                   | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|-------------------|-----------|-------------|-------------|-----------|
| ID1= 1 ( 0041):   | 1.28      | 0.041       | 3.33        | 16.77     |
| + ID2= 2 ( 0042): | 0.24      | 0.009       | 3.25        | 42.36     |

=====

ID = 3 ( 0040): 1.52 0.051 3.33 20.81

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB |
| NASHYD ( 0043) | Area (ha)= 0.74 Curve Number (CN)= 64.2
| ID= 1 DT= 5.0 min | Ia (mm)= 4.80 # of Linear Res.(N)= 3.00
-----
| U.H. Tp(hrs)= 0.17

```

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 2.50 1.583 6.20 3.083 13.50 4.58 3.70
0.167 2.50 1.667 6.20 3.167 13.50 4.67 3.70
0.250 2.50 1.750 6.20 3.250 13.50 4.75 3.70
0.333 2.50 1.833 6.20 3.333 13.50 4.83 3.70
0.417 2.50 1.917 6.20 3.417 13.50 4.92 3.70
0.500 2.50 2.000 6.20 3.500 13.50 5.00 3.70
0.583 3.70 2.083 7.40 3.583 6.20 5.08 2.50
0.667 3.70 2.167 7.40 3.667 6.20 5.17 2.50
0.750 3.70 2.250 7.40 3.750 6.20 5.25 2.50
0.833 3.70 2.333 7.40 3.833 6.20 5.33 2.50
0.917 3.70 2.417 7.40 3.917 6.20 5.42 2.50
1.000 3.70 2.500 7.40 4.000 6.20 5.50 2.50
1.083 3.70 2.583 36.90 4.083 4.90 5.58 2.50
1.167 3.70 2.667 36.90 4.167 4.90 5.67 2.50
1.250 3.70 2.750 36.90 4.250 4.90 5.75 2.50
1.333 3.70 2.833 95.90 4.333 4.90 5.83 2.50
1.417 3.70 2.917 95.90 4.417 4.90 5.92 2.50
1.500 3.70 3.000 95.90 4.500 4.90 6.00 2.50

```

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.043 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 16.200  
 TOTAL RAINFALL (mm)= 61.600  
 RUNOFF COEFFICIENT = 0.263

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

```

-----
| CALIB |

```

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```

| NASHYD ( 0048) | Area (ha)= 0.93 Curve Number (CN)= 61.6
| ID= 1 DT= 5.0 min | Ia (mm)= 10.00 # of Linear Res.(N)= 3.00
-----
| U.H. Tp(hrs)= 0.17

```

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 2.50 1.583 6.20 3.083 13.50 4.58 3.70
0.167 2.50 1.667 6.20 3.167 13.50 4.67 3.70
0.250 2.50 1.750 6.20 3.250 13.50 4.75 3.70
0.333 2.50 1.833 6.20 3.333 13.50 4.83 3.70
0.417 2.50 1.917 6.20 3.417 13.50 4.92 3.70
0.500 2.50 2.000 6.20 3.500 13.50 5.00 3.70
0.583 3.70 2.083 7.40 3.583 6.20 5.08 2.50
0.667 3.70 2.167 7.40 3.667 6.20 5.17 2.50
0.750 3.70 2.250 7.40 3.750 6.20 5.25 2.50
0.833 3.70 2.333 7.40 3.833 6.20 5.33 2.50
0.917 3.70 2.417 7.40 3.917 6.20 5.42 2.50
1.000 3.70 2.500 7.40 4.000 6.20 5.50 2.50
1.083 3.70 2.583 36.90 4.083 4.90 5.58 2.50
1.167 3.70 2.667 36.90 4.167 4.90 5.67 2.50
1.250 3.70 2.750 36.90 4.250 4.90 5.75 2.50
1.333 3.70 2.833 95.90 4.333 4.90 5.83 2.50
1.417 3.70 2.917 95.90 4.417 4.90 5.92 2.50
1.500 3.70 3.000 95.90 4.500 4.90 6.00 2.50

```

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.042 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 12.637  
 TOTAL RAINFALL (mm)= 61.600  
 RUNOFF COEFFICIENT = 0.205

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

```

-----
| ADD HYD ( 0049) |
| 1 + 2 = 3 |
-----
ID1= 1 ( 0043): AREA QPEAK TPEAK R.V.
(ha) (cms) (hrs) (mm)
+ ID2= 2 ( 0048): 0.74 0.043 3.08 16.20
0.93 0.042 3.08 12.64
=====

```

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ID = 3 ( 0049): 1.67 0.086 3.08 14.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB |
| STANDHYD ( 0044) | Area (ha)= 2.14
| ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 33.00
-----

```

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.92       | 1.22         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 1.50       | 0.27         |
| Length (m)=        | 119.44     | 215.00       |
| Mannings n =       | 0.013      | 0.250        |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

-----
      TIME RAIN      TIME RAIN      TIME RAIN      TIME RAIN
      hrs mm/hr      hrs mm/hr      hrs mm/hr      hrs mm/hr
0.083 2.50 | 1.583 6.20 | 3.083 13.50 | 4.58 3.70
0.167 2.50 | 1.667 6.20 | 3.167 13.50 | 4.67 3.70
0.250 2.50 | 1.750 6.20 | 3.250 13.50 | 4.75 3.70
0.333 2.50 | 1.833 6.20 | 3.333 13.50 | 4.83 3.70
0.417 2.50 | 1.917 6.20 | 3.417 13.50 | 4.92 3.70
0.500 2.50 | 2.000 6.20 | 3.500 13.50 | 5.00 3.70
0.583 3.70 | 2.083 7.40 | 3.583 6.20 | 5.08 2.50
0.667 3.70 | 2.167 7.40 | 3.667 6.20 | 5.17 2.50
0.750 3.70 | 2.250 7.40 | 3.750 6.20 | 5.25 2.50
0.833 3.70 | 2.333 7.40 | 3.833 6.20 | 5.33 2.50
0.917 3.70 | 2.417 7.40 | 3.917 6.20 | 5.42 2.50
1.000 3.70 | 2.500 7.40 | 4.000 6.20 | 5.50 2.50
1.083 3.70 | 2.583 36.90 | 4.083 4.90 | 5.58 2.50
1.167 3.70 | 2.667 36.90 | 4.167 4.90 | 5.67 2.50
1.250 3.70 | 2.750 36.90 | 4.250 4.90 | 5.75 2.50
1.333 3.70 | 2.833 95.90 | 4.333 4.90 | 5.83 2.50
1.417 3.70 | 2.917 95.90 | 4.417 4.90 | 5.92 2.50
1.500 3.70 | 3.000 95.90 | 4.500 4.90 | 6.00 2.50
-----

```

|                        |           |            |
|------------------------|-----------|------------|
| Max.Eff.Inten.(mm/hr)= | 95.90     | 13.59      |
| over (min)             | 5.00      | 85.00      |
| Storage Coeff. (min)=  | 2.56 (ii) | 80.99 (ii) |
| Unit Hyd. Tpeak (min)= | 5.00      | 85.00      |
| Unit Hyd. peak (cms)=  | 0.29      | 0.01       |

\*TOTALS\*

|                  |      |      |             |
|------------------|------|------|-------------|
| PEAK FLOW (cms)= | 0.19 | 0.02 | 0.191 (iii) |
|------------------|------|------|-------------|

|                      |       |       |       |
|----------------------|-------|-------|-------|
| TIME TO PEAK (hrs)=  | 3.00  | 4.33  | 3.00  |
| RUNOFF VOLUME (mm)=  | 60.60 | 16.57 | 31.08 |
| TOTAL RAINFALL (mm)= | 61.60 | 61.60 | 61.60 |
| RUNOFF COEFFICIENT = | 0.98  | 0.27  | 0.50  |

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 60.5 Ia = Dep. Storage (Above)
- (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.
- (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| RESERVOIR( 0046) | OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 5.0 min |
-----

```

| OUTFLOW (cms) | STORAGE (ha.m.) | OUTFLOW (cms) | STORAGE (ha.m.) |
|---------------|-----------------|---------------|-----------------|
| 0.0000        | 0.0000          | 0.0581        | 0.0439          |
| 0.0039        | 0.0043          | 0.0782        | 0.0554          |
| 0.0064        | 0.0099          | 0.0938        | 0.0681          |
| 0.0082        | 0.0166          | 0.1070        | 0.0819          |
| 0.0097        | 0.0245          | 0.1187        | 0.0970          |
| 0.0110        | 0.0336          | 0.0000        | 0.0000          |

|                        | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|------------------------|-----------|-------------|-------------|-----------|
| INFLOW : ID= 2 ( 0044) | 2.140     | 0.191       | 3.00        | 31.08     |
| OUTFLOW: ID= 1 ( 0046) | 2.140     | 0.026       | 4.92        | 30.95     |

PEAK FLOW REDUCTION [Qout/Qin](%)= 13.51  
TIME SHIFT OF PEAK FLOW (min)=115.00  
MAXIMUM STORAGE USED (ha.m.)= 0.0368

```

-----
| ADD HYD ( 0045) |
| 1 + 2 = 3 |
-----

```

|                   | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
|-------------------|-----------|-------------|-------------|-----------|
| ID1= 1 ( 0046):   | 2.14      | 0.026       | 4.92        | 30.95     |
| + ID2= 2 ( 0049): | 1.67      | 0.086       | 3.08        | 14.22     |
| =====             |           |             |             |           |
| ID = 3 ( 0045):   | 3.81      | 0.096       | 3.08        | 23.62     |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

=====

```

V  V  I  SSSSS  U  U  A  L          (v 6.2.2006)
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

```

```

000  TTTT  TTTT  H  H  Y  Y  M  M  000  TM
O  O  T  T  H  H  Y  Y  MM  MM  O  O
O  O  T  T  H  H  Y  M  M  O  O
000  T  T  H  H  Y  M  M  000

```

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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\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\6774b  
aa0-4a0b-4a3d-a1a5-56121cbc5525\scena

Summary filename:

C:\Users\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\6774b  
aa0-4a0b-4a3d-a1a5-56121cbc5525\scena

DATE: 05/10/2022

TIME: 12:42:10

USER:

COMMENTS: \_\_\_\_\_

-----

```

*****
** SIMULATION : Run 04          **
*****

```

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10985-V0 Output

|                  |                                                                                            |
|------------------|--------------------------------------------------------------------------------------------|
| READ STORM       | Filename: C:\Users\sormel\AppData\Local\Temp\2deb8561-d1e0-47f6-9eb6-5ad55f7cb9f2\236803ef |
| Ptotal= 72.90 mm | Comments: 25-Year, 6 hour SCS Type II - City of Pe                                         |

| TIME | RAIN  | TIME | RAIN   | TIME | RAIN  | TIME | RAIN  |
|------|-------|------|--------|------|-------|------|-------|
| hrs  | mm/hr | hrs  | mm/hr  | hrs  | mm/hr | hrs  | mm/hr |
| 0.25 | 2.90  | 1.75 | 7.30   | 3.25 | 16.00 | 4.75 | 4.40  |
| 0.50 | 2.90  | 2.00 | 7.30   | 3.50 | 16.00 | 5.00 | 4.40  |
| 0.75 | 4.40  | 2.25 | 8.80   | 3.75 | 7.30  | 5.25 | 2.90  |
| 1.00 | 4.40  | 2.50 | 8.80   | 4.00 | 7.30  | 5.50 | 2.90  |
| 1.25 | 4.40  | 2.75 | 43.70  | 4.25 | 5.80  | 5.75 | 2.90  |
| 1.50 | 4.40  | 3.00 | 113.70 | 4.50 | 5.80  | 6.00 | 2.90  |

|                   |                    |                           |
|-------------------|--------------------|---------------------------|
| CALIB             | Area (ha)= 2.18    | Curve Number (CN)= 67.7   |
| NASHYD ( 1100)    | Ia (mm)= 8.20      | # of Linear Res.(N)= 3.00 |
| ID= 1 DT= 5.0 min | U.H. Tp(hrs)= 0.36 |                           |

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 | 2.90  | 1.583 | 7.30   | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167 | 2.90  | 1.667 | 7.30   | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250 | 2.90  | 1.750 | 7.30   | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333 | 2.90  | 1.833 | 7.30   | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417 | 2.90  | 1.917 | 7.30   | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500 | 2.90  | 2.000 | 7.30   | 3.500 | 16.00 | 5.00 | 4.40  |
| 0.583 | 4.40  | 2.083 | 8.80   | 3.583 | 7.30  | 5.08 | 2.90  |
| 0.667 | 4.40  | 2.167 | 8.80   | 3.667 | 7.30  | 5.17 | 2.90  |
| 0.750 | 4.40  | 2.250 | 8.80   | 3.750 | 7.30  | 5.25 | 2.90  |
| 0.833 | 4.40  | 2.333 | 8.80   | 3.833 | 7.30  | 5.33 | 2.90  |
| 0.917 | 4.40  | 2.417 | 8.80   | 3.917 | 7.30  | 5.42 | 2.90  |
| 1.000 | 4.40  | 2.500 | 8.80   | 4.000 | 7.30  | 5.50 | 2.90  |
| 1.083 | 4.40  | 2.583 | 43.70  | 4.083 | 5.80  | 5.58 | 2.90  |
| 1.167 | 4.40  | 2.667 | 43.70  | 4.167 | 5.80  | 5.67 | 2.90  |
| 1.250 | 4.40  | 2.750 | 43.70  | 4.250 | 5.80  | 5.75 | 2.90  |
| 1.333 | 4.40  | 2.833 | 113.70 | 4.333 | 5.80  | 5.83 | 2.90  |
| 1.417 | 4.40  | 2.917 | 113.70 | 4.417 | 5.80  | 5.92 | 2.90  |
| 1.500 | 4.40  | 3.000 | 113.70 | 4.500 | 5.80  | 6.00 | 2.90  |

Unit Hyd Qpeak (cms)= 0.231

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PEAK FLOW (cms)= 0.110 (i)  
 TIME TO PEAK (hrs)= 3.250  
 RUNOFF VOLUME (mm)= 22.515  
 TOTAL RAINFALL (mm)= 72.900  
 RUNOFF COEFFICIENT = 0.309

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

CALIB  
 NASHYD ( 1200) | Area (ha)= 1.76 Curve Number (CN)= 64.3  
 ID= 1 DT= 5.0 min | Ia (mm)= 8.90 # of Linear Res.(N)= 3.00  
 U.H. Tp(hrs)= 0.12

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                              | 2.90  | 1.583 | 7.30   | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167                              | 2.90  | 1.667 | 7.30   | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250                              | 2.90  | 1.750 | 7.30   | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333                              | 2.90  | 1.833 | 7.30   | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417                              | 2.90  | 1.917 | 7.30   | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500                              | 2.90  | 2.000 | 7.30   | 3.500 | 16.00 | 5.00 | 4.40  |
| 0.583                              | 4.40  | 2.083 | 8.80   | 3.583 | 7.30  | 5.08 | 2.90  |
| 0.667                              | 4.40  | 2.167 | 8.80   | 3.667 | 7.30  | 5.17 | 2.90  |
| 0.750                              | 4.40  | 2.250 | 8.80   | 3.750 | 7.30  | 5.25 | 2.90  |
| 0.833                              | 4.40  | 2.333 | 8.80   | 3.833 | 7.30  | 5.33 | 2.90  |
| 0.917                              | 4.40  | 2.417 | 8.80   | 3.917 | 7.30  | 5.42 | 2.90  |
| 1.000                              | 4.40  | 2.500 | 8.80   | 4.000 | 7.30  | 5.50 | 2.90  |
| 1.083                              | 4.40  | 2.583 | 43.70  | 4.083 | 5.80  | 5.58 | 2.90  |
| 1.167                              | 4.40  | 2.667 | 43.70  | 4.167 | 5.80  | 5.67 | 2.90  |
| 1.250                              | 4.40  | 2.750 | 43.70  | 4.250 | 5.80  | 5.75 | 2.90  |
| 1.333                              | 4.40  | 2.833 | 113.70 | 4.333 | 5.80  | 5.83 | 2.90  |
| 1.417                              | 4.40  | 2.917 | 113.70 | 4.417 | 5.80  | 5.92 | 2.90  |
| 1.500                              | 4.40  | 3.000 | 113.70 | 4.500 | 5.80  | 6.00 | 2.90  |

Unit Hyd Qpeak (cms)= 0.560

PEAK FLOW (cms)= 0.161 (i)  
 TIME TO PEAK (hrs)= 3.000  
 RUNOFF VOLUME (mm)= 19.711  
 TOTAL RAINFALL (mm)= 72.900  
 RUNOFF COEFFICIENT = 0.270

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

CALIB  
 NASHYD ( 1300) | Area (ha)= 1.70 Curve Number (CN)= 68.8  
 ID= 1 DT= 5.0 min | Ia (mm)= 8.00 # of Linear Res.(N)= 3.00  
 U.H. Tp(hrs)= 0.51

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                              | 2.90  | 1.583 | 7.30   | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167                              | 2.90  | 1.667 | 7.30   | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250                              | 2.90  | 1.750 | 7.30   | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333                              | 2.90  | 1.833 | 7.30   | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417                              | 2.90  | 1.917 | 7.30   | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500                              | 2.90  | 2.000 | 7.30   | 3.500 | 16.00 | 5.00 | 4.40  |
| 0.583                              | 4.40  | 2.083 | 8.80   | 3.583 | 7.30  | 5.08 | 2.90  |
| 0.667                              | 4.40  | 2.167 | 8.80   | 3.667 | 7.30  | 5.17 | 2.90  |
| 0.750                              | 4.40  | 2.250 | 8.80   | 3.750 | 7.30  | 5.25 | 2.90  |
| 0.833                              | 4.40  | 2.333 | 8.80   | 3.833 | 7.30  | 5.33 | 2.90  |
| 0.917                              | 4.40  | 2.417 | 8.80   | 3.917 | 7.30  | 5.42 | 2.90  |
| 1.000                              | 4.40  | 2.500 | 8.80   | 4.000 | 7.30  | 5.50 | 2.90  |
| 1.083                              | 4.40  | 2.583 | 43.70  | 4.083 | 5.80  | 5.58 | 2.90  |
| 1.167                              | 4.40  | 2.667 | 43.70  | 4.167 | 5.80  | 5.67 | 2.90  |
| 1.250                              | 4.40  | 2.750 | 43.70  | 4.250 | 5.80  | 5.75 | 2.90  |
| 1.333                              | 4.40  | 2.833 | 113.70 | 4.333 | 5.80  | 5.83 | 2.90  |
| 1.417                              | 4.40  | 2.917 | 113.70 | 4.417 | 5.80  | 5.92 | 2.90  |
| 1.500                              | 4.40  | 3.000 | 113.70 | 4.500 | 5.80  | 6.00 | 2.90  |

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.070 (i)  
 TIME TO PEAK (hrs)= 3.417  
 RUNOFF VOLUME (mm)= 23.387  
 TOTAL RAINFALL (mm)= 72.900  
 RUNOFF COEFFICIENT = 0.321

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

CALIB

NASHYD ( 2201) | Area (ha)= 0.74 Curve Number (CN)= 64.2  
 ID= 1 DT= 5.0 min | Ia (mm)= 4.80 # of Linear Res.(N)= 3.00  
 U.H. Tp(hrs)= 0.17

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                              | 2.90  | 1.583 | 7.30   | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167                              | 2.90  | 1.667 | 7.30   | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250                              | 2.90  | 1.750 | 7.30   | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333                              | 2.90  | 1.833 | 7.30   | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417                              | 2.90  | 1.917 | 7.30   | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500                              | 2.90  | 2.000 | 7.30   | 3.500 | 16.00 | 5.00 | 4.40  |
| 0.583                              | 4.40  | 2.083 | 8.80   | 3.583 | 7.30  | 5.08 | 2.90  |
| 0.667                              | 4.40  | 2.167 | 8.80   | 3.667 | 7.30  | 5.17 | 2.90  |
| 0.750                              | 4.40  | 2.250 | 8.80   | 3.750 | 7.30  | 5.25 | 2.90  |
| 0.833                              | 4.40  | 2.333 | 8.80   | 3.833 | 7.30  | 5.33 | 2.90  |
| 0.917                              | 4.40  | 2.417 | 8.80   | 3.917 | 7.30  | 5.42 | 2.90  |
| 1.000                              | 4.40  | 2.500 | 8.80   | 4.000 | 7.30  | 5.50 | 2.90  |
| 1.083                              | 4.40  | 2.583 | 43.70  | 4.083 | 5.80  | 5.58 | 2.90  |
| 1.167                              | 4.40  | 2.667 | 43.70  | 4.167 | 5.80  | 5.67 | 2.90  |
| 1.250                              | 4.40  | 2.750 | 43.70  | 4.250 | 5.80  | 5.75 | 2.90  |
| 1.333                              | 4.40  | 2.833 | 113.70 | 4.333 | 5.80  | 5.83 | 2.90  |
| 1.417                              | 4.40  | 2.917 | 113.70 | 4.417 | 5.80  | 5.92 | 2.90  |
| 1.500                              | 4.40  | 3.000 | 113.70 | 4.500 | 5.80  | 6.00 | 2.90  |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.059 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 22.032  
 TOTAL RAINFALL (mm)= 72.900  
 RUNOFF COEFFICIENT = 0.302

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

CALIB  
 NASHYD ( 0047) | Area (ha)= 0.93 Curve Number (CN)= 61.6  
 ID= 1 DT= 5.0 min | Ia (mm)= 10.00 # of Linear Res.(N)= 3.00  
 U.H. Tp(hrs)= 0.17

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 | 2.90  | 1.583 | 7.30   | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167 | 2.90  | 1.667 | 7.30   | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250 | 2.90  | 1.750 | 7.30   | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333 | 2.90  | 1.833 | 7.30   | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417 | 2.90  | 1.917 | 7.30   | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500 | 2.90  | 2.000 | 7.30   | 3.500 | 16.00 | 5.00 | 4.40  |
| 0.583 | 4.40  | 2.083 | 8.80   | 3.583 | 7.30  | 5.08 | 2.90  |
| 0.667 | 4.40  | 2.167 | 8.80   | 3.667 | 7.30  | 5.17 | 2.90  |
| 0.750 | 4.40  | 2.250 | 8.80   | 3.750 | 7.30  | 5.25 | 2.90  |
| 0.833 | 4.40  | 2.333 | 8.80   | 3.833 | 7.30  | 5.33 | 2.90  |
| 0.917 | 4.40  | 2.417 | 8.80   | 3.917 | 7.30  | 5.42 | 2.90  |
| 1.000 | 4.40  | 2.500 | 8.80   | 4.000 | 7.30  | 5.50 | 2.90  |
| 1.083 | 4.40  | 2.583 | 43.70  | 4.083 | 5.80  | 5.58 | 2.90  |
| 1.167 | 4.40  | 2.667 | 43.70  | 4.167 | 5.80  | 5.67 | 2.90  |
| 1.250 | 4.40  | 2.750 | 43.70  | 4.250 | 5.80  | 5.75 | 2.90  |
| 1.333 | 4.40  | 2.833 | 113.70 | 4.333 | 5.80  | 5.83 | 2.90  |
| 1.417 | 4.40  | 2.917 | 113.70 | 4.417 | 5.80  | 5.92 | 2.90  |
| 1.500 | 4.40  | 3.000 | 113.70 | 4.500 | 5.80  | 6.00 | 2.90  |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.060 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 17.819  
 TOTAL RAINFALL (mm)= 72.900  
 RUNOFF COEFFICIENT = 0.244

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

CALIB  
 STANDHYD ( 2200) | Area (ha)= 2.14  
 ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 33.00

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.92       | 1.22         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 1.50       | 0.27         |
| Length (m)=        | 119.44     | 215.00       |
| 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 | 2.90  | 1.583 | 7.30   | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167 | 2.90  | 1.667 | 7.30   | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250 | 2.90  | 1.750 | 7.30   | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333 | 2.90  | 1.833 | 7.30   | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417 | 2.90  | 1.917 | 7.30   | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500 | 2.90  | 2.000 | 7.30   | 3.500 | 16.00 | 5.00 | 4.40  |
| 0.583 | 4.40  | 2.083 | 8.80   | 3.583 | 7.30  | 5.08 | 2.90  |
| 0.667 | 4.40  | 2.167 | 8.80   | 3.667 | 7.30  | 5.17 | 2.90  |
| 0.750 | 4.40  | 2.250 | 8.80   | 3.750 | 7.30  | 5.25 | 2.90  |
| 0.833 | 4.40  | 2.333 | 8.80   | 3.833 | 7.30  | 5.33 | 2.90  |
| 0.917 | 4.40  | 2.417 | 8.80   | 3.917 | 7.30  | 5.42 | 2.90  |
| 1.000 | 4.40  | 2.500 | 8.80   | 4.000 | 7.30  | 5.50 | 2.90  |
| 1.083 | 4.40  | 2.583 | 43.70  | 4.083 | 5.80  | 5.58 | 2.90  |
| 1.167 | 4.40  | 2.667 | 43.70  | 4.167 | 5.80  | 5.67 | 2.90  |
| 1.250 | 4.40  | 2.750 | 43.70  | 4.250 | 5.80  | 5.75 | 2.90  |
| 1.333 | 4.40  | 2.833 | 113.70 | 4.333 | 5.80  | 5.83 | 2.90  |
| 1.417 | 4.40  | 2.917 | 113.70 | 4.417 | 5.80  | 5.92 | 2.90  |
| 1.500 | 4.40  | 3.000 | 113.70 | 4.500 | 5.80  | 6.00 | 2.90  |

Max.Eff.Inten.(mm/hr)= 113.70 18.55  
over (min) 5.00 75.00  
Storage Coeff. (min)= 2.39 (ii) 71.64 (ii)  
Unit Hyd. Tpeak (min)= 5.00 75.00  
Unit Hyd. peak (cms)= 0.30 0.02

## \*TOTALS\*

PEAK FLOW (cms)= 0.22 0.03 0.228 (iii)  
TIME TO PEAK (hrs)= 3.00 4.17 3.00  
RUNOFF VOLUME (mm)= 71.90 22.47 38.76  
TOTAL RAINFALL (mm)= 72.90 72.90 72.90  
RUNOFF COEFFICIENT = 0.99 0.31 0.53

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 60.5 Ia = Dep. Storage (Above)  
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.  
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----  
| ADD HYD ( 0009) |  
| 1 + 2 = 3 |

AREA QPEAK TPEAK R.V.

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-----  
(ha) (cms) (hrs) (mm)  
ID1= 1 ( 2200): 2.14 0.228 3.00 38.76  
+ ID2= 2 ( 2201): 0.74 0.059 3.08 22.03  
=====

ID = 3 ( 0009): 2.88 0.286 3.00 34.46

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----  
| ADD HYD ( 0009) |  
| 3 + 2 = 1 |

AREA QPEAK TPEAK R.V.  
(ha) (cms) (hrs) (mm)  
ID1= 3 ( 0009): 2.88 0.286 3.00 34.46  
+ ID2= 2 ( 0047): 0.93 0.060 3.08 17.82  
=====

ID = 1 ( 0009): 3.81 0.344 3.00 30.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----  
| CALIB  
| NASHYD ( 2101) |

Area (ha)= 1.28 Curve Number (CN)= 65.1  
ID= 1 DT= 5.0 min Ia (mm)= 4.70 # of Linear Res.(N)= 3.00  
U.H. Tp(hrs)= 0.44

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 | 2.90  | 1.583 | 7.30   | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167 | 2.90  | 1.667 | 7.30   | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250 | 2.90  | 1.750 | 7.30   | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333 | 2.90  | 1.833 | 7.30   | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417 | 2.90  | 1.917 | 7.30   | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500 | 2.90  | 2.000 | 7.30   | 3.500 | 16.00 | 5.00 | 4.40  |
| 0.583 | 4.40  | 2.083 | 8.80   | 3.583 | 7.30  | 5.08 | 2.90  |
| 0.667 | 4.40  | 2.167 | 8.80   | 3.667 | 7.30  | 5.17 | 2.90  |
| 0.750 | 4.40  | 2.250 | 8.80   | 3.750 | 7.30  | 5.25 | 2.90  |
| 0.833 | 4.40  | 2.333 | 8.80   | 3.833 | 7.30  | 5.33 | 2.90  |
| 0.917 | 4.40  | 2.417 | 8.80   | 3.917 | 7.30  | 5.42 | 2.90  |
| 1.000 | 4.40  | 2.500 | 8.80   | 4.000 | 7.30  | 5.50 | 2.90  |
| 1.083 | 4.40  | 2.583 | 43.70  | 4.083 | 5.80  | 5.58 | 2.90  |
| 1.167 | 4.40  | 2.667 | 43.70  | 4.167 | 5.80  | 5.67 | 2.90  |
| 1.250 | 4.40  | 2.750 | 43.70  | 4.250 | 5.80  | 5.75 | 2.90  |
| 1.333 | 4.40  | 2.833 | 113.70 | 4.333 | 5.80  | 5.83 | 2.90  |

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1.417 4.40 | 2.917 113.70 | 4.417 5.80 | 5.92 2.90  
1.500 4.40 | 3.000 113.70 | 4.500 5.80 | 6.00 2.90

61/105

Unit Hyd Qpeak (cms)= 0.111

PEAK FLOW (cms)= 0.057 (i)  
TIME TO PEAK (hrs)= 3.333  
RUNOFF VOLUME (mm)= 22.756  
TOTAL RAINFALL (mm)= 72.900  
RUNOFF COEFFICIENT = 0.312

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

CALIB  
STANDHYD ( 2100)  
ID= 1 DT= 5.0 min | Area (ha)= 0.24  
Total Imp(%)= 64.00 Dir. Conn.(%)= 60.00

IMPERVIOUS Pervious (i)  
Surface Area (ha)= 0.15 0.09  
Dep. Storage (mm)= 1.00 5.00  
Average Slope (%)= 3.10 3.00  
Length (m)= 40.00 70.00  
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 2.90 | 1.583 7.30 | 3.083 16.00 | 4.58 4.40  
0.167 2.90 | 1.667 7.30 | 3.167 16.00 | 4.67 4.40  
0.250 2.90 | 1.750 7.30 | 3.250 16.00 | 4.75 4.40  
0.333 2.90 | 1.833 7.30 | 3.333 16.00 | 4.83 4.40  
0.417 2.90 | 1.917 7.30 | 3.417 16.00 | 4.92 4.40  
0.500 2.90 | 2.000 7.30 | 3.500 16.00 | 5.00 4.40  
0.583 4.40 | 2.083 8.80 | 3.583 7.30 | 5.08 2.90  
0.667 4.40 | 2.167 8.80 | 3.667 7.30 | 5.17 2.90  
0.750 4.40 | 2.250 8.80 | 3.750 7.30 | 5.25 2.90  
0.833 4.40 | 2.333 8.80 | 3.833 7.30 | 5.33 2.90  
0.917 4.40 | 2.417 8.80 | 3.917 7.30 | 5.42 2.90  
1.000 4.40 | 2.500 8.80 | 4.000 7.30 | 5.50 2.90  
1.083 4.40 | 2.583 43.70 | 4.083 5.80 | 5.58 2.90  
1.167 4.40 | 2.667 43.70 | 4.167 5.80 | 5.67 2.90  
1.250 4.40 | 2.750 43.70 | 4.250 5.80 | 5.75 2.90  
1.333 4.40 | 2.833 113.70 | 4.333 5.80 | 5.83 2.90

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1.417 4.40 | 2.917 113.70 | 4.417 5.80 | 5.92 2.90  
1.500 4.40 | 3.000 113.70 | 4.500 5.80 | 6.00 2.90

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Max.Eff.Inten.(mm/hr)= 113.70 42.52  
over (min) 5.00 15.00  
Storage Coeff. (min)= 1.00 (ii) 13.31 (ii)  
Unit Hyd. Tpeak (min)= 5.00 15.00  
Unit Hyd. peak (cms)= 0.34 0.08

\*TOTALS\*

PEAK FLOW (cms)= 0.05 0.01 0.051 (iii)  
TIME TO PEAK (hrs)= 3.00 3.08 3.00  
RUNOFF VOLUME (mm)= 71.90 21.50 51.71  
TOTAL RAINFALL (mm)= 72.90 72.90 72.90  
RUNOFF COEFFICIENT = 0.99 0.29 0.71

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

(i) CN PROCEDURE SELECTED FOR Pervious LOSSES:  
CN\* = 60.5 Ia = Dep. Storage (Above)  
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.  
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD ( 0006)  
1 + 2 = 3 | AREA QPEAK TPEAK R.V.  
(ha) (cms) (hrs) (mm)  
ID1= 1 ( 2100): 0.24 0.051 3.00 51.71  
+ ID2= 2 ( 2101): 1.28 0.057 3.33 22.76  
===== ID = 3 ( 0006): 1.52 0.080 3.00 27.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB  
NASHYD ( 2300) | Area (ha)= 0.23 Curve Number (CN)= 66.5  
ID= 1 DT= 5.0 min | Ia (mm)= 4.60 # of Linear Res.(N)= 3.00  
U.H. Tp(hrs)= 0.27

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 2.90 | 1.583 7.30 | 3.083 16.00 | 4.58 4.40  
0.167 2.90 | 1.667 7.30 | 3.167 16.00 | 4.67 4.40  
0.250 2.90 | 1.750 7.30 | 3.250 16.00 | 4.75 4.40  
0.333 2.90 | 1.833 7.30 | 3.333 16.00 | 4.83 4.40  
0.417 2.90 | 1.917 7.30 | 3.417 16.00 | 4.92 4.40  
0.500 2.90 | 2.000 7.30 | 3.500 16.00 | 5.00 4.40  
0.583 4.40 | 2.083 8.80 | 3.583 7.30 | 5.08 2.90  
0.667 4.40 | 2.167 8.80 | 3.667 7.30 | 5.17 2.90  
0.750 4.40 | 2.250 8.80 | 3.750 7.30 | 5.25 2.90  
0.833 4.40 | 2.333 8.80 | 3.833 7.30 | 5.33 2.90  
0.917 4.40 | 2.417 8.80 | 3.917 7.30 | 5.42 2.90  
1.000 4.40 | 2.500 8.80 | 4.000 7.30 | 5.50 2.90  
1.083 4.40 | 2.583 43.70 | 4.083 5.80 | 5.58 2.90  
1.167 4.40 | 2.667 43.70 | 4.167 5.80 | 5.67 2.90  
1.250 4.40 | 2.750 43.70 | 4.250 5.80 | 5.75 2.90  
1.333 4.40 | 2.833 113.70 | 4.333 5.80 | 5.83 2.90

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|       |      |       |        |       |       |      |      |
|-------|------|-------|--------|-------|-------|------|------|
| 0.083 | 2.90 | 1.583 | 7.30   | 3.083 | 16.00 | 4.58 | 4.40 |
| 0.167 | 2.90 | 1.667 | 7.30   | 3.167 | 16.00 | 4.67 | 4.40 |
| 0.250 | 2.90 | 1.750 | 7.30   | 3.250 | 16.00 | 4.75 | 4.40 |
| 0.333 | 2.90 | 1.833 | 7.30   | 3.333 | 16.00 | 4.83 | 4.40 |
| 0.417 | 2.90 | 1.917 | 7.30   | 3.417 | 16.00 | 4.92 | 4.40 |
| 0.500 | 2.90 | 2.000 | 7.30   | 3.500 | 16.00 | 5.00 | 4.40 |
| 0.583 | 4.40 | 2.083 | 8.80   | 3.583 | 7.30  | 5.08 | 2.90 |
| 0.667 | 4.40 | 2.167 | 8.80   | 3.667 | 7.30  | 5.17 | 2.90 |
| 0.750 | 4.40 | 2.250 | 8.80   | 3.750 | 7.30  | 5.25 | 2.90 |
| 0.833 | 4.40 | 2.333 | 8.80   | 3.833 | 7.30  | 5.33 | 2.90 |
| 0.917 | 4.40 | 2.417 | 8.80   | 3.917 | 7.30  | 5.42 | 2.90 |
| 1.000 | 4.40 | 2.500 | 8.80   | 4.000 | 7.30  | 5.50 | 2.90 |
| 1.083 | 4.40 | 2.583 | 43.70  | 4.083 | 5.80  | 5.58 | 2.90 |
| 1.167 | 4.40 | 2.667 | 43.70  | 4.167 | 5.80  | 5.67 | 2.90 |
| 1.250 | 4.40 | 2.750 | 43.70  | 4.250 | 5.80  | 5.75 | 2.90 |
| 1.333 | 4.40 | 2.833 | 113.70 | 4.333 | 5.80  | 5.83 | 2.90 |
| 1.417 | 4.40 | 2.917 | 113.70 | 4.417 | 5.80  | 5.92 | 2.90 |
| 1.500 | 4.40 | 3.000 | 113.70 | 4.500 | 5.80  | 6.00 | 2.90 |

|                    |        |           |
|--------------------|--------|-----------|
| PEAK FLOW          | (cms)= | 0.015 (i) |
| TIME TO PEAK       | (hrs)= | 3.167     |
| RUNOFF VOLUME      | (mm)=  | 23.753    |
| TOTAL RAINFALL     | (mm)=  | 72.900    |
| RUNOFF COEFFICIENT | =      | 0.326     |

|                   |               |      |                      |      |
|-------------------|---------------|------|----------------------|------|
| CALIB             | Area (ha)=    | 1.28 | Curve Number (CN)=   | 65.1 |
| NASHYD (0041)     | Ia (mm)=      | 4.70 | # of Linear Res.(N)= | 3.00 |
| ID= 1 DT= 5.0 min | U.H. Tp(hrs)= | 0.44 |                      |      |

| --- TRANSFORMED HYETOGRAPH --- |       |       |       |       |       |      |       |
|--------------------------------|-------|-------|-------|-------|-------|------|-------|
| TIME                           | RAIN  | TIME  | RAIN  | TIME  | RAIN  | TIME | RAIN  |
| hrs                            | mm/hr | hrs   | mm/hr | hrs   | mm/hr | hrs  | mm/hr |
| 0.083                          | 2.90  | 1.583 | 7.30  | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167                          | 2.90  | 1.667 | 7.30  | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250                          | 2.90  | 1.750 | 7.30  | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333                          | 2.90  | 1.833 | 7.30  | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417                          | 2.90  | 1.917 | 7.30  | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500                          | 2.90  | 2.000 | 7.30  | 3.500 | 16.00 | 5.00 | 4.40  |

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|       |      |       |        |       |      |      |      |
|-------|------|-------|--------|-------|------|------|------|
| 0.583 | 4.40 | 2.083 | 8.80   | 3.583 | 7.30 | 5.08 | 2.90 |
| 0.667 | 4.40 | 2.167 | 8.80   | 3.667 | 7.30 | 5.17 | 2.90 |
| 0.750 | 4.40 | 2.250 | 8.80   | 3.750 | 7.30 | 5.25 | 2.90 |
| 0.833 | 4.40 | 2.333 | 8.80   | 3.833 | 7.30 | 5.33 | 2.90 |
| 0.917 | 4.40 | 2.417 | 8.80   | 3.917 | 7.30 | 5.42 | 2.90 |
| 1.000 | 4.40 | 2.500 | 8.80   | 4.000 | 7.30 | 5.50 | 2.90 |
| 1.083 | 4.40 | 2.583 | 43.70  | 4.083 | 5.80 | 5.58 | 2.90 |
| 1.167 | 4.40 | 2.667 | 43.70  | 4.167 | 5.80 | 5.67 | 2.90 |
| 1.250 | 4.40 | 2.750 | 43.70  | 4.250 | 5.80 | 5.75 | 2.90 |
| 1.333 | 4.40 | 2.833 | 113.70 | 4.333 | 5.80 | 5.83 | 2.90 |
| 1.417 | 4.40 | 2.917 | 113.70 | 4.417 | 5.80 | 5.92 | 2.90 |
| 1.500 | 4.40 | 3.000 | 113.70 | 4.500 | 5.80 | 6.00 | 2.90 |

|                    |        |           |
|--------------------|--------|-----------|
| PEAK FLOW          | (cms)= | 0.057 (i) |
| TIME TO PEAK       | (hrs)= | 3.333     |
| RUNOFF VOLUME      | (mm)=  | 22.756    |
| TOTAL RAINFALL     | (mm)=  | 72.900    |
| RUNOFF COEFFICIENT | =      | 0.312     |

|                   |               |       |                      |
|-------------------|---------------|-------|----------------------|
| CALIB             |               |       |                      |
| STANDHYD ( 0039)  | Area (ha)=    | 0.24  |                      |
| ID= 1 DT= 5.0 min | Total Imp(%)= | 64.00 | Dir. Conn.(%)= 60.00 |

|               |       |            |              |
|---------------|-------|------------|--------------|
|               |       | IMPERVIOUS | PERVIOUS (i) |
| Surface Area  | (ha)= | 0.15       | 0.09         |
| Dep. Storage  | (mm)= | 1.00       | 5.00         |
| Average Slope | (%)=  | 3.10       | 3.00         |
| Length        | (m)=  | 40.00      | 70.00        |
| Mannings n    | =     | 0.013      | 0.250        |

| ---- TRANSFORMED HYETOGRAPH ---- |       |       |       |       |       |      |       |
|----------------------------------|-------|-------|-------|-------|-------|------|-------|
| TIME                             | RAIN  | TIME  | RAIN  | TIME  | RAIN  | TIME | RAIN  |
| hrs                              | mm/hr | hrs   | mm/hr | hrs   | mm/hr | hrs  | mm/hr |
| 0.083                            | 2.90  | 1.583 | 7.30  | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167                            | 2.90  | 1.667 | 7.30  | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250                            | 2.90  | 1.750 | 7.30  | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333                            | 2.90  | 1.833 | 7.30  | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417                            | 2.90  | 1.917 | 7.30  | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500                            | 2.90  | 2.000 | 7.30  | 3.500 | 16.00 | 5.00 | 4.40  |

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|       |      |       |        |       |      |      |      |
|-------|------|-------|--------|-------|------|------|------|
| 0.583 | 4.40 | 2.083 | 8.80   | 3.583 | 7.30 | 5.08 | 2.90 |
| 0.667 | 4.40 | 2.167 | 8.80   | 3.667 | 7.30 | 5.17 | 2.90 |
| 0.750 | 4.40 | 2.250 | 8.80   | 3.750 | 7.30 | 5.25 | 2.90 |
| 0.833 | 4.40 | 2.333 | 8.80   | 3.833 | 7.30 | 5.33 | 2.90 |
| 0.917 | 4.40 | 2.417 | 8.80   | 3.917 | 7.30 | 5.42 | 2.90 |
| 1.000 | 4.40 | 2.500 | 8.80   | 4.000 | 7.30 | 5.50 | 2.90 |
| 1.083 | 4.40 | 2.583 | 43.70  | 4.083 | 5.80 | 5.58 | 2.90 |
| 1.167 | 4.40 | 2.667 | 43.70  | 4.167 | 5.80 | 5.67 | 2.90 |
| 1.250 | 4.40 | 2.750 | 43.70  | 4.250 | 5.80 | 5.75 | 2.90 |
| 1.333 | 4.40 | 2.833 | 113.70 | 4.333 | 5.80 | 5.83 | 2.90 |
| 1.417 | 4.40 | 2.917 | 113.70 | 4.417 | 5.80 | 5.92 | 2.90 |
| 1.500 | 4.40 | 3.000 | 113.70 | 4.500 | 5.80 | 6.00 | 2.90 |

Max.Eff.Inten.(mm/hr)= 113.70 42.52  
over (min) 5.00 15.00  
Storage Coeff. (min)= 1.00 (ii) 13.31 (ii)  
Unit Hyd. Tpeak (min)= 5.00 15.00  
Unit Hyd. peak (cms)= 0.34 0.08

\*TOTALS\*

PEAK FLOW (cms)= 0.05 0.01 0.051 (iii)  
TIME TO PEAK (hrs)= 3.00 3.08 3.00  
RUNOFF VOLUME (mm)= 71.90 21.50 51.71  
TOTAL RAINFALL (mm)= 72.90 72.90 72.90  
RUNOFF COEFFICIENT = 0.99 0.29 0.71

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 60.5 Ia = Dep. 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( 0042)  
IN= 2--> OUT= 1  
DT= 5.0 min

OVERFLOW IS OFF

| OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) | OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) |
|------------------|--------------------|------------------|--------------------|
| 0.0000           | 0.0000             | 0.0116           | 0.0080             |
| 0.0023           | 0.0007             | 0.0127           | 0.0102             |
| 0.0055           | 0.0017             | 0.0137           | 0.0127             |
| 0.0075           | 0.0029             | 0.0146           | 0.0153             |
| 0.0091           | 0.0044             | 0.0155           | 0.0183             |
| 0.0104           | 0.0061             | 0.0000           | 0.0000             |
| AREA<br>(ha)     | QPEAK<br>(cms)     | TPEAK<br>(hrs)   | R.V.<br>(mm)       |

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INFLOW : ID= 2 ( 0039) 0.240 0.051 3.00 51.71  
OUTFLOW: ID= 1 ( 0042) 0.240 0.010 3.33 51.40

PEAK FLOW REDUCTION [Qout/Qin](%)= 20.23  
TIME SHIFT OF PEAK FLOW (min)= 20.00  
MAXIMUM STORAGE USED (ha.m.)= 0.0059

ADD HYD ( 0040)  
1 + 2 = 3

|                   | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|-------------------|--------------|----------------|----------------|--------------|
| ID1= 1 ( 0041):   | 1.28         | 0.057          | 3.33           | 22.76        |
| + ID2= 2 ( 0042): | 0.24         | 0.010          | 3.33           | 51.40        |
| ID = 3 ( 0040):   | 1.52         | 0.067          | 3.33           | 27.28        |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB  
NASHYD ( 0043)  
ID= 1 DT= 5.0 min

Area (ha)= 0.74 Curve Number (CN)= 64.2  
Ia (mm)= 4.80 # of Linear Res.(N)= 3.00  
U.H. Tp(hrs)= 0.17

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 2.90          | 1.583       | 7.30          | 3.083       | 16.00         | 4.58        | 4.40          |
| 0.167       | 2.90          | 1.667       | 7.30          | 3.167       | 16.00         | 4.67        | 4.40          |
| 0.250       | 2.90          | 1.750       | 7.30          | 3.250       | 16.00         | 4.75        | 4.40          |
| 0.333       | 2.90          | 1.833       | 7.30          | 3.333       | 16.00         | 4.83        | 4.40          |
| 0.417       | 2.90          | 1.917       | 7.30          | 3.417       | 16.00         | 4.92        | 4.40          |
| 0.500       | 2.90          | 2.000       | 7.30          | 3.500       | 16.00         | 5.00        | 4.40          |
| 0.583       | 4.40          | 2.083       | 8.80          | 3.583       | 7.30          | 5.08        | 2.90          |
| 0.667       | 4.40          | 2.167       | 8.80          | 3.667       | 7.30          | 5.17        | 2.90          |
| 0.750       | 4.40          | 2.250       | 8.80          | 3.750       | 7.30          | 5.25        | 2.90          |
| 0.833       | 4.40          | 2.333       | 8.80          | 3.833       | 7.30          | 5.33        | 2.90          |
| 0.917       | 4.40          | 2.417       | 8.80          | 3.917       | 7.30          | 5.42        | 2.90          |
| 1.000       | 4.40          | 2.500       | 8.80          | 4.000       | 7.30          | 5.50        | 2.90          |
| 1.083       | 4.40          | 2.583       | 43.70         | 4.083       | 5.80          | 5.58        | 2.90          |
| 1.167       | 4.40          | 2.667       | 43.70         | 4.167       | 5.80          | 5.67        | 2.90          |
| 1.250       | 4.40          | 2.750       | 43.70         | 4.250       | 5.80          | 5.75        | 2.90          |
| 1.333       | 4.40          | 2.833       | 113.70        | 4.333       | 5.80          | 5.83        | 2.90          |



|       |      |       |        |       |      |      |      |
|-------|------|-------|--------|-------|------|------|------|
| 1.417 | 4.40 | 2.917 | 113.70 | 4.417 | 5.80 | 5.92 | 2.90 |
| 1.500 | 4.40 | 3.000 | 113.70 | 4.500 | 5.80 | 6.00 | 2.90 |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.059 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 22.032  
 TOTAL RAINFALL (mm)= 72.900  
 RUNOFF COEFFICIENT = 0.302

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

|                   |                    |                           |  |
|-------------------|--------------------|---------------------------|--|
| CALIB             |                    |                           |  |
| NASHYD ( 0048)    | Area (ha)= 0.93    | Curve Number (CN)= 61.6   |  |
| ID= 1 DT= 5.0 min | Ia (mm)= 10.00     | # of Linear Res.(N)= 3.00 |  |
|                   | U.H. Tp(hrs)= 0.17 |                           |  |

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 | 2.90  | 1.583 | 7.30   | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167 | 2.90  | 1.667 | 7.30   | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250 | 2.90  | 1.750 | 7.30   | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333 | 2.90  | 1.833 | 7.30   | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417 | 2.90  | 1.917 | 7.30   | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500 | 2.90  | 2.000 | 7.30   | 3.500 | 16.00 | 5.00 | 4.40  |
| 0.583 | 4.40  | 2.083 | 8.80   | 3.583 | 7.30  | 5.08 | 2.90  |
| 0.667 | 4.40  | 2.167 | 8.80   | 3.667 | 7.30  | 5.17 | 2.90  |
| 0.750 | 4.40  | 2.250 | 8.80   | 3.750 | 7.30  | 5.25 | 2.90  |
| 0.833 | 4.40  | 2.333 | 8.80   | 3.833 | 7.30  | 5.33 | 2.90  |
| 0.917 | 4.40  | 2.417 | 8.80   | 3.917 | 7.30  | 5.42 | 2.90  |
| 1.000 | 4.40  | 2.500 | 8.80   | 4.000 | 7.30  | 5.50 | 2.90  |
| 1.083 | 4.40  | 2.583 | 43.70  | 4.083 | 5.80  | 5.58 | 2.90  |
| 1.167 | 4.40  | 2.667 | 43.70  | 4.167 | 5.80  | 5.67 | 2.90  |
| 1.250 | 4.40  | 2.750 | 43.70  | 4.250 | 5.80  | 5.75 | 2.90  |
| 1.333 | 4.40  | 2.833 | 113.70 | 4.333 | 5.80  | 5.83 | 2.90  |
| 1.417 | 4.40  | 2.917 | 113.70 | 4.417 | 5.80  | 5.92 | 2.90  |
| 1.500 | 4.40  | 3.000 | 113.70 | 4.500 | 5.80  | 6.00 | 2.90  |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.060 (i)

TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 17.819  
 TOTAL RAINFALL (mm)= 72.900  
 RUNOFF COEFFICIENT = 0.244

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

|                   |           |             |             |           |
|-------------------|-----------|-------------|-------------|-----------|
| ADD HYD ( 0049)   |           |             |             |           |
| 1 + 2 = 3         | AREA (ha) | QPEAK (cms) | TPEAK (hrs) | R.V. (mm) |
| ID1= 1 ( 0043):   | 0.74      | 0.059       | 3.08        | 22.03     |
| + ID2= 2 ( 0048): | 0.93      | 0.060       | 3.08        | 17.82     |
| ID = 3 ( 0049):   | 1.67      | 0.120       | 3.08        | 19.69     |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

|                   |                     |                      |  |
|-------------------|---------------------|----------------------|--|
| CALIB             |                     |                      |  |
| STANDHYD ( 0044)  | Area (ha)= 2.14     |                      |  |
| ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 | Dir. Conn.(%)= 33.00 |  |

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.92       | 1.22         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 1.50       | 0.27         |
| Length (m)=        | 119.44     | 215.00       |
| 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 | 2.90  | 1.583 | 7.30  | 3.083 | 16.00 | 4.58 | 4.40  |
| 0.167 | 2.90  | 1.667 | 7.30  | 3.167 | 16.00 | 4.67 | 4.40  |
| 0.250 | 2.90  | 1.750 | 7.30  | 3.250 | 16.00 | 4.75 | 4.40  |
| 0.333 | 2.90  | 1.833 | 7.30  | 3.333 | 16.00 | 4.83 | 4.40  |
| 0.417 | 2.90  | 1.917 | 7.30  | 3.417 | 16.00 | 4.92 | 4.40  |
| 0.500 | 2.90  | 2.000 | 7.30  | 3.500 | 16.00 | 5.00 | 4.40  |
| 0.583 | 4.40  | 2.083 | 8.80  | 3.583 | 7.30  | 5.08 | 2.90  |
| 0.667 | 4.40  | 2.167 | 8.80  | 3.667 | 7.30  | 5.17 | 2.90  |
| 0.750 | 4.40  | 2.250 | 8.80  | 3.750 | 7.30  | 5.25 | 2.90  |
| 0.833 | 4.40  | 2.333 | 8.80  | 3.833 | 7.30  | 5.33 | 2.90  |

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|       |      |       |        |       |      |      |      |
|-------|------|-------|--------|-------|------|------|------|
| 0.917 | 4.40 | 2.417 | 8.80   | 3.917 | 7.30 | 5.42 | 2.90 |
| 1.000 | 4.40 | 2.500 | 8.80   | 4.000 | 7.30 | 5.50 | 2.90 |
| 1.083 | 4.40 | 2.583 | 43.70  | 4.083 | 5.80 | 5.58 | 2.90 |
| 1.167 | 4.40 | 2.667 | 43.70  | 4.167 | 5.80 | 5.67 | 2.90 |
| 1.250 | 4.40 | 2.750 | 43.70  | 4.250 | 5.80 | 5.75 | 2.90 |
| 1.333 | 4.40 | 2.833 | 113.70 | 4.333 | 5.80 | 5.83 | 2.90 |
| 1.417 | 4.40 | 2.917 | 113.70 | 4.417 | 5.80 | 5.92 | 2.90 |
| 1.500 | 4.40 | 3.000 | 113.70 | 4.500 | 5.80 | 6.00 | 2.90 |

Max.Eff.Inten.(mm/hr)= 113.70 18.55  
 over (min) 5.00 75.00  
 Storage Coeff. (min)= 2.39 (ii) 71.64 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 75.00  
 Unit Hyd. peak (cms)= 0.30 0.02

\*TOTALS\*

PEAK FLOW (cms)= 0.22 0.03 0.228 (iii)  
 TIME TO PEAK (hrs)= 3.00 4.17 3.00  
 RUNOFF VOLUME (mm)= 71.90 22.47 38.76  
 TOTAL RAINFALL (mm)= 72.90 72.90 72.90  
 RUNOFF COEFFICIENT = 0.99 0.31 0.53

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. Storage (Above)  
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.  
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

RESERVOIR( 0046)  
 IN= 2---> OUT= 1  
 DT= 5.0 min

OVERFLOW IS OFF

| OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) | OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) |
|------------------|--------------------|------------------|--------------------|
| 0.0000           | 0.0000             | 0.0581           | 0.0439             |
| 0.0039           | 0.0043             | 0.0782           | 0.0554             |
| 0.0064           | 0.0099             | 0.0938           | 0.0681             |
| 0.0082           | 0.0166             | 0.1070           | 0.0819             |
| 0.0097           | 0.0245             | 0.1187           | 0.0970             |
| 0.0110           | 0.0336             | 0.0000           | 0.0000             |

|                        | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|------------------------|--------------|----------------|----------------|--------------|
| INFLOW : ID= 2 ( 0044) | 2.140        | 0.228          | 3.00           | 38.76        |
| OUTFLOW: ID= 1 ( 0046) | 2.140        | 0.040          | 4.50           | 38.63        |

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.43

May 10, 2022 12:56:02 PM

10985-V0 Output

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TIME SHIFT OF PEAK FLOW (min)= 90.00  
 MAXIMUM STORAGE USED (ha.m.)= 0.0399

|                   | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|-------------------|--------------|----------------|----------------|--------------|
| ID1= 1 ( 0046):   | 2.14         | 0.040          | 4.50           | 38.63        |
| + ID2= 2 ( 0049): | 1.67         | 0.120          | 3.08           | 19.69        |
| ID = 3 ( 0045):   | 3.81         | 0.131          | 3.08           | 30.33        |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

V V I SSSS U U A L (v 6.2.2006)  
 V V I SS U U A A L  
 V V I SS U U A A A A L  
 V V I SS U U A A L  
 VV I SSSS UUUU A A LLLLL

000 TTTT TTTT H H Y Y M M 000 TM  
 0 0 T T H H Y Y MM MM 0 0  
 0 0 T T H H Y M M 0 0  
 000 T T H H Y M M 000

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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\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\c13c9  
 313-2b25-42c8-8aaf-0b5ac6a5bf6c\scena

Summary filename:  
 C:\Users\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\c13c9  
 313-2b25-42c8-8aaf-0b5ac6a5bf6c\scena

DATE: 05/10/2022

TIME: 12:42:13

May 10, 2022 12:56:02 PM

10985-V0 Output

USER:

COMMENTS: \_\_\_\_\_

\*\*\*\*\*  
 \*\* SIMULATION : Run 05 \*\*  
 \*\*\*\*\*

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.25        | 3.30          | 1.75        | 8.10          | 3.25        | 17.90         | 4.75        | 4.90          |
| 0.50        | 3.30          | 2.00        | 8.10          | 3.50        | 17.90         | 5.00        | 4.90          |
| 0.75        | 4.90          | 2.25        | 9.80          | 3.75        | 8.10          | 5.25        | 3.30          |
| 1.00        | 4.90          | 2.50        | 9.80          | 4.00        | 8.10          | 5.50        | 3.30          |
| 1.25        | 4.90          | 2.75        | 48.90         | 4.25        | 6.50          | 5.75        | 3.30          |
| 1.50        | 4.90          | 3.00        | 127.00        | 4.50        | 6.50          | 6.00        | 3.30          |

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 3.30          | 1.583       | 8.10          | 3.083       | 17.90         | 4.58        | 4.90          |
| 0.167       | 3.30          | 1.667       | 8.10          | 3.167       | 17.90         | 4.67        | 4.90          |
| 0.250       | 3.30          | 1.750       | 8.10          | 3.250       | 17.90         | 4.75        | 4.90          |
| 0.333       | 3.30          | 1.833       | 8.10          | 3.333       | 17.90         | 4.83        | 4.90          |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 3.30          | 1.583       | 8.10          | 3.083       | 17.90         | 4.58        | 4.90          |
| 0.167       | 3.30          | 1.667       | 8.10          | 3.167       | 17.90         | 4.67        | 4.90          |
| 0.250       | 3.30          | 1.750       | 8.10          | 3.250       | 17.90         | 4.75        | 4.90          |
| 0.333       | 3.30          | 1.833       | 8.10          | 3.333       | 17.90         | 4.83        | 4.90          |

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.417       | 3.30          | 1.917       | 8.10          | 3.417       | 17.90         | 4.92        | 4.90          |
| 0.500       | 3.30          | 2.000       | 8.10          | 3.500       | 17.90         | 5.00        | 4.90          |
| 0.583       | 4.90          | 2.083       | 9.80          | 3.583       | 8.10          | 5.08        | 3.30          |
| 0.667       | 4.90          | 2.167       | 9.80          | 3.667       | 8.10          | 5.17        | 3.30          |
| 0.750       | 4.90          | 2.250       | 9.80          | 3.750       | 8.10          | 5.25        | 3.30          |
| 0.833       | 4.90          | 2.333       | 9.80          | 3.833       | 8.10          | 5.33        | 3.30          |
| 0.917       | 4.90          | 2.417       | 9.80          | 3.917       | 8.10          | 5.42        | 3.30          |
| 1.000       | 4.90          | 2.500       | 9.80          | 4.000       | 8.10          | 5.50        | 3.30          |
| 1.083       | 4.90          | 2.583       | 48.90         | 4.083       | 6.50          | 5.58        | 3.30          |
| 1.167       | 4.90          | 2.667       | 48.90         | 4.167       | 6.50          | 5.67        | 3.30          |
| 1.250       | 4.90          | 2.750       | 48.90         | 4.250       | 6.50          | 5.75        | 3.30          |
| 1.333       | 4.90          | 2.833       | 127.00        | 4.333       | 6.50          | 5.83        | 3.30          |
| 1.417       | 4.90          | 2.917       | 127.00        | 4.417       | 6.50          | 5.92        | 3.30          |
| 1.500       | 4.90          | 3.000       | 127.00        | 4.500       | 6.50          | 6.00        | 3.30          |

Unit Hyd Qpeak (cms)= 0.231

PEAK FLOW (cms)= 0.136 (i)  
 TIME TO PEAK (hrs)= 3.250  
 RUNOFF VOLUME (mm)= 27.606  
 TOTAL RAINFALL (mm)= 81.475  
 RUNOFF COEFFICIENT = 0.339

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

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 3.30          | 1.583       | 8.10          | 3.083       | 17.90         | 4.58        | 4.90          |
| 0.167       | 3.30          | 1.667       | 8.10          | 3.167       | 17.90         | 4.67        | 4.90          |
| 0.250       | 3.30          | 1.750       | 8.10          | 3.250       | 17.90         | 4.75        | 4.90          |
| 0.333       | 3.30          | 1.833       | 8.10          | 3.333       | 17.90         | 4.83        | 4.90          |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 3.30          | 1.583       | 8.10          | 3.083       | 17.90         | 4.58        | 4.90          |
| 0.167       | 3.30          | 1.667       | 8.10          | 3.167       | 17.90         | 4.67        | 4.90          |
| 0.250       | 3.30          | 1.750       | 8.10          | 3.250       | 17.90         | 4.75        | 4.90          |
| 0.333       | 3.30          | 1.833       | 8.10          | 3.333       | 17.90         | 4.83        | 4.90          |

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|       |      |       |        |       |      |      |      |
|-------|------|-------|--------|-------|------|------|------|
| 0.917 | 4.90 | 2.417 | 9.80   | 3.917 | 8.10 | 5.42 | 3.30 |
| 1.000 | 4.90 | 2.500 | 9.80   | 4.000 | 8.10 | 5.50 | 3.30 |
| 1.083 | 4.90 | 2.583 | 48.90  | 4.083 | 6.50 | 5.58 | 3.30 |
| 1.167 | 4.90 | 2.667 | 48.90  | 4.167 | 6.50 | 5.67 | 3.30 |
| 1.250 | 4.90 | 2.750 | 48.90  | 4.250 | 6.50 | 5.75 | 3.30 |
| 1.333 | 4.90 | 2.833 | 127.00 | 4.333 | 6.50 | 5.83 | 3.30 |
| 1.417 | 4.90 | 2.917 | 127.00 | 4.417 | 6.50 | 5.92 | 3.30 |
| 1.500 | 4.90 | 3.000 | 127.00 | 4.500 | 6.50 | 6.00 | 3.30 |

Unit Hyd Qpeak (cms)= 0.560

PEAK FLOW (cms)= 0.199 (i)  
TIME TO PEAK (hrs)= 3.000  
RUNOFF VOLUME (mm)= 24.330  
TOTAL RAINFALL (mm)= 81.475  
RUNOFF COEFFICIENT = 0.299

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

-----  
| CALIB |  
| NASHYD ( 1300) | Area (ha)= 1.70 Curve Number (CN)= 68.8  
| ID= 1 DT= 5.0 min | Ia (mm)= 8.00 # of Linear Res.(N)= 3.00  
-----  
U.H. Tp(hrs)= 0.51

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 | 3.30  | 1.583 | 8.10   | 3.083 | 17.90 | 4.58 | 4.90  |
| 0.167 | 3.30  | 1.667 | 8.10   | 3.167 | 17.90 | 4.67 | 4.90  |
| 0.250 | 3.30  | 1.750 | 8.10   | 3.250 | 17.90 | 4.75 | 4.90  |
| 0.333 | 3.30  | 1.833 | 8.10   | 3.333 | 17.90 | 4.83 | 4.90  |
| 0.417 | 3.30  | 1.917 | 8.10   | 3.417 | 17.90 | 4.92 | 4.90  |
| 0.500 | 3.30  | 2.000 | 8.10   | 3.500 | 17.90 | 5.00 | 4.90  |
| 0.583 | 4.90  | 2.083 | 9.80   | 3.583 | 8.10  | 5.08 | 3.30  |
| 0.667 | 4.90  | 2.167 | 9.80   | 3.667 | 8.10  | 5.17 | 3.30  |
| 0.750 | 4.90  | 2.250 | 9.80   | 3.750 | 8.10  | 5.25 | 3.30  |
| 0.833 | 4.90  | 2.333 | 9.80   | 3.833 | 8.10  | 5.33 | 3.30  |
| 0.917 | 4.90  | 2.417 | 9.80   | 3.917 | 8.10  | 5.42 | 3.30  |
| 1.000 | 4.90  | 2.500 | 9.80   | 4.000 | 8.10  | 5.50 | 3.30  |
| 1.083 | 4.90  | 2.583 | 48.90  | 4.083 | 6.50  | 5.58 | 3.30  |
| 1.167 | 4.90  | 2.667 | 48.90  | 4.167 | 6.50  | 5.67 | 3.30  |
| 1.250 | 4.90  | 2.750 | 48.90  | 4.250 | 6.50  | 5.75 | 3.30  |
| 1.333 | 4.90  | 2.833 | 127.00 | 4.333 | 6.50  | 5.83 | 3.30  |

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|       |      |       |        |       |      |      |      |
|-------|------|-------|--------|-------|------|------|------|
| 1.417 | 4.90 | 2.917 | 127.00 | 4.417 | 6.50 | 5.92 | 3.30 |
| 1.500 | 4.90 | 3.000 | 127.00 | 4.500 | 6.50 | 6.00 | 3.30 |

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.086 (i)  
TIME TO PEAK (hrs)= 3.417  
RUNOFF VOLUME (mm)= 28.613  
TOTAL RAINFALL (mm)= 81.475  
RUNOFF COEFFICIENT = 0.351

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

-----  
| CALIB |  
| NASHYD ( 2201) | Area (ha)= 0.74 Curve Number (CN)= 64.2  
| ID= 1 DT= 5.0 min | Ia (mm)= 4.80 # of Linear Res.(N)= 3.00  
-----  
U.H. Tp(hrs)= 0.17

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 | 3.30  | 1.583 | 8.10   | 3.083 | 17.90 | 4.58 | 4.90  |
| 0.167 | 3.30  | 1.667 | 8.10   | 3.167 | 17.90 | 4.67 | 4.90  |
| 0.250 | 3.30  | 1.750 | 8.10   | 3.250 | 17.90 | 4.75 | 4.90  |
| 0.333 | 3.30  | 1.833 | 8.10   | 3.333 | 17.90 | 4.83 | 4.90  |
| 0.417 | 3.30  | 1.917 | 8.10   | 3.417 | 17.90 | 4.92 | 4.90  |
| 0.500 | 3.30  | 2.000 | 8.10   | 3.500 | 17.90 | 5.00 | 4.90  |
| 0.583 | 4.90  | 2.083 | 9.80   | 3.583 | 8.10  | 5.08 | 3.30  |
| 0.667 | 4.90  | 2.167 | 9.80   | 3.667 | 8.10  | 5.17 | 3.30  |
| 0.750 | 4.90  | 2.250 | 9.80   | 3.750 | 8.10  | 5.25 | 3.30  |
| 0.833 | 4.90  | 2.333 | 9.80   | 3.833 | 8.10  | 5.33 | 3.30  |
| 0.917 | 4.90  | 2.417 | 9.80   | 3.917 | 8.10  | 5.42 | 3.30  |
| 1.000 | 4.90  | 2.500 | 9.80   | 4.000 | 8.10  | 5.50 | 3.30  |
| 1.083 | 4.90  | 2.583 | 48.90  | 4.083 | 6.50  | 5.58 | 3.30  |
| 1.167 | 4.90  | 2.667 | 48.90  | 4.167 | 6.50  | 5.67 | 3.30  |
| 1.250 | 4.90  | 2.750 | 48.90  | 4.250 | 6.50  | 5.75 | 3.30  |
| 1.333 | 4.90  | 2.833 | 127.00 | 4.333 | 6.50  | 5.83 | 3.30  |
| 1.417 | 4.90  | 2.917 | 127.00 | 4.417 | 6.50  | 5.92 | 3.30  |
| 1.500 | 4.90  | 3.000 | 127.00 | 4.500 | 6.50  | 6.00 | 3.30  |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.072 (i)

TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 26.833  
 TOTAL RAINFALL (mm)= 81.475  
 RUNOFF COEFFICIENT = 0.329

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

-----  
 | CALIB |  
 | NASHYD ( 0047) | Area (ha)= 0.93 Curve Number (CN)= 61.6  
 | ID= 1 DT= 5.0 min | Ia (mm)= 10.00 # of Linear Res.(N)= 3.00  
 -----  
 U.H. Tp(hrs)= 0.17

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 3.30          | 1.583       | 8.10          | 3.083       | 17.90         | 4.58        | 4.90          |
| 0.167       | 3.30          | 1.667       | 8.10          | 3.167       | 17.90         | 4.67        | 4.90          |
| 0.250       | 3.30          | 1.750       | 8.10          | 3.250       | 17.90         | 4.75        | 4.90          |
| 0.333       | 3.30          | 1.833       | 8.10          | 3.333       | 17.90         | 4.83        | 4.90          |
| 0.417       | 3.30          | 1.917       | 8.10          | 3.417       | 17.90         | 4.92        | 4.90          |
| 0.500       | 3.30          | 2.000       | 8.10          | 3.500       | 17.90         | 5.00        | 4.90          |
| 0.583       | 4.90          | 2.083       | 9.80          | 3.583       | 8.10          | 5.08        | 3.30          |
| 0.667       | 4.90          | 2.167       | 9.80          | 3.667       | 8.10          | 5.17        | 3.30          |
| 0.750       | 4.90          | 2.250       | 9.80          | 3.750       | 8.10          | 5.25        | 3.30          |
| 0.833       | 4.90          | 2.333       | 9.80          | 3.833       | 8.10          | 5.33        | 3.30          |
| 0.917       | 4.90          | 2.417       | 9.80          | 3.917       | 8.10          | 5.42        | 3.30          |
| 1.000       | 4.90          | 2.500       | 9.80          | 4.000       | 8.10          | 5.50        | 3.30          |
| 1.083       | 4.90          | 2.583       | 48.90         | 4.083       | 6.50          | 5.58        | 3.30          |
| 1.167       | 4.90          | 2.667       | 48.90         | 4.167       | 6.50          | 5.67        | 3.30          |
| 1.250       | 4.90          | 2.750       | 48.90         | 4.250       | 6.50          | 5.75        | 3.30          |
| 1.333       | 4.90          | 2.833       | 127.00        | 4.333       | 6.50          | 5.83        | 3.30          |
| 1.417       | 4.90          | 2.917       | 127.00        | 4.417       | 6.50          | 5.92        | 3.30          |
| 1.500       | 4.90          | 3.000       | 127.00        | 4.500       | 6.50          | 6.00        | 3.30          |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.075 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 22.150  
 TOTAL RAINFALL (mm)= 81.475  
 RUNOFF COEFFICIENT = 0.272

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

-----  
 | CALIB |  
 | STANDHYD ( 2200) | Area (ha)= 2.14  
 | ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 33.00  
 -----

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.92       | 1.22         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 1.50       | 0.27         |
| Length (m)=        | 119.44     | 215.00       |
| Mannings n =       | 0.013      | 0.250        |

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

----- TRANSFORMED HYETOGRAPH -----

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.083       | 3.30          | 1.583       | 8.10          | 3.083       | 17.90         | 4.58        | 4.90          |
| 0.167       | 3.30          | 1.667       | 8.10          | 3.167       | 17.90         | 4.67        | 4.90          |
| 0.250       | 3.30          | 1.750       | 8.10          | 3.250       | 17.90         | 4.75        | 4.90          |
| 0.333       | 3.30          | 1.833       | 8.10          | 3.333       | 17.90         | 4.83        | 4.90          |
| 0.417       | 3.30          | 1.917       | 8.10          | 3.417       | 17.90         | 4.92        | 4.90          |
| 0.500       | 3.30          | 2.000       | 8.10          | 3.500       | 17.90         | 5.00        | 4.90          |
| 0.583       | 4.90          | 2.083       | 9.80          | 3.583       | 8.10          | 5.08        | 3.30          |
| 0.667       | 4.90          | 2.167       | 9.80          | 3.667       | 8.10          | 5.17        | 3.30          |
| 0.750       | 4.90          | 2.250       | 9.80          | 3.750       | 8.10          | 5.25        | 3.30          |
| 0.833       | 4.90          | 2.333       | 9.80          | 3.833       | 8.10          | 5.33        | 3.30          |
| 0.917       | 4.90          | 2.417       | 9.80          | 3.917       | 8.10          | 5.42        | 3.30          |
| 1.000       | 4.90          | 2.500       | 9.80          | 4.000       | 8.10          | 5.50        | 3.30          |
| 1.083       | 4.90          | 2.583       | 48.90         | 4.083       | 6.50          | 5.58        | 3.30          |
| 1.167       | 4.90          | 2.667       | 48.90         | 4.167       | 6.50          | 5.67        | 3.30          |
| 1.250       | 4.90          | 2.750       | 48.90         | 4.250       | 6.50          | 5.75        | 3.30          |
| 1.333       | 4.90          | 2.833       | 127.00        | 4.333       | 6.50          | 5.83        | 3.30          |
| 1.417       | 4.90          | 2.917       | 127.00        | 4.417       | 6.50          | 5.92        | 3.30          |
| 1.500       | 4.90          | 3.000       | 127.00        | 4.500       | 6.50          | 6.00        | 3.30          |

Max.Eff.Inten.(mm/hr)= 127.00 22.61  
 over (min) 5.00 70.00  
 Storage Coeff. (min)= 2.29 (ii) 66.28 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 70.00  
 Unit Hyd. peak (cms)= 0.30 0.02

\*TOTALS\*

PEAK FLOW (cms)= 0.25 0.04 0.256 (iii)  
 TIME TO PEAK (hrs)= 3.00 4.08 3.00  
 RUNOFF VOLUME (mm)= 80.47 27.32 44.84

TOTAL RAINFALL (mm)= 81.48 81.48 81.48  
 RUNOFF COEFFICIENT = 0.99 0.34 0.55

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. Storage (Above)  
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.  
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0009) |
| 1 + 2 = 3 |
-----
      AREA   QPEAK   TPEAK   R.V.
      (ha)   (cms)   (hrs)   (mm)
ID1= 1 ( 2200):  2.14  0.256  3.00  44.84
+ ID2= 2 ( 2201):  0.74  0.072  3.08  26.83
=====
ID = 3 ( 0009):  2.88  0.328  3.00  40.21
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| ADD HYD ( 0009) |
| 3 + 2 = 1 |
-----
      AREA   QPEAK   TPEAK   R.V.
      (ha)   (cms)   (hrs)   (mm)
ID1= 3 ( 0009):  2.88  0.328  3.00  40.21
+ ID2= 2 ( 0047):  0.93  0.075  3.08  22.15
=====
ID = 1 ( 0009):  3.81  0.401  3.00  35.80
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB
| NASHYD ( 2101) | Area (ha)= 1.28 Curve Number (CN)= 65.1
| ID= 1 DT= 5.0 min | Ia (mm)= 4.70 # of Linear Res.(N)= 3.00
-----
      U.H. Tp(hrs)= 0.44
  
```

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
  
```

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```

0.083  3.30 | 1.583  8.10 | 3.083  17.90 | 4.58  4.90
0.167  3.30 | 1.667  8.10 | 3.167  17.90 | 4.67  4.90
0.250  3.30 | 1.750  8.10 | 3.250  17.90 | 4.75  4.90
0.333  3.30 | 1.833  8.10 | 3.333  17.90 | 4.83  4.90
0.417  3.30 | 1.917  8.10 | 3.417  17.90 | 4.92  4.90
0.500  3.30 | 2.000  8.10 | 3.500  17.90 | 5.00  4.90
0.583  4.90 | 2.083  9.80 | 3.583  8.10 | 5.08  3.30
0.667  4.90 | 2.167  9.80 | 3.667  8.10 | 5.17  3.30
0.750  4.90 | 2.250  9.80 | 3.750  8.10 | 5.25  3.30
0.833  4.90 | 2.333  9.80 | 3.833  8.10 | 5.33  3.30
0.917  4.90 | 2.417  9.80 | 3.917  8.10 | 5.42  3.30
1.000  4.90 | 2.500  9.80 | 4.000  8.10 | 5.50  3.30
1.083  4.90 | 2.583  48.90 | 4.083  6.50 | 5.58  3.30
1.167  4.90 | 2.667  48.90 | 4.167  6.50 | 5.67  3.30
1.250  4.90 | 2.750  48.90 | 4.250  6.50 | 5.75  3.30
1.333  4.90 | 2.833  127.00 | 4.333  6.50 | 5.83  3.30
1.417  4.90 | 2.917  127.00 | 4.417  6.50 | 5.92  3.30
1.500  4.90 | 3.000  127.00 | 4.500  6.50 | 6.00  3.30
  
```

Unit Hyd Qpeak (cms)= 0.111

PEAK FLOW (cms)= 0.069 (i)  
 TIME TO PEAK (hrs)= 3.333  
 RUNOFF VOLUME (mm)= 27.677  
 TOTAL RAINFALL (mm)= 81.475  
 RUNOFF COEFFICIENT = 0.340

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

```

-----
| CALIB
| STANDHYD ( 2100) | Area (ha)= 0.24
| ID= 1 DT= 5.0 min | Total Imp(%)= 64.00 Dir. Conn.(%)= 60.00
  
```

```

      IMPERVIOUS   PERVIOUS (i)
Surface Area (ha)= 0.15 0.09
Dep. Storage (mm)= 1.00 5.00
Average Slope (%)= 3.10 3.00
Length (m)= 40.00 70.00
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
  
```

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|       |      |       |        |       |       |      |      |
|-------|------|-------|--------|-------|-------|------|------|
| 0.083 | 3.30 | 1.583 | 8.10   | 3.083 | 17.90 | 4.58 | 4.90 |
| 0.167 | 3.30 | 1.667 | 8.10   | 3.167 | 17.90 | 4.67 | 4.90 |
| 0.250 | 3.30 | 1.750 | 8.10   | 3.250 | 17.90 | 4.75 | 4.90 |
| 0.333 | 3.30 | 1.833 | 8.10   | 3.333 | 17.90 | 4.83 | 4.90 |
| 0.417 | 3.30 | 1.917 | 8.10   | 3.417 | 17.90 | 4.92 | 4.90 |
| 0.500 | 3.30 | 2.000 | 8.10   | 3.500 | 17.90 | 5.00 | 4.90 |
| 0.583 | 4.90 | 2.083 | 9.80   | 3.583 | 8.10  | 5.08 | 3.30 |
| 0.667 | 4.90 | 2.167 | 9.80   | 3.667 | 8.10  | 5.17 | 3.30 |
| 0.750 | 4.90 | 2.250 | 9.80   | 3.750 | 8.10  | 5.25 | 3.30 |
| 0.833 | 4.90 | 2.333 | 9.80   | 3.833 | 8.10  | 5.33 | 3.30 |
| 0.917 | 4.90 | 2.417 | 9.80   | 3.917 | 8.10  | 5.42 | 3.30 |
| 1.000 | 4.90 | 2.500 | 9.80   | 4.000 | 8.10  | 5.50 | 3.30 |
| 1.083 | 4.90 | 2.583 | 48.90  | 4.083 | 6.50  | 5.58 | 3.30 |
| 1.167 | 4.90 | 2.667 | 48.90  | 4.167 | 6.50  | 5.67 | 3.30 |
| 1.250 | 4.90 | 2.750 | 48.90  | 4.250 | 6.50  | 5.75 | 3.30 |
| 1.333 | 4.90 | 2.833 | 127.00 | 4.333 | 6.50  | 5.83 | 3.30 |
| 1.417 | 4.90 | 2.917 | 127.00 | 4.417 | 6.50  | 5.92 | 3.30 |
| 1.500 | 4.90 | 3.000 | 127.00 | 4.500 | 6.50  | 6.00 | 3.30 |

Max.Eff.Inten.(mm/hr)= 127.00 51.87  
over (min) 5.00 15.00  
Storage Coeff. (min)= 0.95 (ii) 12.32 (ii)  
Unit Hyd. Tpeak (min)= 5.00 15.00  
Unit Hyd. peak (cms)= 0.34 0.08

\*TOTALS\*

PEAK FLOW (cms)= 0.05 0.01 0.058 (iii)  
TIME TO PEAK (hrs)= 3.00 3.08 3.00  
RUNOFF VOLUME (mm)= 80.48 26.19 58.73  
TOTAL RAINFALL (mm)= 81.48 81.48 81.48  
RUNOFF COEFFICIENT = 0.99 0.32 0.72

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 60.5 Ia = Dep. Storage (Above)  
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.  
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0006) |
| 1 + 2 = 3 |
-----
      AREA   QPEAK   TPEAK   R.V.
      (ha)   (cms)   (hrs)   (mm)
ID1= 1 ( 2100): 0.24 0.058 3.00 58.73
+ ID2= 2 ( 2101): 1.28 0.069 3.33 27.68
=====

```

ID = 3 ( 0006): 1.52 0.094 3.00 32.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB |
| NASHYD ( 2300) | Area (ha)= 0.23 Curve Number (CN)= 66.5
| ID= 1 DT= 5.0 min | Ia (mm)= 4.60 # of Linear Res.(N)= 3.00
-----
U.H. Tp(hrs)= 0.27

```

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  3.30 | 1.583  8.10 | 3.083 17.90 | 4.58  4.90
0.167  3.30 | 1.667  8.10 | 3.167 17.90 | 4.67  4.90
0.250  3.30 | 1.750  8.10 | 3.250 17.90 | 4.75  4.90
0.333  3.30 | 1.833  8.10 | 3.333 17.90 | 4.83  4.90
0.417  3.30 | 1.917  8.10 | 3.417 17.90 | 4.92  4.90
0.500  3.30 | 2.000  8.10 | 3.500 17.90 | 5.00  4.90
0.583  4.90 | 2.083  9.80 | 3.583  8.10 | 5.08  3.30
0.667  4.90 | 2.167  9.80 | 3.667  8.10 | 5.17  3.30
0.750  4.90 | 2.250  9.80 | 3.750  8.10 | 5.25  3.30
0.833  4.90 | 2.333  9.80 | 3.833  8.10 | 5.33  3.30
0.917  4.90 | 2.417  9.80 | 3.917  8.10 | 5.42  3.30
1.000  4.90 | 2.500  9.80 | 4.000  8.10 | 5.50  3.30
1.083  4.90 | 2.583 48.90 | 4.083  6.50 | 5.58  3.30
1.167  4.90 | 2.667 48.90 | 4.167  6.50 | 5.67  3.30
1.250  4.90 | 2.750 48.90 | 4.250  6.50 | 5.75  3.30
1.333  4.90 | 2.833 127.00 | 4.333  6.50 | 5.83  3.30
1.417  4.90 | 2.917 127.00 | 4.417  6.50 | 5.92  3.30
1.500  4.90 | 3.000 127.00 | 4.500  6.50 | 6.00  3.30

```

Unit Hyd Qpeak (cms)= 0.033

PEAK FLOW (cms)= 0.018 (i)  
TIME TO PEAK (hrs)= 3.167  
RUNOFF VOLUME (mm)= 28.832  
TOTAL RAINFALL (mm)= 81.475  
RUNOFF COEFFICIENT = 0.354

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

```

-----
| CALIB |

```

NASHYD ( 0041) | Area (ha)= 1.28 Curve Number (CN)= 65.1  
 ID= 1 DT= 5.0 min | Ia (mm)= 4.70 # of Linear Res.(N)= 3.00  
 ----- U.H. Tp(hrs)= 0.44

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                            | 3.30  | 1.583 | 8.10   | 3.083 | 17.90 | 4.58 | 4.90  |
| 0.167                            | 3.30  | 1.667 | 8.10   | 3.167 | 17.90 | 4.67 | 4.90  |
| 0.250                            | 3.30  | 1.750 | 8.10   | 3.250 | 17.90 | 4.75 | 4.90  |
| 0.333                            | 3.30  | 1.833 | 8.10   | 3.333 | 17.90 | 4.83 | 4.90  |
| 0.417                            | 3.30  | 1.917 | 8.10   | 3.417 | 17.90 | 4.92 | 4.90  |
| 0.500                            | 3.30  | 2.000 | 8.10   | 3.500 | 17.90 | 5.00 | 4.90  |
| 0.583                            | 4.90  | 2.083 | 9.80   | 3.583 | 8.10  | 5.08 | 3.30  |
| 0.667                            | 4.90  | 2.167 | 9.80   | 3.667 | 8.10  | 5.17 | 3.30  |
| 0.750                            | 4.90  | 2.250 | 9.80   | 3.750 | 8.10  | 5.25 | 3.30  |
| 0.833                            | 4.90  | 2.333 | 9.80   | 3.833 | 8.10  | 5.33 | 3.30  |
| 0.917                            | 4.90  | 2.417 | 9.80   | 3.917 | 8.10  | 5.42 | 3.30  |
| 1.000                            | 4.90  | 2.500 | 9.80   | 4.000 | 8.10  | 5.50 | 3.30  |
| 1.083                            | 4.90  | 2.583 | 48.90  | 4.083 | 6.50  | 5.58 | 3.30  |
| 1.167                            | 4.90  | 2.667 | 48.90  | 4.167 | 6.50  | 5.67 | 3.30  |
| 1.250                            | 4.90  | 2.750 | 48.90  | 4.250 | 6.50  | 5.75 | 3.30  |
| 1.333                            | 4.90  | 2.833 | 127.00 | 4.333 | 6.50  | 5.83 | 3.30  |
| 1.417                            | 4.90  | 2.917 | 127.00 | 4.417 | 6.50  | 5.92 | 3.30  |
| 1.500                            | 4.90  | 3.000 | 127.00 | 4.500 | 6.50  | 6.00 | 3.30  |

Unit Hyd Qpeak (cms)= 0.111

PEAK FLOW (cms)= 0.069 (i)  
 TIME TO PEAK (hrs)= 3.333  
 RUNOFF VOLUME (mm)= 27.677  
 TOTAL RAINFALL (mm)= 81.475  
 RUNOFF COEFFICIENT = 0.340

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

-----  
 CALIB  
 STANDHYD ( 0039) | Area (ha)= 0.24  
 ID= 1 DT= 5.0 min | Total Imp(%)= 64.00 Dir. Conn.(%)= 60.00

|                    |            |              |
|--------------------|------------|--------------|
|                    | IMPERVIOUS | PERVIOUS (i) |
| Surface Area (ha)= | 0.15       | 0.09         |
| Dep. Storage (mm)= | 1.00       | 5.00         |

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Average Slope (%)= 3.10 3.00  
 Length (m)= 40.00 70.00  
 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                            | 3.30  | 1.583 | 8.10   | 3.083 | 17.90 | 4.58 | 4.90  |
| 0.167                            | 3.30  | 1.667 | 8.10   | 3.167 | 17.90 | 4.67 | 4.90  |
| 0.250                            | 3.30  | 1.750 | 8.10   | 3.250 | 17.90 | 4.75 | 4.90  |
| 0.333                            | 3.30  | 1.833 | 8.10   | 3.333 | 17.90 | 4.83 | 4.90  |
| 0.417                            | 3.30  | 1.917 | 8.10   | 3.417 | 17.90 | 4.92 | 4.90  |
| 0.500                            | 3.30  | 2.000 | 8.10   | 3.500 | 17.90 | 5.00 | 4.90  |
| 0.583                            | 4.90  | 2.083 | 9.80   | 3.583 | 8.10  | 5.08 | 3.30  |
| 0.667                            | 4.90  | 2.167 | 9.80   | 3.667 | 8.10  | 5.17 | 3.30  |
| 0.750                            | 4.90  | 2.250 | 9.80   | 3.750 | 8.10  | 5.25 | 3.30  |
| 0.833                            | 4.90  | 2.333 | 9.80   | 3.833 | 8.10  | 5.33 | 3.30  |
| 0.917                            | 4.90  | 2.417 | 9.80   | 3.917 | 8.10  | 5.42 | 3.30  |
| 1.000                            | 4.90  | 2.500 | 9.80   | 4.000 | 8.10  | 5.50 | 3.30  |
| 1.083                            | 4.90  | 2.583 | 48.90  | 4.083 | 6.50  | 5.58 | 3.30  |
| 1.167                            | 4.90  | 2.667 | 48.90  | 4.167 | 6.50  | 5.67 | 3.30  |
| 1.250                            | 4.90  | 2.750 | 48.90  | 4.250 | 6.50  | 5.75 | 3.30  |
| 1.333                            | 4.90  | 2.833 | 127.00 | 4.333 | 6.50  | 5.83 | 3.30  |
| 1.417                            | 4.90  | 2.917 | 127.00 | 4.417 | 6.50  | 5.92 | 3.30  |
| 1.500                            | 4.90  | 3.000 | 127.00 | 4.500 | 6.50  | 6.00 | 3.30  |

Max.Eff.Inten.(mm/hr)= 127.00 51.87  
 over (min) 5.00 15.00  
 Storage Coeff. (min)= 0.95 (ii) 12.32 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 15.00  
 Unit Hyd. peak (cms)= 0.34 0.08

\*TOTALS\*

|                      |       |       |             |
|----------------------|-------|-------|-------------|
| PEAK FLOW (cms)=     | 0.05  | 0.01  | 0.058 (iii) |
| TIME TO PEAK (hrs)=  | 3.00  | 3.08  | 3.00        |
| RUNOFF VOLUME (mm)=  | 80.48 | 26.19 | 58.73       |
| TOTAL RAINFALL (mm)= | 81.48 | 81.48 | 81.48       |
| RUNOFF COEFFICIENT = | 0.99  | 0.32  | 0.72        |

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. 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( 0042)                         |         |         |         |       |
| IN= 2---> OUT= 1                         |         |         |         |       |
| DT= 5.0 min                              |         |         |         |       |
| -----                                    |         |         |         |       |
| OVERFLOW IS OFF                          |         |         |         |       |
| OUTFLOW                                  | STORAGE | OUTFLOW | STORAGE |       |
| (cms)                                    | (ha.m.) | (cms)   | (ha.m.) |       |
| 0.0000                                   | 0.0000  | 0.0116  | 0.0080  |       |
| 0.0023                                   | 0.0007  | 0.0127  | 0.0102  |       |
| 0.0055                                   | 0.0017  | 0.0137  | 0.0127  |       |
| 0.0075                                   | 0.0029  | 0.0146  | 0.0153  |       |
| 0.0091                                   | 0.0044  | 0.0155  | 0.0183  |       |
| 0.0104                                   | 0.0061  | 0.0000  | 0.0000  |       |
|                                          |         |         |         |       |
| AREA                                     | QPEAK   | TPEAK   | R.V.    |       |
| (ha)                                     | (cms)   | (hrs)   | (mm)    |       |
| INFLOW : ID= 2 ( 0039)                   | 0.240   | 0.058   | 3.00    | 58.73 |
| OUTFLOW: ID= 1 ( 0042)                   | 0.240   | 0.011   | 3.42    | 58.45 |
|                                          |         |         |         |       |
| PEAK FLOW REDUCTION [Qout/Qin](%)= 18.94 |         |         |         |       |
| TIME SHIFT OF PEAK FLOW (min)= 25.00     |         |         |         |       |
| MAXIMUM STORAGE USED (ha.m.)= 0.0069     |         |         |         |       |
| -----                                    |         |         |         |       |

|                   |      |       |      |       |
|-------------------|------|-------|------|-------|
| ADD HYD ( 0040)   |      |       |      |       |
| 1 + 2 = 3         |      |       |      |       |
| -----             |      |       |      |       |
| ID1= 1 ( 0041):   | 1.28 | 0.069 | 3.33 | 27.68 |
| + ID2= 2 ( 0042): | 0.24 | 0.011 | 3.42 | 58.45 |
| =====             |      |       |      |       |
| ID = 3 ( 0040):   | 1.52 | 0.080 | 3.33 | 32.54 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

|                   |      |                      |      |  |
|-------------------|------|----------------------|------|--|
| CALIB             |      |                      |      |  |
| NASHYD ( 0043)    |      |                      |      |  |
| ID= 1 DT= 5.0 min |      |                      |      |  |
| -----             |      |                      |      |  |
| Area (ha)=        | 0.74 | Curve Number (CN)=   | 64.2 |  |
| Ia (mm)=          | 4.80 | # of Linear Res.(N)= | 3.00 |  |
| U.H. Tp(hrs)=     | 0.17 |                      |      |  |

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 | 3.30 | 1.583 | 8.10   | 3.083 | 17.90 | 4.58 | 4.90 |
| 0.167 | 3.30 | 1.667 | 8.10   | 3.167 | 17.90 | 4.67 | 4.90 |
| 0.250 | 3.30 | 1.750 | 8.10   | 3.250 | 17.90 | 4.75 | 4.90 |
| 0.333 | 3.30 | 1.833 | 8.10   | 3.333 | 17.90 | 4.83 | 4.90 |
| 0.417 | 3.30 | 1.917 | 8.10   | 3.417 | 17.90 | 4.92 | 4.90 |
| 0.500 | 3.30 | 2.000 | 8.10   | 3.500 | 17.90 | 5.00 | 4.90 |
| 0.583 | 4.90 | 2.083 | 9.80   | 3.583 | 8.10  | 5.08 | 3.30 |
| 0.667 | 4.90 | 2.167 | 9.80   | 3.667 | 8.10  | 5.17 | 3.30 |
| 0.750 | 4.90 | 2.250 | 9.80   | 3.750 | 8.10  | 5.25 | 3.30 |
| 0.833 | 4.90 | 2.333 | 9.80   | 3.833 | 8.10  | 5.33 | 3.30 |
| 0.917 | 4.90 | 2.417 | 9.80   | 3.917 | 8.10  | 5.42 | 3.30 |
| 1.000 | 4.90 | 2.500 | 9.80   | 4.000 | 8.10  | 5.50 | 3.30 |
| 1.083 | 4.90 | 2.583 | 48.90  | 4.083 | 6.50  | 5.58 | 3.30 |
| 1.167 | 4.90 | 2.667 | 48.90  | 4.167 | 6.50  | 5.67 | 3.30 |
| 1.250 | 4.90 | 2.750 | 48.90  | 4.250 | 6.50  | 5.75 | 3.30 |
| 1.333 | 4.90 | 2.833 | 127.00 | 4.333 | 6.50  | 5.83 | 3.30 |
| 1.417 | 4.90 | 2.917 | 127.00 | 4.417 | 6.50  | 5.92 | 3.30 |
| 1.500 | 4.90 | 3.000 | 127.00 | 4.500 | 6.50  | 6.00 | 3.30 |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.072 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 26.833  
 TOTAL RAINFALL (mm)= 81.475  
 RUNOFF COEFFICIENT = 0.329

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

|                   |       |                      |      |
|-------------------|-------|----------------------|------|
| CALIB             |       |                      |      |
| NASHYD ( 0048)    |       |                      |      |
| ID= 1 DT= 5.0 min |       |                      |      |
| -----             |       |                      |      |
| Area (ha)=        | 0.93  | Curve Number (CN)=   | 61.6 |
| Ia (mm)=          | 10.00 | # of Linear Res.(N)= | 3.00 |
| U.H. Tp(hrs)=     | 0.17  |                      |      |

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                              | 3.30  | 1.583 | 8.10  | 3.083 | 17.90 | 4.58 | 4.90  |
| 0.167                              | 3.30  | 1.667 | 8.10  | 3.167 | 17.90 | 4.67 | 4.90  |
| 0.250                              | 3.30  | 1.750 | 8.10  | 3.250 | 17.90 | 4.75 | 4.90  |
| 0.333                              | 3.30  | 1.833 | 8.10  | 3.333 | 17.90 | 4.83 | 4.90  |
| 0.417                              | 3.30  | 1.917 | 8.10  | 3.417 | 17.90 | 4.92 | 4.90  |
| 0.500                              | 3.30  | 2.000 | 8.10  | 3.500 | 17.90 | 5.00 | 4.90  |

|       |      |       |        |       |      |      |      |
|-------|------|-------|--------|-------|------|------|------|
| 0.583 | 4.90 | 2.083 | 9.80   | 3.583 | 8.10 | 5.08 | 3.30 |
| 0.667 | 4.90 | 2.167 | 9.80   | 3.667 | 8.10 | 5.17 | 3.30 |
| 0.750 | 4.90 | 2.250 | 9.80   | 3.750 | 8.10 | 5.25 | 3.30 |
| 0.833 | 4.90 | 2.333 | 9.80   | 3.833 | 8.10 | 5.33 | 3.30 |
| 0.917 | 4.90 | 2.417 | 9.80   | 3.917 | 8.10 | 5.42 | 3.30 |
| 1.000 | 4.90 | 2.500 | 9.80   | 4.000 | 8.10 | 5.50 | 3.30 |
| 1.083 | 4.90 | 2.583 | 48.90  | 4.083 | 6.50 | 5.58 | 3.30 |
| 1.167 | 4.90 | 2.667 | 48.90  | 4.167 | 6.50 | 5.67 | 3.30 |
| 1.250 | 4.90 | 2.750 | 48.90  | 4.250 | 6.50 | 5.75 | 3.30 |
| 1.333 | 4.90 | 2.833 | 127.00 | 4.333 | 6.50 | 5.83 | 3.30 |
| 1.417 | 4.90 | 2.917 | 127.00 | 4.417 | 6.50 | 5.92 | 3.30 |
| 1.500 | 4.90 | 3.000 | 127.00 | 4.500 | 6.50 | 6.00 | 3.30 |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.075 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 22.150  
 TOTAL RAINFALL (mm)= 81.475  
 RUNOFF COEFFICIENT = 0.272

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

| ADD HYD ( 0049)   |      |       |       |       |
|-------------------|------|-------|-------|-------|
| 1 + 2 = 3         |      |       |       |       |
|                   | AREA | QPEAK | TPEAK | R.V.  |
|                   | (ha) | (cms) | (hrs) | (mm)  |
| ID1= 1 ( 0043):   | 0.74 | 0.072 | 3.08  | 26.83 |
| + ID2= 2 ( 0048): | 0.93 | 0.075 | 3.08  | 22.15 |
| =====             |      |       |       |       |
| ID = 3 ( 0049):   | 1.67 | 0.147 | 3.08  | 24.22 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| CALIB             |               |       |                      |
|-------------------|---------------|-------|----------------------|
| STANDHYD ( 0044)  |               |       |                      |
| ID= 1 DT= 5.0 min |               |       |                      |
|                   | Area (ha)=    | 2.14  |                      |
|                   | Total Imp(%)= | 43.00 | Dir. Conn.(%)= 33.00 |

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.92       | 1.22         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 1.50       | 0.27         |
| Length (m)=        | 119.44     | 215.00       |
| 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                            | 3.30  | 1.583 | 8.10   | 3.083 | 17.90 | 4.58 | 4.90  |
| 0.167                            | 3.30  | 1.667 | 8.10   | 3.167 | 17.90 | 4.67 | 4.90  |
| 0.250                            | 3.30  | 1.750 | 8.10   | 3.250 | 17.90 | 4.75 | 4.90  |
| 0.333                            | 3.30  | 1.833 | 8.10   | 3.333 | 17.90 | 4.83 | 4.90  |
| 0.417                            | 3.30  | 1.917 | 8.10   | 3.417 | 17.90 | 4.92 | 4.90  |
| 0.500                            | 3.30  | 2.000 | 8.10   | 3.500 | 17.90 | 5.00 | 4.90  |
| 0.583                            | 4.90  | 2.083 | 9.80   | 3.583 | 8.10  | 5.08 | 3.30  |
| 0.667                            | 4.90  | 2.167 | 9.80   | 3.667 | 8.10  | 5.17 | 3.30  |
| 0.750                            | 4.90  | 2.250 | 9.80   | 3.750 | 8.10  | 5.25 | 3.30  |
| 0.833                            | 4.90  | 2.333 | 9.80   | 3.833 | 8.10  | 5.33 | 3.30  |
| 0.917                            | 4.90  | 2.417 | 9.80   | 3.917 | 8.10  | 5.42 | 3.30  |
| 1.000                            | 4.90  | 2.500 | 9.80   | 4.000 | 8.10  | 5.50 | 3.30  |
| 1.083                            | 4.90  | 2.583 | 48.90  | 4.083 | 6.50  | 5.58 | 3.30  |
| 1.167                            | 4.90  | 2.667 | 48.90  | 4.167 | 6.50  | 5.67 | 3.30  |
| 1.250                            | 4.90  | 2.750 | 48.90  | 4.250 | 6.50  | 5.75 | 3.30  |
| 1.333                            | 4.90  | 2.833 | 127.00 | 4.333 | 6.50  | 5.83 | 3.30  |
| 1.417                            | 4.90  | 2.917 | 127.00 | 4.417 | 6.50  | 5.92 | 3.30  |
| 1.500                            | 4.90  | 3.000 | 127.00 | 4.500 | 6.50  | 6.00 | 3.30  |

Max.Eff.Inten.(mm/hr)= 127.00 22.61  
 over (min) 5.00 70.00  
 Storage Coeff. (min)= 2.29 (ii) 66.28 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 70.00  
 Unit Hyd. peak (cms)= 0.30 0.02

\*TOTALS\*

PEAK FLOW (cms)= 0.25 0.04 0.256 (iii)  
 TIME TO PEAK (hrs)= 3.00 4.08 3.00  
 RUNOFF VOLUME (mm)= 80.47 27.32 44.84  
 TOTAL RAINFALL (mm)= 81.48 81.48 81.48  
 RUNOFF COEFFICIENT = 0.99 0.34 0.55

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. Storage (Above)  
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.  
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| RESERVOIR( 0046) | OVERFLOW IS OFF

| IN= 2--> OUT= 1 |  
| DT= 5.0 min |

| OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) | OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) |
|------------------|--------------------|------------------|--------------------|
| 0.0000           | 0.0000             | 0.0581           | 0.0439             |
| 0.0039           | 0.0043             | 0.0782           | 0.0554             |
| 0.0064           | 0.0099             | 0.0938           | 0.0681             |
| 0.0082           | 0.0166             | 0.1070           | 0.0819             |
| 0.0097           | 0.0245             | 0.1187           | 0.0970             |
| 0.0110           | 0.0336             | 0.0000           | 0.0000             |

|                        | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|------------------------|--------------|----------------|----------------|--------------|
| INFLOW : ID= 2 ( 0044) | 2.140        | 0.256          | 3.00           | 44.84        |
| OUTFLOW: ID= 1 ( 0046) | 2.140        | 0.051          | 4.42           | 44.71        |

PEAK FLOW REDUCTION [Qout/Qin](%)= 19.75  
TIME SHIFT OF PEAK FLOW (min)= 85.00  
MAXIMUM STORAGE USED (ha.m.)= 0.0423

| ADD HYD ( 0045) |  
| 1 + 2 = 3 |

|                   | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|-------------------|--------------|----------------|----------------|--------------|
| ID1= 1 ( 0046):   | 2.14         | 0.051          | 4.42           | 44.71        |
| + ID2= 2 ( 0049): | 1.67         | 0.147          | 3.08           | 24.22        |
| =====             |              |                |                |              |
| ID = 3 ( 0045):   | 3.81         | 0.178          | 3.08           | 35.73        |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

FINISH

=====

=====

|    |   |      |      |   |   |      |   |              |
|----|---|------|------|---|---|------|---|--------------|
| V  | V | I    | SSSS | U | U | A    | L | (v 6.2.2006) |
| V  | V | I    | SS   | U | U | A A  | L |              |
| V  | V | I    | SS   | U | U | AAAA | L |              |
| V  | V | I    | SS   | U | U | A A  | L |              |
| VV | I | SSSS | UUUU | A | A | LLLL |   |              |

|     |      |      |   |   |   |   |   |    |     |    |   |
|-----|------|------|---|---|---|---|---|----|-----|----|---|
| 000 | TTTT | TTTT | H | H | Y | Y | M | M  | 000 | TM |   |
| O   | O    | T    | T | H | H | Y | Y | MM | MM  | O  | O |

May 10, 2022 12:56:02 PM

10985-V0 Output

O O T T H H Y M M O O  
000 T T H H Y M M 000  
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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\V02\voindat

Output filename:  
C:\Users\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\95454  
090-a153-4b44-a550-78be01c0678e\scena

Summary filename:  
C:\Users\sormel\AppData\Local\Civica\XH5\438ef3f6-2c2f-4118-8c04-e6291d4a0f15\95454  
090-a153-4b44-a550-78be01c0678e\scena

DATE: 05/10/2022

TIME: 12:42:10

USER:

COMMENTS: \_\_\_\_\_

\*\*\*\*\*  
\*\* SIMULATION : Run 06 \*\*  
\*\*\*\*\*

| READ STORM       | Filename: C:\Users\sormel\AppData\Local\Temp\2deb8561-d1e0-47f6-9eb6-5ad55f7cb9f2\ffa5c488 |
|------------------|--------------------------------------------------------------------------------------------|
| Ptotal= 89.93 mm | Comments: 100-Year, 6 hour SCS Type II - City of P                                         |

| TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr | TIME<br>hrs | RAIN<br>mm/hr |
|-------------|---------------|-------------|---------------|-------------|---------------|-------------|---------------|
| 0.25        | 3.60          | 1.75        | 9.00          | 3.25        | 19.80         | 4.75        | 5.40          |
| 0.50        | 3.60          | 2.00        | 9.00          | 3.50        | 19.80         | 5.00        | 5.40          |
| 0.75        | 5.40          | 2.25        | 10.80         | 3.75        | 9.00          | 5.25        | 3.60          |
| 1.00        | 5.40          | 2.50        | 10.80         | 4.00        | 9.00          | 5.50        | 3.60          |

May 10, 2022 12:56:02 PM

10985-V0 Output

89/105

|      |      |      |        |      |      |      |      |
|------|------|------|--------|------|------|------|------|
| 1.25 | 5.40 | 2.75 | 53.90  | 4.25 | 7.20 | 5.75 | 3.60 |
| 1.50 | 5.40 | 3.00 | 140.20 | 4.50 | 7.20 | 6.00 | 3.60 |

```

-----
| CALIB
| NASHYD ( 1100) | Area (ha)= 2.18 Curve Number (CN)= 67.7
| ID= 1 DT= 5.0 min | Ia (mm)= 8.20 # of Linear Res.(N)= 3.00
-----
| U.H. Tp(hrs)= 0.36

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

-----
      TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
      hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
-----
0.083 3.60 | 1.583 9.00 | 3.083 19.80 | 4.58 5.40
0.167 3.60 | 1.667 9.00 | 3.167 19.80 | 4.67 5.40
0.250 3.60 | 1.750 9.00 | 3.250 19.80 | 4.75 5.40
0.333 3.60 | 1.833 9.00 | 3.333 19.80 | 4.83 5.40
0.417 3.60 | 1.917 9.00 | 3.417 19.80 | 4.92 5.40
0.500 3.60 | 2.000 9.00 | 3.500 19.80 | 5.00 5.40
0.583 5.40 | 2.083 10.80 | 3.583 9.00 | 5.08 3.60
0.667 5.40 | 2.167 10.80 | 3.667 9.00 | 5.17 3.60
0.750 5.40 | 2.250 10.80 | 3.750 9.00 | 5.25 3.60
0.833 5.40 | 2.333 10.80 | 3.833 9.00 | 5.33 3.60
0.917 5.40 | 2.417 10.80 | 3.917 9.00 | 5.42 3.60
1.000 5.40 | 2.500 10.80 | 4.000 9.00 | 5.50 3.60
1.083 5.40 | 2.583 53.90 | 4.083 7.20 | 5.58 3.60
1.167 5.40 | 2.667 53.90 | 4.167 7.20 | 5.67 3.60
1.250 5.40 | 2.750 53.90 | 4.250 7.20 | 5.75 3.60
1.333 5.40 | 2.833 140.20 | 4.333 7.20 | 5.83 3.60
1.417 5.40 | 2.917 140.20 | 4.417 7.20 | 5.92 3.60
1.500 5.40 | 3.000 140.20 | 4.500 7.20 | 6.00 3.60

```

Unit Hyd Qpeak (cms)= 0.231

```

PEAK FLOW (cms)= 0.164 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 32.909
TOTAL RAINFALL (mm)= 89.925
RUNOFF COEFFICIENT = 0.366

```

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

90/105

```

-----
| CALIB
| NASHYD ( 1200) | Area (ha)= 1.76 Curve Number (CN)= 64.3
| ID= 1 DT= 5.0 min | Ia (mm)= 8.90 # of Linear Res.(N)= 3.00
-----
| U.H. Tp(hrs)= 0.12

```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

```

-----
      TIME RAIN | TIME RAIN | TIME RAIN | TIME RAIN
      hrs mm/hr | hrs mm/hr | hrs mm/hr | hrs mm/hr
-----
0.083 3.60 | 1.583 9.00 | 3.083 19.80 | 4.58 5.40
0.167 3.60 | 1.667 9.00 | 3.167 19.80 | 4.67 5.40
0.250 3.60 | 1.750 9.00 | 3.250 19.80 | 4.75 5.40
0.333 3.60 | 1.833 9.00 | 3.333 19.80 | 4.83 5.40
0.417 3.60 | 1.917 9.00 | 3.417 19.80 | 4.92 5.40
0.500 3.60 | 2.000 9.00 | 3.500 19.80 | 5.00 5.40
0.583 5.40 | 2.083 10.80 | 3.583 9.00 | 5.08 3.60
0.667 5.40 | 2.167 10.80 | 3.667 9.00 | 5.17 3.60
0.750 5.40 | 2.250 10.80 | 3.750 9.00 | 5.25 3.60
0.833 5.40 | 2.333 10.80 | 3.833 9.00 | 5.33 3.60
0.917 5.40 | 2.417 10.80 | 3.917 9.00 | 5.42 3.60
1.000 5.40 | 2.500 10.80 | 4.000 9.00 | 5.50 3.60
1.083 5.40 | 2.583 53.90 | 4.083 7.20 | 5.58 3.60
1.167 5.40 | 2.667 53.90 | 4.167 7.20 | 5.67 3.60
1.250 5.40 | 2.750 53.90 | 4.250 7.20 | 5.75 3.60
1.333 5.40 | 2.833 140.20 | 4.333 7.20 | 5.83 3.60
1.417 5.40 | 2.917 140.20 | 4.417 7.20 | 5.92 3.60
1.500 5.40 | 3.000 140.20 | 4.500 7.20 | 6.00 3.60

```

Unit Hyd Qpeak (cms)= 0.560

```

PEAK FLOW (cms)= 0.239 (i)
TIME TO PEAK (hrs)= 3.000
RUNOFF VOLUME (mm)= 29.171
TOTAL RAINFALL (mm)= 89.925
RUNOFF COEFFICIENT = 0.324

```

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

```

-----
| CALIB
| NASHYD ( 1300) | Area (ha)= 1.70 Curve Number (CN)= 68.8
| ID= 1 DT= 5.0 min | Ia (mm)= 8.00 # of Linear Res.(N)= 3.00
-----
| U.H. Tp(hrs)= 0.51

```

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 | 3.60  | 1.583 | 9.00   | 3.083 | 19.80 | 4.58 | 5.40  |
| 0.167 | 3.60  | 1.667 | 9.00   | 3.167 | 19.80 | 4.67 | 5.40  |
| 0.250 | 3.60  | 1.750 | 9.00   | 3.250 | 19.80 | 4.75 | 5.40  |
| 0.333 | 3.60  | 1.833 | 9.00   | 3.333 | 19.80 | 4.83 | 5.40  |
| 0.417 | 3.60  | 1.917 | 9.00   | 3.417 | 19.80 | 4.92 | 5.40  |
| 0.500 | 3.60  | 2.000 | 9.00   | 3.500 | 19.80 | 5.00 | 5.40  |
| 0.583 | 5.40  | 2.083 | 10.80  | 3.583 | 9.00  | 5.08 | 3.60  |
| 0.667 | 5.40  | 2.167 | 10.80  | 3.667 | 9.00  | 5.17 | 3.60  |
| 0.750 | 5.40  | 2.250 | 10.80  | 3.750 | 9.00  | 5.25 | 3.60  |
| 0.833 | 5.40  | 2.333 | 10.80  | 3.833 | 9.00  | 5.33 | 3.60  |
| 0.917 | 5.40  | 2.417 | 10.80  | 3.917 | 9.00  | 5.42 | 3.60  |
| 1.000 | 5.40  | 2.500 | 10.80  | 4.000 | 9.00  | 5.50 | 3.60  |
| 1.083 | 5.40  | 2.583 | 53.90  | 4.083 | 7.20  | 5.58 | 3.60  |
| 1.167 | 5.40  | 2.667 | 53.90  | 4.167 | 7.20  | 5.67 | 3.60  |
| 1.250 | 5.40  | 2.750 | 53.90  | 4.250 | 7.20  | 5.75 | 3.60  |
| 1.333 | 5.40  | 2.833 | 140.20 | 4.333 | 7.20  | 5.83 | 3.60  |
| 1.417 | 5.40  | 2.917 | 140.20 | 4.417 | 7.20  | 5.92 | 3.60  |
| 1.500 | 5.40  | 3.000 | 140.20 | 4.500 | 7.20  | 6.00 | 3.60  |

Unit Hyd Qpeak (cms)= 0.127

PEAK FLOW (cms)= 0.103 (i)  
 TIME TO PEAK (hrs)= 3.417  
 RUNOFF VOLUME (mm)= 34.048  
 TOTAL RAINFALL (mm)= 89.925  
 RUNOFF COEFFICIENT = 0.379

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

-----  
 | CALIB  
 | NASHYD ( 2201) | Area (ha)= 0.74 Curve Number (CN)= 64.2  
 | ID= 1 DT= 5.0 min | Ia (mm)= 4.80 # of Linear Res.(N)= 3.00  
 | U.H. Tp(hrs)= 0.17

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 | 3.60  | 1.583 | 9.00  | 3.083 | 19.80 | 4.58 | 5.40  |

|       |      |       |        |       |       |      |      |
|-------|------|-------|--------|-------|-------|------|------|
| 0.167 | 3.60 | 1.667 | 9.00   | 3.167 | 19.80 | 4.67 | 5.40 |
| 0.250 | 3.60 | 1.750 | 9.00   | 3.250 | 19.80 | 4.75 | 5.40 |
| 0.333 | 3.60 | 1.833 | 9.00   | 3.333 | 19.80 | 4.83 | 5.40 |
| 0.417 | 3.60 | 1.917 | 9.00   | 3.417 | 19.80 | 4.92 | 5.40 |
| 0.500 | 3.60 | 2.000 | 9.00   | 3.500 | 19.80 | 5.00 | 5.40 |
| 0.583 | 5.40 | 2.083 | 10.80  | 3.583 | 9.00  | 5.08 | 3.60 |
| 0.667 | 5.40 | 2.167 | 10.80  | 3.667 | 9.00  | 5.17 | 3.60 |
| 0.750 | 5.40 | 2.250 | 10.80  | 3.750 | 9.00  | 5.25 | 3.60 |
| 0.833 | 5.40 | 2.333 | 10.80  | 3.833 | 9.00  | 5.33 | 3.60 |
| 0.917 | 5.40 | 2.417 | 10.80  | 3.917 | 9.00  | 5.42 | 3.60 |
| 1.000 | 5.40 | 2.500 | 10.80  | 4.000 | 9.00  | 5.50 | 3.60 |
| 1.083 | 5.40 | 2.583 | 53.90  | 4.083 | 7.20  | 5.58 | 3.60 |
| 1.167 | 5.40 | 2.667 | 53.90  | 4.167 | 7.20  | 5.67 | 3.60 |
| 1.250 | 5.40 | 2.750 | 53.90  | 4.250 | 7.20  | 5.75 | 3.60 |
| 1.333 | 5.40 | 2.833 | 140.20 | 4.333 | 7.20  | 5.83 | 3.60 |
| 1.417 | 5.40 | 2.917 | 140.20 | 4.417 | 7.20  | 5.92 | 3.60 |
| 1.500 | 5.40 | 3.000 | 140.20 | 4.500 | 7.20  | 6.00 | 3.60 |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.086 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 31.840  
 TOTAL RAINFALL (mm)= 89.925  
 RUNOFF COEFFICIENT = 0.354

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

-----  
 | CALIB  
 | NASHYD ( 0047) | Area (ha)= 0.93 Curve Number (CN)= 61.6  
 | ID= 1 DT= 5.0 min | Ia (mm)= 10.00 # of Linear Res.(N)= 3.00  
 | U.H. Tp(hrs)= 0.17

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 | 3.60  | 1.583 | 9.00  | 3.083 | 19.80 | 4.58 | 5.40  |
| 0.167 | 3.60  | 1.667 | 9.00  | 3.167 | 19.80 | 4.67 | 5.40  |
| 0.250 | 3.60  | 1.750 | 9.00  | 3.250 | 19.80 | 4.75 | 5.40  |
| 0.333 | 3.60  | 1.833 | 9.00  | 3.333 | 19.80 | 4.83 | 5.40  |
| 0.417 | 3.60  | 1.917 | 9.00  | 3.417 | 19.80 | 4.92 | 5.40  |
| 0.500 | 3.60  | 2.000 | 9.00  | 3.500 | 19.80 | 5.00 | 5.40  |
| 0.583 | 5.40  | 2.083 | 10.80 | 3.583 | 9.00  | 5.08 | 3.60  |

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|       |      |       |        |       |      |      |      |
|-------|------|-------|--------|-------|------|------|------|
| 0.667 | 5.40 | 2.167 | 10.80  | 3.667 | 9.00 | 5.17 | 3.60 |
| 0.750 | 5.40 | 2.250 | 10.80  | 3.750 | 9.00 | 5.25 | 3.60 |
| 0.833 | 5.40 | 2.333 | 10.80  | 3.833 | 9.00 | 5.33 | 3.60 |
| 0.917 | 5.40 | 2.417 | 10.80  | 3.917 | 9.00 | 5.42 | 3.60 |
| 1.000 | 5.40 | 2.500 | 10.80  | 4.000 | 9.00 | 5.50 | 3.60 |
| 1.083 | 5.40 | 2.583 | 53.90  | 4.083 | 7.20 | 5.58 | 3.60 |
| 1.167 | 5.40 | 2.667 | 53.90  | 4.167 | 7.20 | 5.67 | 3.60 |
| 1.250 | 5.40 | 2.750 | 53.90  | 4.250 | 7.20 | 5.75 | 3.60 |
| 1.333 | 5.40 | 2.833 | 140.20 | 4.333 | 7.20 | 5.83 | 3.60 |
| 1.417 | 5.40 | 2.917 | 140.20 | 4.417 | 7.20 | 5.92 | 3.60 |
| 1.500 | 5.40 | 3.000 | 140.20 | 4.500 | 7.20 | 6.00 | 3.60 |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.091 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 26.715  
 TOTAL RAINFALL (mm)= 89.925  
 RUNOFF COEFFICIENT = 0.297

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

| CALIB                                                                                                                                                                                                                                                                                                                                                                                                                                                              |            | STANDHYD ( 2200) |       | ID= 1 DT= 5.0 min |       |  |            |              |                    |      |      |                    |      |      |                    |      |      |             |        |        |            |       |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------|-------|-------------------|-------|--|------------|--------------|--------------------|------|------|--------------------|------|------|--------------------|------|------|-------------|--------|--------|------------|-------|-------|
| Area (ha)=                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.14       | Total Imp(%)=    | 43.00 | Dir. Conn.(%)=    | 33.00 |  |            |              |                    |      |      |                    |      |      |                    |      |      |             |        |        |            |       |       |
| <table border="1"> <thead> <tr> <th></th> <th>IMPERVIOUS</th> <th>PERVIOUS (i)</th> </tr> </thead> <tbody> <tr> <td>Surface Area (ha)=</td> <td>0.92</td> <td>1.22</td> </tr> <tr> <td>Dep. Storage (mm)=</td> <td>1.00</td> <td>5.00</td> </tr> <tr> <td>Average Slope (%)=</td> <td>1.50</td> <td>0.27</td> </tr> <tr> <td>Length (m)=</td> <td>119.44</td> <td>215.00</td> </tr> <tr> <td>Mannings n</td> <td>0.013</td> <td>0.250</td> </tr> </tbody> </table> |            |                  |       |                   |       |  | IMPERVIOUS | PERVIOUS (i) | Surface Area (ha)= | 0.92 | 1.22 | Dep. Storage (mm)= | 1.00 | 5.00 | Average Slope (%)= | 1.50 | 0.27 | Length (m)= | 119.44 | 215.00 | Mannings n | 0.013 | 0.250 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | IMPERVIOUS | PERVIOUS (i)     |       |                   |       |  |            |              |                    |      |      |                    |      |      |                    |      |      |             |        |        |            |       |       |
| Surface Area (ha)=                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.92       | 1.22             |       |                   |       |  |            |              |                    |      |      |                    |      |      |                    |      |      |             |        |        |            |       |       |
| Dep. Storage (mm)=                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1.00       | 5.00             |       |                   |       |  |            |              |                    |      |      |                    |      |      |                    |      |      |             |        |        |            |       |       |
| Average Slope (%)=                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1.50       | 0.27             |       |                   |       |  |            |              |                    |      |      |                    |      |      |                    |      |      |             |        |        |            |       |       |
| Length (m)=                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 119.44     | 215.00           |       |                   |       |  |            |              |                    |      |      |                    |      |      |                    |      |      |             |        |        |            |       |       |
| 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                            | 3.60  | 1.583 | 9.00  | 3.083 | 19.80 | 4.58 | 5.40  |
| 0.167                            | 3.60  | 1.667 | 9.00  | 3.167 | 19.80 | 4.67 | 5.40  |
| 0.250                            | 3.60  | 1.750 | 9.00  | 3.250 | 19.80 | 4.75 | 5.40  |
| 0.333                            | 3.60  | 1.833 | 9.00  | 3.333 | 19.80 | 4.83 | 5.40  |
| 0.417                            | 3.60  | 1.917 | 9.00  | 3.417 | 19.80 | 4.92 | 5.40  |
| 0.500                            | 3.60  | 2.000 | 9.00  | 3.500 | 19.80 | 5.00 | 5.40  |
| 0.583                            | 5.40  | 2.083 | 10.80 | 3.583 | 9.00  | 5.08 | 3.60  |

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|       |      |       |        |       |      |      |      |
|-------|------|-------|--------|-------|------|------|------|
| 0.667 | 5.40 | 2.167 | 10.80  | 3.667 | 9.00 | 5.17 | 3.60 |
| 0.750 | 5.40 | 2.250 | 10.80  | 3.750 | 9.00 | 5.25 | 3.60 |
| 0.833 | 5.40 | 2.333 | 10.80  | 3.833 | 9.00 | 5.33 | 3.60 |
| 0.917 | 5.40 | 2.417 | 10.80  | 3.917 | 9.00 | 5.42 | 3.60 |
| 1.000 | 5.40 | 2.500 | 10.80  | 4.000 | 9.00 | 5.50 | 3.60 |
| 1.083 | 5.40 | 2.583 | 53.90  | 4.083 | 7.20 | 5.58 | 3.60 |
| 1.167 | 5.40 | 2.667 | 53.90  | 4.167 | 7.20 | 5.67 | 3.60 |
| 1.250 | 5.40 | 2.750 | 53.90  | 4.250 | 7.20 | 5.75 | 3.60 |
| 1.333 | 5.40 | 2.833 | 140.20 | 4.333 | 7.20 | 5.83 | 3.60 |
| 1.417 | 5.40 | 2.917 | 140.20 | 4.417 | 7.20 | 5.92 | 3.60 |
| 1.500 | 5.40 | 3.000 | 140.20 | 4.500 | 7.20 | 6.00 | 3.60 |

Max.Eff.Inten.(mm/hr)= 140.20 26.86  
 over (min)= 5.00 65.00  
 Storage Coeff. (min)= 2.20 (ii) 61.93 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 65.00  
 Unit Hyd. peak (cms)= 0.30 0.02

\*TOTALS\*

PEAK FLOW (cms)= 0.27 0.05 0.285 (iii)  
 TIME TO PEAK (hrs)= 3.00 4.00 3.00  
 RUNOFF VOLUME (mm)= 88.93 32.37 51.02  
 TOTAL RAINFALL (mm)= 89.93 89.93 89.93  
 RUNOFF COEFFICIENT = 0.99 0.36 0.57

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. Storage (Above)  
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.  
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| ADD HYD ( 0009)   |   | AREA | QPEAK | TPEAK | R.V.  |
|-------------------|---|------|-------|-------|-------|
| 1                 | 2 | (ha) | (cms) | (hrs) | (mm)  |
| ID1= 1 ( 2200):   |   | 2.14 | 0.285 | 3.00  | 51.02 |
| + ID2= 2 ( 2201): |   | 0.74 | 0.086 | 3.08  | 31.84 |
| =====             |   |      |       |       |       |
| ID = 3 ( 0009):   |   | 2.88 | 0.370 | 3.00  | 46.09 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD ( 0009)|

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|                   |      |       |       |       |
|-------------------|------|-------|-------|-------|
| 3 + 2 = 1         | AREA | QPEAK | TPEAK | R.V.  |
| -----             | (ha) | (cms) | (hrs) | (mm)  |
| ID1= 3 ( 0009):   | 2.88 | 0.370 | 3.00  | 46.09 |
| + ID2= 2 ( 0047): | 0.93 | 0.091 | 3.08  | 26.71 |
| =====             |      |       |       |       |
| ID = 1 ( 0009):   | 3.81 | 0.459 | 3.00  | 41.36 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

|                   |               |      |                           |
|-------------------|---------------|------|---------------------------|
| CALIB             |               |      |                           |
| NASHYD ( 2101)    | Area (ha)=    | 1.28 | Curve Number (CN)= 65.1   |
| ID= 1 DT= 5.0 min | Ia (mm)=      | 4.70 | # of Linear Res.(N)= 3.00 |
| -----             | U.H. Tp(hrs)= | 0.44 |                           |

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                            | 3.60  | 1.583 | 9.00   | 3.083 | 19.80 | 4.58 | 5.40  |
| 0.167                            | 3.60  | 1.667 | 9.00   | 3.167 | 19.80 | 4.67 | 5.40  |
| 0.250                            | 3.60  | 1.750 | 9.00   | 3.250 | 19.80 | 4.75 | 5.40  |
| 0.333                            | 3.60  | 1.833 | 9.00   | 3.333 | 19.80 | 4.83 | 5.40  |
| 0.417                            | 3.60  | 1.917 | 9.00   | 3.417 | 19.80 | 4.92 | 5.40  |
| 0.500                            | 3.60  | 2.000 | 9.00   | 3.500 | 19.80 | 5.00 | 5.40  |
| 0.583                            | 5.40  | 2.083 | 10.80  | 3.583 | 9.00  | 5.08 | 3.60  |
| 0.667                            | 5.40  | 2.167 | 10.80  | 3.667 | 9.00  | 5.17 | 3.60  |
| 0.750                            | 5.40  | 2.250 | 10.80  | 3.750 | 9.00  | 5.25 | 3.60  |
| 0.833                            | 5.40  | 2.333 | 10.80  | 3.833 | 9.00  | 5.33 | 3.60  |
| 0.917                            | 5.40  | 2.417 | 10.80  | 3.917 | 9.00  | 5.42 | 3.60  |
| 1.000                            | 5.40  | 2.500 | 10.80  | 4.000 | 9.00  | 5.50 | 3.60  |
| 1.083                            | 5.40  | 2.583 | 53.90  | 4.083 | 7.20  | 5.58 | 3.60  |
| 1.167                            | 5.40  | 2.667 | 53.90  | 4.167 | 7.20  | 5.67 | 3.60  |
| 1.250                            | 5.40  | 2.750 | 53.90  | 4.250 | 7.20  | 5.75 | 3.60  |
| 1.333                            | 5.40  | 2.833 | 140.20 | 4.333 | 7.20  | 5.83 | 3.60  |
| 1.417                            | 5.40  | 2.917 | 140.20 | 4.417 | 7.20  | 5.92 | 3.60  |
| 1.500                            | 5.40  | 3.000 | 140.20 | 4.500 | 7.20  | 6.00 | 3.60  |

Unit Hyd Qpeak (cms)= 0.111

PEAK FLOW (cms)= 0.082 (i)  
 TIME TO PEAK (hrs)= 3.333  
 RUNOFF VOLUME (mm)= 32.804  
 TOTAL RAINFALL (mm)= 89.925  
 RUNOFF COEFFICIENT = 0.365

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

|                   |               |       |                      |
|-------------------|---------------|-------|----------------------|
| CALIB             |               |       |                      |
| STANDHYD ( 2100)  | Area (ha)=    | 0.24  |                      |
| ID= 1 DT= 5.0 min | Total Imp(%)= | 64.00 | Dir. Conn.(%)= 60.00 |

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.15       | 0.09         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 3.10       | 3.00         |
| Length (m)=        | 40.00      | 70.00        |
| 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                            | 3.60  | 1.583 | 9.00   | 3.083 | 19.80 | 4.58 | 5.40  |
| 0.167                            | 3.60  | 1.667 | 9.00   | 3.167 | 19.80 | 4.67 | 5.40  |
| 0.250                            | 3.60  | 1.750 | 9.00   | 3.250 | 19.80 | 4.75 | 5.40  |
| 0.333                            | 3.60  | 1.833 | 9.00   | 3.333 | 19.80 | 4.83 | 5.40  |
| 0.417                            | 3.60  | 1.917 | 9.00   | 3.417 | 19.80 | 4.92 | 5.40  |
| 0.500                            | 3.60  | 2.000 | 9.00   | 3.500 | 19.80 | 5.00 | 5.40  |
| 0.583                            | 5.40  | 2.083 | 10.80  | 3.583 | 9.00  | 5.08 | 3.60  |
| 0.667                            | 5.40  | 2.167 | 10.80  | 3.667 | 9.00  | 5.17 | 3.60  |
| 0.750                            | 5.40  | 2.250 | 10.80  | 3.750 | 9.00  | 5.25 | 3.60  |
| 0.833                            | 5.40  | 2.333 | 10.80  | 3.833 | 9.00  | 5.33 | 3.60  |
| 0.917                            | 5.40  | 2.417 | 10.80  | 3.917 | 9.00  | 5.42 | 3.60  |
| 1.000                            | 5.40  | 2.500 | 10.80  | 4.000 | 9.00  | 5.50 | 3.60  |
| 1.083                            | 5.40  | 2.583 | 53.90  | 4.083 | 7.20  | 5.58 | 3.60  |
| 1.167                            | 5.40  | 2.667 | 53.90  | 4.167 | 7.20  | 5.67 | 3.60  |
| 1.250                            | 5.40  | 2.750 | 53.90  | 4.250 | 7.20  | 5.75 | 3.60  |
| 1.333                            | 5.40  | 2.833 | 140.20 | 4.333 | 7.20  | 5.83 | 3.60  |
| 1.417                            | 5.40  | 2.917 | 140.20 | 4.417 | 7.20  | 5.92 | 3.60  |
| 1.500                            | 5.40  | 3.000 | 140.20 | 4.500 | 7.20  | 6.00 | 3.60  |

Max.Eff.Inten.(mm/hr)= 140.20 61.70  
 over (min) 5.00 15.00  
 Storage Coeff. (min)= 0.92 (ii) 11.52 (ii)  
 Unit Hyd. Tpeak (min)= 5.00 15.00  
 Unit Hyd. peak (cms)= 0.34 0.09

PEAK FLOW (cms)= 0.06 0.01  
 TIME TO PEAK (hrs)= 3.00 3.08  
 \*TOTALS\*  
 0.065 (iii)  
 3.00

RUNOFF VOLUME (mm)= 88.93 31.10 65.77  
 TOTAL RAINFALL (mm)= 89.93 89.93 89.93  
 RUNOFF COEFFICIENT = 0.99 0.35 0.73

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

- (i) CN PROCEDURE SELECTED FOR PVIOUS LOSSES:  
 CN\* = 60.5 Ia = Dep. Storage (Above)  
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
 THAN THE STORAGE COEFFICIENT.  
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```

-----
| ADD HYD ( 0006) |
| 1 + 2 = 3 |
-----
      AREA   QPEAK   TPEAK   R.V.
      (ha)   (cms)   (hrs)   (mm)
ID1= 1 ( 2100):  0.24  0.065   3.00  65.77
+ ID2= 2 ( 2101):  1.28  0.082   3.33  32.80
=====
ID = 3 ( 0006):  1.52  0.109   3.00  38.01
  
```

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```

-----
| CALIB
| NASHYD ( 2300) |
| ID= 1 DT= 5.0 min |
-----
      Area   (ha)=  0.23  Curve Number (CN)= 66.5
      Ia     (mm)=  4.60  # of Linear Res.(N)= 3.00
      U.H. Tp(hrs)=  0.27
  
```

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   3.60   1.583   9.00   | 3.083   19.80   | 4.58   5.40
0.167   3.60   1.667   9.00   | 3.167   19.80   | 4.67   5.40
0.250   3.60   1.750   9.00   | 3.250   19.80   | 4.75   5.40
0.333   3.60   1.833   9.00   | 3.333   19.80   | 4.83   5.40
0.417   3.60   1.917   9.00   | 3.417   19.80   | 4.92   5.40
0.500   3.60   2.000   9.00   | 3.500   19.80   | 5.00   5.40
0.583   5.40   2.083   10.80  | 3.583   9.00    | 5.08   3.60
0.667   5.40   2.167   10.80  | 3.667   9.00    | 5.17   3.60
0.750   5.40   2.250   10.80  | 3.750   9.00    | 5.25   3.60
0.833   5.40   2.333   10.80  | 3.833   9.00    | 5.33   3.60
0.917   5.40   2.417   10.80  | 3.917   9.00    | 5.42   3.60
  
```

```

1.000   5.40 | 2.500   10.80 | 4.000   9.00 | 5.50   3.60
1.083   5.40 | 2.583   53.90 | 4.083   7.20 | 5.58   3.60
1.167   5.40 | 2.667   53.90 | 4.167   7.20 | 5.67   3.60
1.250   5.40 | 2.750   53.90 | 4.250   7.20 | 5.75   3.60
1.333   5.40 | 2.833   140.20 | 4.333   7.20 | 5.83   3.60
1.417   5.40 | 2.917   140.20 | 4.417   7.20 | 5.92   3.60
1.500   5.40 | 3.000   140.20 | 4.500   7.20 | 6.00   3.60
  
```

Unit Hyd Qpeak (cms)= 0.033

PEAK FLOW (cms)= 0.022 (i)  
 TIME TO PEAK (hrs)= 3.167  
 RUNOFF VOLUME (mm)= 34.112  
 TOTAL RAINFALL (mm)= 89.925  
 RUNOFF COEFFICIENT = 0.379

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

```

-----
| CALIB
| NASHYD ( 0041) |
| ID= 1 DT= 5.0 min |
-----
      Area   (ha)=  1.28  Curve Number (CN)= 65.1
      Ia     (mm)=  4.70  # of Linear Res.(N)= 3.00
      U.H. Tp(hrs)=  0.44
  
```

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   3.60   1.583   9.00   | 3.083   19.80   | 4.58   5.40
0.167   3.60   1.667   9.00   | 3.167   19.80   | 4.67   5.40
0.250   3.60   1.750   9.00   | 3.250   19.80   | 4.75   5.40
0.333   3.60   1.833   9.00   | 3.333   19.80   | 4.83   5.40
0.417   3.60   1.917   9.00   | 3.417   19.80   | 4.92   5.40
0.500   3.60   2.000   9.00   | 3.500   19.80   | 5.00   5.40
0.583   5.40   2.083   10.80  | 3.583   9.00    | 5.08   3.60
0.667   5.40   2.167   10.80  | 3.667   9.00    | 5.17   3.60
0.750   5.40   2.250   10.80  | 3.750   9.00    | 5.25   3.60
0.833   5.40   2.333   10.80  | 3.833   9.00    | 5.33   3.60
0.917   5.40   2.417   10.80  | 3.917   9.00    | 5.42   3.60
1.000   5.40   2.500   10.80  | 4.000   9.00    | 5.50   3.60
1.083   5.40   2.583   53.90 | 4.083   7.20    | 5.58   3.60
1.167   5.40   2.667   53.90 | 4.167   7.20    | 5.67   3.60
1.250   5.40   2.750   53.90 | 4.250   7.20    | 5.75   3.60
1.333   5.40   2.833   140.20 | 4.333   7.20    | 5.83   3.60
1.417   5.40   2.917   140.20 | 4.417   7.20    | 5.92   3.60
  
```



1.500 5.40 | 3.000 140.20 | 4.500 7.20 | 6.00 3.60 99/105

Unit Hyd Qpeak (cms)= 0.111  
PEAK FLOW (cms)= 0.082 (i)  
TIME TO PEAK (hrs)= 3.333  
RUNOFF VOLUME (mm)= 32.804  
TOTAL RAINFALL (mm)= 89.925  
RUNOFF COEFFICIENT = 0.365

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

CALIB  
STANDHYD ( 0039) | Area (ha)= 0.24  
ID= 1 DT= 5.0 min | Total Imp(%)= 64.00 Dir. Conn.(%)= 60.00

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.15       | 0.09         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 3.10       | 3.00         |
| Length (m)=        | 40.00      | 70.00        |
| 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 | 3.60  | 1.583 | 9.00   | 3.083 | 19.80 | 4.58 | 5.40  |
| 0.167 | 3.60  | 1.667 | 9.00   | 3.167 | 19.80 | 4.67 | 5.40  |
| 0.250 | 3.60  | 1.750 | 9.00   | 3.250 | 19.80 | 4.75 | 5.40  |
| 0.333 | 3.60  | 1.833 | 9.00   | 3.333 | 19.80 | 4.83 | 5.40  |
| 0.417 | 3.60  | 1.917 | 9.00   | 3.417 | 19.80 | 4.92 | 5.40  |
| 0.500 | 3.60  | 2.000 | 9.00   | 3.500 | 19.80 | 5.00 | 5.40  |
| 0.583 | 5.40  | 2.083 | 10.80  | 3.583 | 9.00  | 5.08 | 3.60  |
| 0.667 | 5.40  | 2.167 | 10.80  | 3.667 | 9.00  | 5.17 | 3.60  |
| 0.750 | 5.40  | 2.250 | 10.80  | 3.750 | 9.00  | 5.25 | 3.60  |
| 0.833 | 5.40  | 2.333 | 10.80  | 3.833 | 9.00  | 5.33 | 3.60  |
| 0.917 | 5.40  | 2.417 | 10.80  | 3.917 | 9.00  | 5.42 | 3.60  |
| 1.000 | 5.40  | 2.500 | 10.80  | 4.000 | 9.00  | 5.50 | 3.60  |
| 1.083 | 5.40  | 2.583 | 53.90  | 4.083 | 7.20  | 5.58 | 3.60  |
| 1.167 | 5.40  | 2.667 | 53.90  | 4.167 | 7.20  | 5.67 | 3.60  |
| 1.250 | 5.40  | 2.750 | 53.90  | 4.250 | 7.20  | 5.75 | 3.60  |
| 1.333 | 5.40  | 2.833 | 140.20 | 4.333 | 7.20  | 5.83 | 3.60  |
| 1.417 | 5.40  | 2.917 | 140.20 | 4.417 | 7.20  | 5.92 | 3.60  |

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10985-V0 Output

1.500 5.40 | 3.000 140.20 | 4.500 7.20 | 6.00 3.60 100/105

Max.Eff.Inten.(mm/hr)= 140.20 61.70  
over (min)= 5.00 15.00  
Storage Coeff. (min)= 0.92 (ii) 11.52 (ii)  
Unit Hyd. Tpeak (min)= 5.00 15.00  
Unit Hyd. peak (cms)= 0.34 0.09

\*TOTALS\*  
PEAK FLOW (cms)= 0.06 0.01 0.065 (iii)  
TIME TO PEAK (hrs)= 3.00 3.08 3.00  
RUNOFF VOLUME (mm)= 88.93 31.10 65.77  
TOTAL RAINFALL (mm)= 89.93 89.93 89.93  
RUNOFF COEFFICIENT = 0.99 0.35 0.73

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 60.5 Ia = Dep. 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( 0042) | OVERFLOW IS OFF  
IN= 2---> OUT= 1 |  
DT= 5.0 min |

| OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) | OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) |
|------------------|--------------------|------------------|--------------------|
| 0.0000           | 0.0000             | 0.0116           | 0.0080             |
| 0.0023           | 0.0007             | 0.0127           | 0.0102             |
| 0.0055           | 0.0017             | 0.0137           | 0.0127             |
| 0.0075           | 0.0029             | 0.0146           | 0.0153             |
| 0.0091           | 0.0044             | 0.0155           | 0.0183             |
| 0.0104           | 0.0061             | 0.0000           | 0.0000             |

|                        | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|------------------------|--------------|----------------|----------------|--------------|
| INFLOW : ID= 2 ( 0039) | 0.240        | 0.065          | 3.00           | 65.77        |
| OUTFLOW: ID= 1 ( 0042) | 0.240        | 0.012          | 3.50           | 65.47        |

PEAK FLOW REDUCTION [Qout/Qin](%)= 17.90  
TIME SHIFT OF PEAK FLOW (min)= 30.00  
MAXIMUM STORAGE USED (ha.m.)= 0.0079

ADD HYD ( 0040)

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10985-V0 Output

|                   |      |       |       |       |
|-------------------|------|-------|-------|-------|
| 1 + 2 = 3         | AREA | QPEAK | TPEAK | R.V.  |
| -----             | (ha) | (cms) | (hrs) | (mm)  |
| ID1= 1 ( 0041):   | 1.28 | 0.082 | 3.33  | 32.80 |
| + ID2= 2 ( 0042): | 0.24 | 0.012 | 3.50  | 65.47 |
| =====             |      |       |       |       |
| ID = 3 ( 0040):   | 1.52 | 0.094 | 3.33  | 37.96 |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

|                   |               |      |                           |
|-------------------|---------------|------|---------------------------|
| CALIB             |               |      |                           |
| NASHYD ( 0043)    | Area (ha)=    | 0.74 | Curve Number (CN)= 64.2   |
| ID= 1 DT= 5.0 min | Ia (mm)=      | 4.80 | # of Linear Res.(N)= 3.00 |
| -----             | U.H. Tp(hrs)= | 0.17 |                           |

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                            | 3.60  | 1.583 | 9.00   | 3.083 | 19.80 | 4.58 | 5.40  |
| 0.167                            | 3.60  | 1.667 | 9.00   | 3.167 | 19.80 | 4.67 | 5.40  |
| 0.250                            | 3.60  | 1.750 | 9.00   | 3.250 | 19.80 | 4.75 | 5.40  |
| 0.333                            | 3.60  | 1.833 | 9.00   | 3.333 | 19.80 | 4.83 | 5.40  |
| 0.417                            | 3.60  | 1.917 | 9.00   | 3.417 | 19.80 | 4.92 | 5.40  |
| 0.500                            | 3.60  | 2.000 | 9.00   | 3.500 | 19.80 | 5.00 | 5.40  |
| 0.583                            | 5.40  | 2.083 | 10.80  | 3.583 | 9.00  | 5.08 | 3.60  |
| 0.667                            | 5.40  | 2.167 | 10.80  | 3.667 | 9.00  | 5.17 | 3.60  |
| 0.750                            | 5.40  | 2.250 | 10.80  | 3.750 | 9.00  | 5.25 | 3.60  |
| 0.833                            | 5.40  | 2.333 | 10.80  | 3.833 | 9.00  | 5.33 | 3.60  |
| 0.917                            | 5.40  | 2.417 | 10.80  | 3.917 | 9.00  | 5.42 | 3.60  |
| 1.000                            | 5.40  | 2.500 | 10.80  | 4.000 | 9.00  | 5.50 | 3.60  |
| 1.083                            | 5.40  | 2.583 | 53.90  | 4.083 | 7.20  | 5.58 | 3.60  |
| 1.167                            | 5.40  | 2.667 | 53.90  | 4.167 | 7.20  | 5.67 | 3.60  |
| 1.250                            | 5.40  | 2.750 | 53.90  | 4.250 | 7.20  | 5.75 | 3.60  |
| 1.333                            | 5.40  | 2.833 | 140.20 | 4.333 | 7.20  | 5.83 | 3.60  |
| 1.417                            | 5.40  | 2.917 | 140.20 | 4.417 | 7.20  | 5.92 | 3.60  |
| 1.500                            | 5.40  | 3.000 | 140.20 | 4.500 | 7.20  | 6.00 | 3.60  |

Unit Hyd Qpeak (cms)= 0.166

PEAK FLOW (cms)= 0.086 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 31.840  
 TOTAL RAINFALL (mm)= 89.925  
 RUNOFF COEFFICIENT = 0.354

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

|                   |               |       |                           |
|-------------------|---------------|-------|---------------------------|
| CALIB             |               |       |                           |
| NASHYD ( 0048)    | Area (ha)=    | 0.93  | Curve Number (CN)= 61.6   |
| ID= 1 DT= 5.0 min | Ia (mm)=      | 10.00 | # of Linear Res.(N)= 3.00 |
| -----             | U.H. Tp(hrs)= | 0.17  |                           |

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                            | 3.60  | 1.583 | 9.00   | 3.083 | 19.80 | 4.58 | 5.40  |
| 0.167                            | 3.60  | 1.667 | 9.00   | 3.167 | 19.80 | 4.67 | 5.40  |
| 0.250                            | 3.60  | 1.750 | 9.00   | 3.250 | 19.80 | 4.75 | 5.40  |
| 0.333                            | 3.60  | 1.833 | 9.00   | 3.333 | 19.80 | 4.83 | 5.40  |
| 0.417                            | 3.60  | 1.917 | 9.00   | 3.417 | 19.80 | 4.92 | 5.40  |
| 0.500                            | 3.60  | 2.000 | 9.00   | 3.500 | 19.80 | 5.00 | 5.40  |
| 0.583                            | 5.40  | 2.083 | 10.80  | 3.583 | 9.00  | 5.08 | 3.60  |
| 0.667                            | 5.40  | 2.167 | 10.80  | 3.667 | 9.00  | 5.17 | 3.60  |
| 0.750                            | 5.40  | 2.250 | 10.80  | 3.750 | 9.00  | 5.25 | 3.60  |
| 0.833                            | 5.40  | 2.333 | 10.80  | 3.833 | 9.00  | 5.33 | 3.60  |
| 0.917                            | 5.40  | 2.417 | 10.80  | 3.917 | 9.00  | 5.42 | 3.60  |
| 1.000                            | 5.40  | 2.500 | 10.80  | 4.000 | 9.00  | 5.50 | 3.60  |
| 1.083                            | 5.40  | 2.583 | 53.90  | 4.083 | 7.20  | 5.58 | 3.60  |
| 1.167                            | 5.40  | 2.667 | 53.90  | 4.167 | 7.20  | 5.67 | 3.60  |
| 1.250                            | 5.40  | 2.750 | 53.90  | 4.250 | 7.20  | 5.75 | 3.60  |
| 1.333                            | 5.40  | 2.833 | 140.20 | 4.333 | 7.20  | 5.83 | 3.60  |
| 1.417                            | 5.40  | 2.917 | 140.20 | 4.417 | 7.20  | 5.92 | 3.60  |
| 1.500                            | 5.40  | 3.000 | 140.20 | 4.500 | 7.20  | 6.00 | 3.60  |

Unit Hyd Qpeak (cms)= 0.209

PEAK FLOW (cms)= 0.091 (i)  
 TIME TO PEAK (hrs)= 3.083  
 RUNOFF VOLUME (mm)= 26.715  
 TOTAL RAINFALL (mm)= 89.925  
 RUNOFF COEFFICIENT = 0.297

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

| ADD HYD ( 0049) |

| 1 + 2 = 3         | AREA<br>(ha) | QPEAK<br>(cms) | TPEAK<br>(hrs) | R.V.<br>(mm) |
|-------------------|--------------|----------------|----------------|--------------|
| ID1= 1 ( 0043):   | 0.74         | 0.086          | 3.08           | 31.84        |
| + ID2= 2 ( 0048): | 0.93         | 0.091          | 3.08           | 26.71        |
| =====             |              |                |                |              |
| ID = 3 ( 0049):   | 1.67         | 0.177          | 3.08           | 28.99        |

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

|                   |                                          |
|-------------------|------------------------------------------|
| CALIB             |                                          |
| STANDHYD ( 0044)  | Area (ha)= 2.14                          |
| ID= 1 DT= 5.0 min | Total Imp(%)= 43.00 Dir. Conn.(%)= 33.00 |

|                    | IMPERVIOUS | PERVIOUS (i) |
|--------------------|------------|--------------|
| Surface Area (ha)= | 0.92       | 1.22         |
| Dep. Storage (mm)= | 1.00       | 5.00         |
| Average Slope (%)= | 1.50       | 0.27         |
| Length (m)=        | 119.44     | 215.00       |
| 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                            | 3.60  | 1.583 | 9.00   | 3.083 | 19.80 | 4.58 | 5.40  |
| 0.167                            | 3.60  | 1.667 | 9.00   | 3.167 | 19.80 | 4.67 | 5.40  |
| 0.250                            | 3.60  | 1.750 | 9.00   | 3.250 | 19.80 | 4.75 | 5.40  |
| 0.333                            | 3.60  | 1.833 | 9.00   | 3.333 | 19.80 | 4.83 | 5.40  |
| 0.417                            | 3.60  | 1.917 | 9.00   | 3.417 | 19.80 | 4.92 | 5.40  |
| 0.500                            | 3.60  | 2.000 | 9.00   | 3.500 | 19.80 | 5.00 | 5.40  |
| 0.583                            | 5.40  | 2.083 | 10.80  | 3.583 | 9.00  | 5.08 | 3.60  |
| 0.667                            | 5.40  | 2.167 | 10.80  | 3.667 | 9.00  | 5.17 | 3.60  |
| 0.750                            | 5.40  | 2.250 | 10.80  | 3.750 | 9.00  | 5.25 | 3.60  |
| 0.833                            | 5.40  | 2.333 | 10.80  | 3.833 | 9.00  | 5.33 | 3.60  |
| 0.917                            | 5.40  | 2.417 | 10.80  | 3.917 | 9.00  | 5.42 | 3.60  |
| 1.000                            | 5.40  | 2.500 | 10.80  | 4.000 | 9.00  | 5.50 | 3.60  |
| 1.083                            | 5.40  | 2.583 | 53.90  | 4.083 | 7.20  | 5.58 | 3.60  |
| 1.167                            | 5.40  | 2.667 | 53.90  | 4.167 | 7.20  | 5.67 | 3.60  |
| 1.250                            | 5.40  | 2.750 | 53.90  | 4.250 | 7.20  | 5.75 | 3.60  |
| 1.333                            | 5.40  | 2.833 | 140.20 | 4.333 | 7.20  | 5.83 | 3.60  |
| 1.417                            | 5.40  | 2.917 | 140.20 | 4.417 | 7.20  | 5.92 | 3.60  |
| 1.500                            | 5.40  | 3.000 | 140.20 | 4.500 | 7.20  | 6.00 | 3.60  |

Max.Eff.Inten.(mm/hr)= 140.20 26.86  
over (min) 5.00 65.00

Storage Coeff. (min)= 2.20 (ii) 61.93 (ii)  
Unit Hyd. Tpeak (min)= 5.00 65.00  
Unit Hyd. peak (cms)= 0.30 0.02

PEAK FLOW (cms)= 0.27 0.05  
TIME TO PEAK (hrs)= 3.00 4.00  
RUNOFF VOLUME (mm)= 88.93 32.37  
TOTAL RAINFALL (mm)= 89.93 89.93  
RUNOFF COEFFICIENT = 0.99 0.36

\*TOTALS\*

0.285 (iii)

3.00

51.02

89.93

0.57

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

- (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:  
CN\* = 60.5 Ia = Dep. Storage (Above)  
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL  
THAN THE STORAGE COEFFICIENT.  
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| RESERVOIR( 0046) | OVERFLOW IS OFF  |                    |                  |                    |
|------------------|------------------|--------------------|------------------|--------------------|
| IN= 2---> OUT= 1 | OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) | OUTFLOW<br>(cms) | STORAGE<br>(ha.m.) |
| DT= 5.0 min      | 0.0000           | 0.0000             | 0.0581           | 0.0439             |
| 0.0039           | 0.0043           | 0.0782             | 0.0554           |                    |
| 0.0064           | 0.0099           | 0.0938             | 0.0681           |                    |
| 0.0082           | 0.0166           | 0.1070             | 0.0819           |                    |
| 0.0097           | 0.0245           | 0.1187             | 0.0970           |                    |
| 0.0110           | 0.0336           | 0.0000             | 0.0000           |                    |

INFLOW : ID= 2 ( 0044) AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm)  
OUTFLOW: ID= 1 ( 0046) 2.140 0.285 3.00 51.02  
2.140 0.061 4.33 50.89

PEAK FLOW REDUCTION [Qout/Qin](%)= 21.24  
TIME SHIFT OF PEAK FLOW (min)= 80.00  
MAXIMUM STORAGE USED (ha.m.)= 0.0453

|                   |                                             |
|-------------------|---------------------------------------------|
| ADD HYD ( 0045)   |                                             |
| 1 + 2 = 3         | AREA (ha) QPEAK (cms) TPEAK (hrs) R.V. (mm) |
| ID1= 1 ( 0046):   | 2.14 0.061 4.33 50.89                       |
| + ID2= 2 ( 0049): | 1.67 0.177 3.08 28.99                       |

=====

|                 |      |       |      |       |
|-----------------|------|-------|------|-------|
| ID = 3 ( 0045): | 3.81 | 0.224 | 3.08 | 41.29 |
|-----------------|------|-------|------|-------|

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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## Appendix C

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### Quantity Control



# Stage-Storage-Discharge: Outlet 1



Project No: 21-10985  
Project Name: Heritage Line  
Designed/Checked By: SO / KS  
Date: May 10, 2022

| Storage Summary        |        |                |
|------------------------|--------|----------------|
| Top of Permanent Pool: | 100.00 | m              |
| Permanent Pool Volume: | 0.0    | m <sup>3</sup> |
| Active Storage Volume: | 182.7  | m <sup>3</sup> |

| Outlet Capacity Summary |          |       |           |        |
|-------------------------|----------|-------|-----------|--------|
| Type                    | Diameter | Slope | Peak Flow | % Full |
|                         |          |       |           |        |

| Discharge Summary |                         |                 |                           |
|-------------------|-------------------------|-----------------|---------------------------|
| Stage             | Type                    | Invert Elev (m) | Diameter / Width (mm) (m) |
| 1                 | Orifice Plate: Vertical | 100.00          | 100                       |

Stage-Storage-Discharge Summary Table

| Elevation | Stage | Stage 1 Orifice Plate |                   |  |  |  |  | Active Storage | Total Discharge   | Notes |
|-----------|-------|-----------------------|-------------------|--|--|--|--|----------------|-------------------|-------|
| m         | m     |                       | m <sup>3</sup> /s |  |  |  |  | ha*m           | m <sup>3</sup> /s |       |
| 100.00    | 0.00  | 0.000                 |                   |  |  |  |  | 0.0000         | 0.000             |       |
| 100.01    | 0.01  | 0.000                 |                   |  |  |  |  | 0.0001         | 0.000             |       |
| 100.02    | 0.02  | 0.000                 |                   |  |  |  |  | 0.0002         | 0.000             |       |
| 100.03    | 0.03  | 0.001                 |                   |  |  |  |  | 0.0003         | 0.001             |       |
| 100.04    | 0.04  | 0.001                 |                   |  |  |  |  | 0.0005         | 0.001             |       |
| 100.05    | 0.05  | 0.002                 |                   |  |  |  |  | 0.0006         | 0.002             |       |
| 100.06    | 0.06  | 0.002                 |                   |  |  |  |  | 0.0007         | 0.002             |       |
| 100.07    | 0.07  | 0.003                 |                   |  |  |  |  | 0.0009         | 0.003             |       |
| 100.08    | 0.08  | 0.004                 |                   |  |  |  |  | 0.0010         | 0.004             |       |
| 100.09    | 0.09  | 0.004                 |                   |  |  |  |  | 0.0012         | 0.004             |       |
| 100.10    | 0.10  | 0.005                 |                   |  |  |  |  | 0.0013         | 0.005             |       |
| 100.11    | 0.11  | 0.005                 |                   |  |  |  |  | 0.0015         | 0.005             |       |
| 100.12    | 0.12  | 0.006                 |                   |  |  |  |  | 0.0017         | 0.006             |       |
| 100.13    | 0.13  | 0.006                 |                   |  |  |  |  | 0.0019         | 0.006             |       |
| 100.14    | 0.14  | 0.006                 |                   |  |  |  |  | 0.0021         | 0.006             |       |
| 100.15    | 0.15  | 0.007                 |                   |  |  |  |  | 0.0023         | 0.007             |       |
| 100.16    | 0.16  | 0.007                 |                   |  |  |  |  | 0.0025         | 0.007             |       |
| 100.17    | 0.17  | 0.007                 |                   |  |  |  |  | 0.0027         | 0.007             |       |
| 100.18    | 0.18  | 0.008                 |                   |  |  |  |  | 0.0029         | 0.008             |       |
| 100.19    | 0.19  | 0.008                 |                   |  |  |  |  | 0.0031         | 0.008             |       |
| 100.20    | 0.20  | 0.008                 |                   |  |  |  |  | 0.0034         | 0.008             |       |
| 100.21    | 0.21  | 0.008                 |                   |  |  |  |  | 0.0036         | 0.008             |       |
| 100.22    | 0.22  | 0.009                 |                   |  |  |  |  | 0.0039         | 0.009             |       |
| 100.23    | 0.23  | 0.009                 |                   |  |  |  |  | 0.0041         | 0.009             |       |
| 100.24    | 0.24  | 0.009                 |                   |  |  |  |  | 0.0044         | 0.009             |       |
| 100.25    | 0.25  | 0.009                 |                   |  |  |  |  | 0.0046         | 0.009             |       |
| 100.26    | 0.26  | 0.010                 |                   |  |  |  |  | 0.0049         | 0.010             |       |
| 100.27    | 0.27  | 0.010                 |                   |  |  |  |  | 0.0052         | 0.010             |       |
| 100.28    | 0.28  | 0.010                 |                   |  |  |  |  | 0.0055         | 0.010             |       |
| 100.29    | 0.29  | 0.010                 |                   |  |  |  |  | 0.0058         | 0.010             |       |
| 100.30    | 0.30  | 0.010                 |                   |  |  |  |  | 0.0061         | 0.010             |       |
| 100.31    | 0.31  | 0.011                 |                   |  |  |  |  | 0.0064         | 0.011             |       |
| 100.32    | 0.32  | 0.011                 |                   |  |  |  |  | 0.0067         | 0.011             |       |
| 100.33    | 0.33  | 0.011                 |                   |  |  |  |  | 0.0070         | 0.011             |       |
| 100.34    | 0.34  | 0.011                 |                   |  |  |  |  | 0.0073         | 0.011             |       |
| 100.35    | 0.35  | 0.011                 |                   |  |  |  |  | 0.0077         | 0.011             |       |
| 100.36    | 0.36  | 0.012                 |                   |  |  |  |  | 0.0080         | 0.012             |       |
| 100.37    | 0.37  | 0.012                 |                   |  |  |  |  | 0.0084         | 0.012             |       |
| 100.38    | 0.38  | 0.012                 |                   |  |  |  |  | 0.0087         | 0.012             |       |
| 100.39    | 0.39  | 0.012                 |                   |  |  |  |  | 0.0091         | 0.012             |       |
| 100.40    | 0.40  | 0.012                 |                   |  |  |  |  | 0.0095         | 0.012             |       |
| 100.41    | 0.41  | 0.013                 |                   |  |  |  |  | 0.0098         | 0.013             |       |
| 100.42    | 0.42  | 0.013                 |                   |  |  |  |  | 0.0102         | 0.013             |       |
| 100.43    | 0.43  | 0.013                 |                   |  |  |  |  | 0.0106         | 0.013             |       |
| 100.44    | 0.44  | 0.013                 |                   |  |  |  |  | 0.0110         | 0.013             |       |
| 100.45    | 0.45  | 0.013                 |                   |  |  |  |  | 0.0114         | 0.013             |       |
| 100.46    | 0.46  | 0.013                 |                   |  |  |  |  | 0.0118         | 0.013             |       |
| 100.47    | 0.47  | 0.014                 |                   |  |  |  |  | 0.0122         | 0.014             |       |
| 100.48    | 0.48  | 0.014                 |                   |  |  |  |  | 0.0127         | 0.014             |       |

| Stage-Storage-Discharge Summary Table |       |                             |  |  |  |  |  |                   |                    |       |  |
|---------------------------------------|-------|-----------------------------|--|--|--|--|--|-------------------|--------------------|-------|--|
| Elevation                             | Stage | Stage 1<br>Orifice<br>Plate |  |  |  |  |  | Active<br>Storage | Total<br>Discharge | Notes |  |
| m                                     | m     | m³/s                        |  |  |  |  |  | ha*m              | m³/s               |       |  |
| 100.49                                | 0.49  | 0.014                       |  |  |  |  |  |                   | 0.0131             | 0.014 |  |
| 100.50                                | 0.50  | 0.014                       |  |  |  |  |  |                   | 0.0135             | 0.014 |  |
| 100.51                                | 0.51  | 0.014                       |  |  |  |  |  |                   | 0.0140             | 0.014 |  |
| 100.52                                | 0.52  | 0.014                       |  |  |  |  |  |                   | 0.0144             | 0.014 |  |
| 100.53                                | 0.53  | 0.014                       |  |  |  |  |  |                   | 0.0149             | 0.014 |  |
| 100.54                                | 0.54  | 0.015                       |  |  |  |  |  |                   | 0.0153             | 0.015 |  |
| 100.55                                | 0.55  | 0.015                       |  |  |  |  |  |                   | 0.0158             | 0.015 |  |
| 100.56                                | 0.56  | 0.015                       |  |  |  |  |  |                   | 0.0163             | 0.015 |  |
| 100.57                                | 0.57  | 0.015                       |  |  |  |  |  |                   | 0.0168             | 0.015 |  |
| 100.58                                | 0.58  | 0.015                       |  |  |  |  |  |                   | 0.0173             | 0.015 |  |
| 100.59                                | 0.59  | 0.015                       |  |  |  |  |  |                   | 0.0178             | 0.015 |  |
| 100.60                                | 0.60  | 0.015                       |  |  |  |  |  |                   | 0.0183             | 0.015 |  |

# Stage-Storage-Discharge: Outlet 2



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: May 10, 2022

| Storage Summary        |        |                |  |
|------------------------|--------|----------------|--|
| Top of Permanent Pool: | 100.00 | m              |  |
| Permanent Pool Volume: | 0.0    | m <sup>3</sup> |  |
| Active Storage Volume: | 969.9  | m <sup>3</sup> |  |

| Outlet Capacity Summary |          |       |           |        |
|-------------------------|----------|-------|-----------|--------|
| Type                    | Diameter | Slope | Peak Flow | % Full |
|                         |          |       |           |        |

| Discharge Summary |                           |                 |                           |
|-------------------|---------------------------|-----------------|---------------------------|
| Stage             | Type                      | Invert Elev (m) | Diameter / Width (mm) (m) |
| 1                 | Orifice Plate: Vertical   | 100.00          | 50                        |
| 2                 | Orifice Plate: Vertical   | 100.00          | 50                        |
| 3                 | Orifice Plate: Vertical   | 100.00          | 50                        |
| 4                 | Orifice Plate: Vertical   | 100.00          | 50                        |
| 6                 | Orifice Plate: Horizontal | 100.30          | 300                       |

Stage-Storage-Discharge Summary Table

| Elevation | Stage | Stage 1<br>Orifice<br>Plate | Stage 2<br>Orifice<br>Plate | Stage 3<br>Orifice<br>Plate | Stage 4<br>Orifice<br>Plate |  | Stage 6<br>Orifice<br>Plate | Active<br>Storage | Total<br>Discharge | Notes |
|-----------|-------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--|-----------------------------|-------------------|--------------------|-------|
| m         | m     | m <sup>3</sup> /s           |                             |                             |                             |  |                             | ha*m              | m <sup>3</sup> /s  |       |
| 100.00    | 0.00  | 0.000                       | 0.000                       | 0.000                       | 0.000                       |  | 0.000                       | 0.0000            | 0.000              |       |
| 100.01    | 0.01  | 0.000                       | 0.000                       | 0.000                       | 0.000                       |  | 0.000                       | 0.0006            | 0.000              |       |
| 100.02    | 0.02  | 0.000                       | 0.000                       | 0.000                       | 0.000                       |  | 0.000                       | 0.0013            | 0.001              |       |
| 100.03    | 0.03  | 0.000                       | 0.000                       | 0.000                       | 0.000                       |  | 0.000                       | 0.0020            | 0.002              |       |
| 100.04    | 0.04  | 0.001                       | 0.001                       | 0.001                       | 0.001                       |  | 0.000                       | 0.0028            | 0.003              |       |
| 100.05    | 0.05  | 0.001                       | 0.001                       | 0.001                       | 0.001                       |  | 0.000                       | 0.0035            | 0.003              |       |
| 100.06    | 0.06  | 0.001                       | 0.001                       | 0.001                       | 0.001                       |  | 0.000                       | 0.0043            | 0.004              |       |
| 100.07    | 0.07  | 0.001                       | 0.001                       | 0.001                       | 0.001                       |  | 0.000                       | 0.0052            | 0.004              |       |
| 100.08    | 0.08  | 0.001                       | 0.001                       | 0.001                       | 0.001                       |  | 0.000                       | 0.0061            | 0.005              |       |
| 100.09    | 0.09  | 0.001                       | 0.001                       | 0.001                       | 0.001                       |  | 0.000                       | 0.0070            | 0.005              |       |
| 100.10    | 0.10  | 0.001                       | 0.001                       | 0.001                       | 0.001                       |  | 0.000                       | 0.0079            | 0.006              |       |
| 100.11    | 0.11  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0089            | 0.006              |       |
| 100.12    | 0.12  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0099            | 0.006              |       |
| 100.13    | 0.13  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0109            | 0.007              |       |
| 100.14    | 0.14  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0120            | 0.007              |       |
| 100.15    | 0.15  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0131            | 0.007              |       |
| 100.16    | 0.16  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0142            | 0.008              |       |
| 100.17    | 0.17  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0154            | 0.008              |       |
| 100.18    | 0.18  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0166            | 0.008              |       |
| 100.19    | 0.19  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0178            | 0.008              |       |
| 100.20    | 0.20  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0191            | 0.009              |       |
| 100.21    | 0.21  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0204            | 0.009              |       |
| 100.22    | 0.22  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0218            | 0.009              |       |
| 100.23    | 0.23  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0231            | 0.009              |       |
| 100.24    | 0.24  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0245            | 0.010              |       |
| 100.25    | 0.25  | 0.002                       | 0.002                       | 0.002                       | 0.002                       |  | 0.000                       | 0.0260            | 0.010              |       |
| 100.26    | 0.26  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.000                       | 0.0274            | 0.010              |       |
| 100.27    | 0.27  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.000                       | 0.0289            | 0.010              |       |
| 100.28    | 0.28  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.000                       | 0.0305            | 0.011              |       |
| 100.29    | 0.29  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.000                       | 0.0320            | 0.011              |       |
| 100.30    | 0.30  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.000                       | 0.0336            | 0.011              |       |
| 100.31    | 0.31  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.019                       | 0.0353            | 0.030              |       |
| 100.32    | 0.32  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.027                       | 0.0369            | 0.038              |       |
| 100.33    | 0.33  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.033                       | 0.0386            | 0.044              |       |
| 100.34    | 0.34  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.038                       | 0.0404            | 0.049              |       |
| 100.35    | 0.35  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.042                       | 0.0421            | 0.054              |       |
| 100.36    | 0.36  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.046                       | 0.0439            | 0.058              |       |
| 100.37    | 0.37  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.050                       | 0.0458            | 0.062              |       |
| 100.38    | 0.38  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.053                       | 0.0476            | 0.066              |       |
| 100.39    | 0.39  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.056                       | 0.0495            | 0.069              |       |
| 100.40    | 0.40  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.059                       | 0.0514            | 0.072              |       |
| 100.41    | 0.41  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.062                       | 0.0534            | 0.075              |       |
| 100.42    | 0.42  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.065                       | 0.0554            | 0.078              |       |
| 100.43    | 0.43  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.068                       | 0.0574            | 0.081              |       |
| 100.44    | 0.44  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.070                       | 0.0595            | 0.084              |       |
| 100.45    | 0.45  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.073                       | 0.0616            | 0.086              |       |
| 100.46    | 0.46  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.075                       | 0.0637            | 0.089              |       |
| 100.47    | 0.47  | 0.003                       | 0.003                       | 0.003                       | 0.003                       |  | 0.077                       | 0.0659            | 0.091              |       |
| 100.48    | 0.48  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.080                       | 0.0681            | 0.094              |       |



| Stage-Storage-Discharge Summary Table |       |                             |                             |                             |                             |  |                             |                   |                    |       |
|---------------------------------------|-------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|--|-----------------------------|-------------------|--------------------|-------|
| Elevation                             | Stage | Stage 1<br>Orifice<br>Plate | Stage 2<br>Orifice<br>Plate | Stage 3<br>Orifice<br>Plate | Stage 4<br>Orifice<br>Plate |  | Stage 6<br>Orifice<br>Plate | Active<br>Storage | Total<br>Discharge | Notes |
| m                                     | m     | m <sup>3</sup> /s           |                             |                             |                             |  |                             | ha*m              | m <sup>3</sup> /s  |       |
| 100.49                                | 0.49  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.082                       | 0.0703            | 0.096              |       |
| 100.50                                | 0.50  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.084                       | 0.0726            | 0.098              |       |
| 100.51                                | 0.51  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.086                       | 0.0749            | 0.101              |       |
| 100.52                                | 0.52  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.088                       | 0.0772            | 0.103              |       |
| 100.53                                | 0.53  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.090                       | 0.0795            | 0.105              |       |
| 100.54                                | 0.54  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.092                       | 0.0819            | 0.107              |       |
| 100.55                                | 0.55  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.094                       | 0.0844            | 0.109              |       |
| 100.56                                | 0.56  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.096                       | 0.0868            | 0.111              |       |
| 100.57                                | 0.57  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.098                       | 0.0893            | 0.113              |       |
| 100.58                                | 0.58  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.099                       | 0.0918            | 0.115              |       |
| 100.59                                | 0.59  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.101                       | 0.0944            | 0.117              |       |
| 100.60                                | 0.60  | 0.004                       | 0.004                       | 0.004                       | 0.004                       |  | 0.103                       | 0.0970            | 0.119              |       |

## Appendix D

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Quality Control



## Infiltration Facility Design - PR-100



**Project No:** 21-10985

**Project Name:** Heritage Line Preliminary SWM

**Designed/Checked By:** SO/KS

**Date:** May 5, 2022

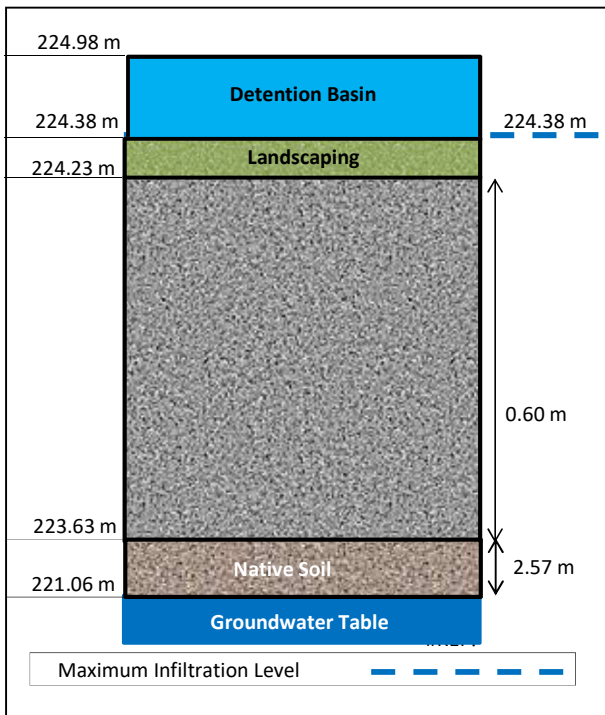
| Site Characteristics          |            |
|-------------------------------|------------|
| Contributing Area             | 0.24 ha    |
| Water Quality Storm           | N/A mm     |
| Runoff Coefficient            | 0.61       |
| Groundwater Elevation         | 221.06 m   |
| Bedrock Elevation             | N/A        |
| Infiltration Characteristics  |            |
| Native Soil Infiltration Rate | 30.0 mm/hr |
| Safety Correction Factor      | 2.5        |
| Adjusted Infiltration Rate    | 12.0 mm/hr |

| Design Constraints & Assumptions                       |                     |
|--------------------------------------------------------|---------------------|
| Water Quality Control Volume                           | 8.4 m <sup>3</sup>  |
| Quantity Control Volume                                | 79.0 m <sup>3</sup> |
| Quantity Control Volume Includes Infiltration Storage? | No                  |
| Max Allowable Drawdown Time                            | 48 hours            |
| Separation to Groundwater                              | 1.00 m              |
| Stone Void Ratio                                       | 0.40                |

| Surface Storage                |                      |
|--------------------------------|----------------------|
| Surface Storage Type           | Detention Basin      |
| Pretreatment                   | None                 |
| Starting Elevation             | 224.38 m             |
| Maximum Elevation              | 224.98 m             |
| Max Surface Ponding Depth      | 0.60 m               |
| Surface Storage Volume         | 125.0 m <sup>3</sup> |
| Underground Storage            |                      |
| Underground Storage Type       | Stone Trench         |
| Pretreatment                   | None                 |
| Underground Storage Footprint  | 165 m <sup>2</sup>   |
| Bottom Elevation               | 223.63 m             |
| Inlet Elevation                | 224.38 m             |
| Outlet Elevation               | 224.38 m             |
| Top Elevation                  | 224.23 m             |
| Underground Storage Volume     | 28.0 m <sup>3</sup>  |
| Infiltration Design            |                      |
| Infiltration Footprint         | 165 m <sup>2</sup>   |
| Max Infiltration Storage Depth | 0.75 m               |
| Estimated Drawdown Time        | 25.0 hours           |
| Infiltration Storage Volume    | 28.0 m <sup>3</sup>  |

| Provided Storage Summary |                      |
|--------------------------|----------------------|
| Total Storage Depth      | 1.35 m               |
| Groundwater Separation   | 2.57 m               |
| Quality Control Volume   | 28.0 m <sup>3</sup>  |
| Quantity Control Volume  | 125.0 m <sup>3</sup> |
| Total Storage Volume     | 153.0 m <sup>3</sup> |

### Infiltration Facility Typical Section



#### Notes:

- Runoff Coefficient determined based on the Hydrologic Parameters of the contributing drainage area  
Water Quality Control Volume based on MOE Table 3.2 for Infiltration Facilities
- Native soil infiltration rate incorporates a safety correction factor in accordance with the method outlined in the LID Design Manual Appendix C, Table C2
- Infiltration Storage Drawdown Time calculated using the following equation, rearranged from the BMP Sizing formula with in the LID Design Manual:

$$t_d = \frac{d_i V_r}{i}$$

$t_d$  = Drawdown Time (hours)  
 $d_i$  = Max infiltration storage depth (m)  
 $i$  = Adjusted Infiltration Rate (mm/hr)  
 $V_r$  = Void Space of Stone

## Infiltration Facility Design - PR-200



**Project No:** 21-10985

**Project Name:** Heritage Line Preliminary SWM

**Designed/Checked By:** SO/KS

**Date:** 05/10/2022

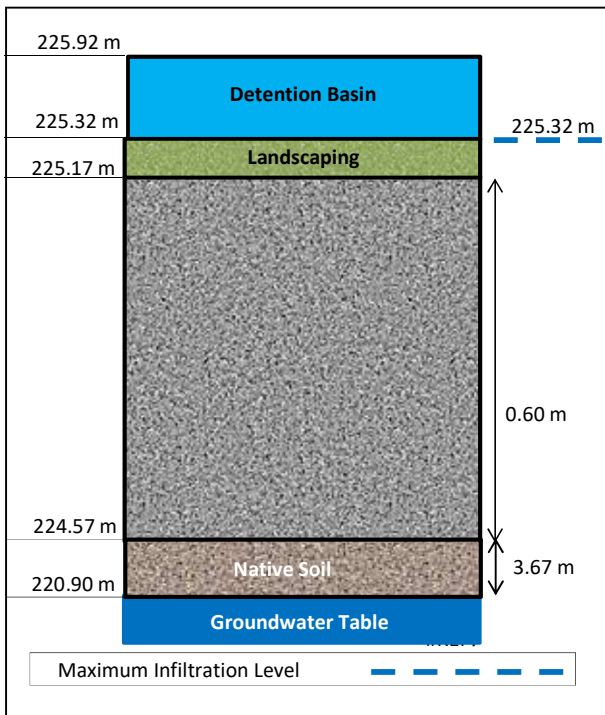
| Site Characteristics          |            |
|-------------------------------|------------|
| Contributing Area             | 2.14 ha    |
| Water Quality Storm           | N/A mm     |
| Runoff Coefficient            | 0.42       |
| Groundwater Elevation         | 220.90 m   |
| Bedrock Elevation             | N/A        |
| Infiltration Characteristics  |            |
| Native Soil Infiltration Rate | 20.0 mm/hr |
| Safety Correction Factor      | 2.5        |
| Adjusted Infiltration Rate    | 8.0 mm/hr  |

| Design Constraints & Assumptions                       |                      |
|--------------------------------------------------------|----------------------|
| Water Quality Control Volume                           | 64.2 m <sup>3</sup>  |
| Quantity Control Volume                                | 453.0 m <sup>3</sup> |
| Quantity Control Volume Includes Infiltration Storage? | No                   |
| Max Allowable Drawdown Time                            | 48 hours             |
| Separation to Groundwater                              | 1.00 m               |
| Stone Void Ratio                                       | 0.40                 |

| Surface Storage                |                      |
|--------------------------------|----------------------|
| Surface Storage Type           | Detention Basin      |
| Pretreatment                   | None                 |
| Starting Elevation             | 225.32 m             |
| Maximum Elevation              | 225.92 m             |
| Max Surface Ponding Depth      | 0.60 m               |
| Surface Storage Volume         | 661.0 m <sup>3</sup> |
| Underground Storage            |                      |
| Underground Storage Type       | Stone Trench         |
| Pretreatment                   | None                 |
| Underground Storage Footprint  | 285.5 m <sup>2</sup> |
| Bottom Elevation               | 224.57 m             |
| Inlet Elevation                | 225.32 m             |
| Outlet Elevation               | 225.32 m             |
| Top Elevation                  | 225.17 m             |
| Underground Storage Volume     | 170.0 m <sup>3</sup> |
| Infiltration Design            |                      |
| Infiltration Footprint         | 285.5 m <sup>2</sup> |
| Max Infiltration Storage Depth | 0.75 m               |
| Estimated Drawdown Time        | 37.5 hours           |
| Infiltration Storage Volume    | 170.0 m <sup>3</sup> |

| Provided Storage Summary |                      |
|--------------------------|----------------------|
| Total Storage Depth      | 1.35 m               |
| Groundwater Separation   | 3.67 m               |
| Quality Control Volume   | 170.0 m <sup>3</sup> |
| Quantity Control Volume  | 661.0 m <sup>3</sup> |
| Total Storage Volume     | 831.0 m <sup>3</sup> |

### Infiltration Facility Typical Section



#### Notes:

- Runoff Coefficient determined based on the Hydrologic Parameters of the contributing drainage area  
Water Quality Control Volume based on MOE Table 3.2 for Infiltration Facilities
- Native soil infiltration rate incorporates a safety correction factor in accordance with the method outlined in the LID Design Manual Appendix C, Table C2
- Infiltration Storage Drawdown Time calculated using the following equation, rearranged from the BMP Sizing formula with in the LID Design Manual:

$$t_d = \frac{d_i V_r}{i}$$

$t_d$  = Drawdown Time (hours)  
 $d_i$  = Max infiltration storage depth (m)  
 $i$  = Adjusted Infiltration Rate (mm/hr)  
 $V_r$  = Void Space of Stone

## Appendix E

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### Geotechnical Information

## Soil Investigation Results OG



**Project No:** 21-10985  
**Project Name:** Heritage Line  
**Designed/Checked By:** RC/CPB  
**Date:** August 19, 2021

### Borehole / Test Pit Elevations

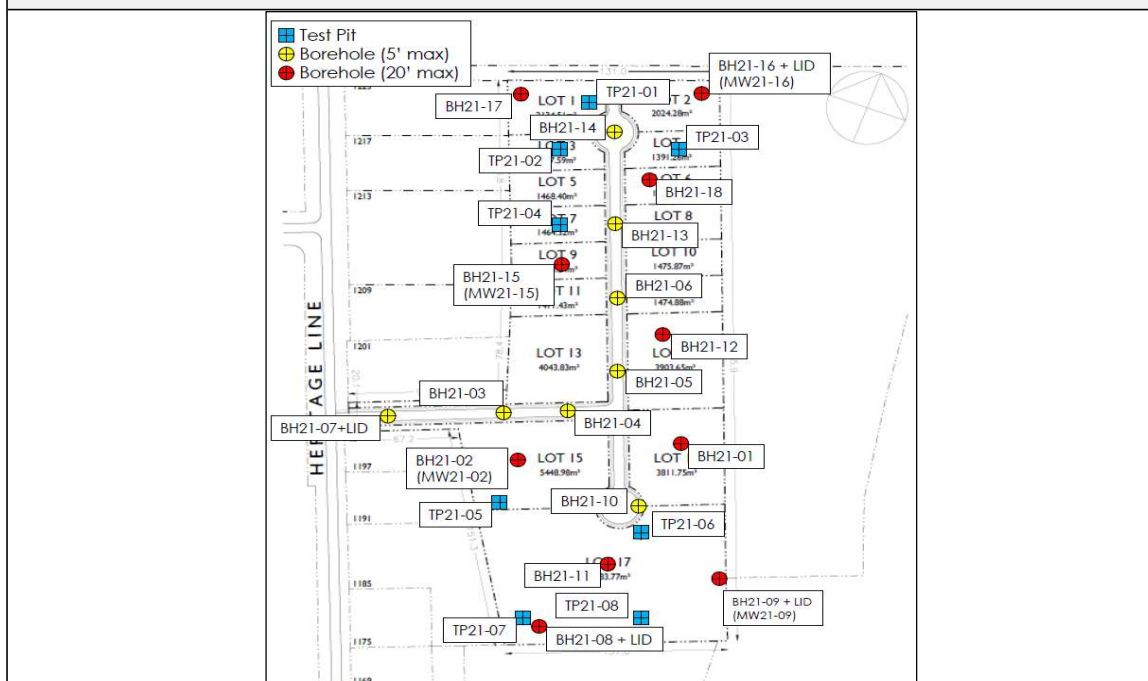
| Borehole/<br>Test Pit ID | Assumed Benchmark (mbeg)     |                      |                      | Geodetic Benchmark (m)       |                          |                          |                                    |
|--------------------------|------------------------------|----------------------|----------------------|------------------------------|--------------------------|--------------------------|------------------------------------|
|                          | Existing Ground<br>Elevation | Groundwater<br>Depth | Termination<br>Depth | Existing Ground<br>Elevation | Groundwater<br>Elevation | Termination<br>Elevation | LID Base<br>Elevation <sup>1</sup> |
| BH-01                    | 225.24                       | Dry                  | 6.55                 | 225.24                       | -                        | 218.69                   | 219.69                             |
| MW-02                    | 224.33                       | 0.7                  | 6.55                 | 224.33                       | 223.63                   | 217.78                   | 224.63                             |
| BH-03                    | 225.11                       | 1.3                  | 2.00                 | 225.11                       | 223.81                   | 223.11                   | 224.81                             |
| BH-04                    | 224.39                       | Dry                  | 2.00                 | 224.39                       | -                        | 222.39                   | 223.39                             |
| BH-05                    | 224.78                       | 1.2                  | 2.00                 | 224.78                       | 223.58                   | 222.78                   | 224.58                             |
| BH-06                    | 224.77                       | Dry                  | 2.00                 | 224.77                       | -                        | 222.77                   | 223.77                             |
| BH-07                    | 227.56                       | Dry                  | 2.00                 | 227.56                       | -                        | 225.56                   | 226.56                             |
| BH-08                    | 222.56                       | 2.7                  | 6.55                 | 222.56                       | 219.86                   | 216.01                   | 220.86                             |
| MW-09                    | 213.23                       | 4                    | 6.55                 | 213.23                       | 209.23                   | 206.68                   | 210.23                             |
| BH-10                    | 224.30                       | Dry                  | 2.00                 | 224.30                       | -                        | 222.30                   | 223.30                             |
| BH-11                    | 223.70                       | 4.6                  | 5.05                 | 223.70                       | 219.10                   | 218.65                   | 220.10                             |
| BH-12                    | 225.31                       | 2.1                  | 6.55                 | 225.31                       | 223.21                   | 218.76                   | 224.21                             |
| BH-13                    | 224.05                       | 1.2                  | 2.00                 | 224.05                       | 222.85                   | 222.05                   | 223.85                             |
| BH-14                    | 222.71                       | Dry                  | 2.00                 | 222.71                       | -                        | 220.71                   | 221.71                             |
| MW-15                    | 225.34                       | 0.9                  | 6.55                 | 225.34                       | 224.44                   | 218.79                   | 225.44                             |
| MW-16                    | 222.81                       | 1.75                 | 6.55                 | 222.81                       | 221.06                   | 216.26                   | 222.06                             |
| BH-17                    | 220.53                       | Dry                  | 6.55                 | 220.53                       | -                        | 213.98                   | 214.98                             |
| BH-18                    | 223.69                       | 4.6                  | 6.55                 | 223.69                       | 219.09                   | 217.14                   | 220.09                             |

1. Low Impact Development design guidelines require a minimum 1.0 m separation from the base of an infiltration feature to the greater of the seasonally high groundwater elevation and the bedrock elevation. As such, the LID Base Elevation represents the lowest possible

### In-Situ Infiltration Analysis

| Borehole /<br>Test Pit ID | Testing Depth<br>(mbeg) | Testing<br>Elevation (m) | Observed<br>Infiltration Rate<br>(mm/hr) | Recorded<br>Infiltration Rate<br>(mm/hr) | OBC Table 2<br>Percolation<br>Rate (mm/hr) | Selected<br>Infiltration Rate<br>(mm/hr) | Recommend<br>ed Safety Factor |
|---------------------------|-------------------------|--------------------------|------------------------------------------|------------------------------------------|--------------------------------------------|------------------------------------------|-------------------------------|
| MW-09                     | 1.7                     | 211.53                   | 24.0                                     |                                          |                                            | 24.0                                     |                               |
| MW-16                     | 1.75                    | 221.06                   | 30.0                                     |                                          |                                            | 30.0                                     |                               |
| BH-08                     | 1.7                     | 220.86                   |                                          |                                          |                                            |                                          |                               |

### Borehole / Test Pit Locations



## Appendix F

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### Water Balance



| Monthly Water Budget Calculations                                                 |                                    |                                                    |            |                               |                            |                   | Sheet 1 of 4 |              |
|-----------------------------------------------------------------------------------|------------------------------------|----------------------------------------------------|------------|-------------------------------|----------------------------|-------------------|--------------|--------------|
|  |                                    | <b>Project No:</b> 21-10985                        |            |                               |                            |                   |              |              |
|                                                                                   |                                    | <b>Project Name:</b> Heritage Line Preliminary SWM |            |                               |                            |                   |              |              |
|                                                                                   |                                    | <b>Designed/Checked By:</b> SO/KS                  |            |                               |                            |                   |              |              |
|                                                                                   |                                    | <b>Date:</b> 10-May-22                             |            |                               |                            |                   |              |              |
| CANADIAN CLIMATE NORMALS FOR 'PETERBOROUGH A (5186)' (1980-2010)                  |                                    |                                                    |            |                               |                            |                   |              |              |
| Climate ID = 6166418                                                              |                                    |                                                    |            |                               |                            |                   |              |              |
| Latitude = 44.23                                                                  |                                    |                                                    |            |                               |                            |                   |              |              |
| Longitude = 78.37                                                                 |                                    |                                                    |            |                               |                            |                   |              |              |
| Thornthwaite (1948) Inputs                                                        |                                    |                                                    |            | Monthly Water Budget Analysis |                            |                   |              |              |
| Month                                                                             | Mean Temperature (°C) <sup>1</sup> | Total Precipitation (mm) <sup>1</sup>              | Heat Index | PET (mm)                      | Daylight Correction Factor | Adjusted PET (mm) | Surplus (mm) | Deficit (mm) |
| January                                                                           | -8.9                               | 58.5                                               | 0.00       | 0.0                           | 0.77                       | 0.0               | 58.5         | 0.0          |
| February                                                                          | -7.7                               | 50.6                                               | 0.00       | 0.0                           | 0.87                       | 0.0               | 50.6         | 0.0          |
| March                                                                             | -2.0                               | 65.0                                               | 0.00       | 0.0                           | 0.99                       | 0.0               | 65.0         | 0.0          |
| April                                                                             | 5.7                                | 68.8                                               | 1.22       | 28.2                          | 1.12                       | 31.6              | 40.6         | 0.0          |
| May                                                                               | 12.4                               | 73.2                                               | 3.96       | 64.3                          | 1.23                       | 79.2              | 8.9          | 6.0          |
| June                                                                              | 16.8                               | 76.7                                               | 6.26       | 84.8                          | 1.29                       | 109.2             | 0.0          | 32.5         |
| July                                                                              | 19.4                               | 66.7                                               | 7.79       | 101.5                         | 1.26                       | 128.0             | 0.0          | 61.3         |
| August                                                                            | 18.2                               | 83.2                                               | 7.07       | 95.1                          | 1.17                       | 110.9             | 0.0          | 27.7         |
| September                                                                         | 13.5                               | 78.4                                               | 4.50       | 67.9                          | 1.04                       | 70.8              | 10.5         | 0.0          |
| October                                                                           | 7.3                                | 70.0                                               | 1.77       | 37.4                          | 0.92                       | 34.3              | 32.6         | 0.0          |
| November                                                                          | 1.7                                | 79.0                                               | 0.20       | 8.2                           | 0.80                       | 6.6               | 70.8         | 0.0          |
| December                                                                          | -5.3                               | 70.3                                               | 0.00       | 0.0                           | 0.74                       | 0.0               | 70.3         | 0.0          |
| Totals                                                                            |                                    | 840.4                                              | 32.77      |                               |                            | 570.5             | 407.8        | 127.5        |
| Thornthwaite Coefficient (α)                                                      |                                    |                                                    | 1.021      | Total Water Surplus (mm)      |                            |                   |              | 269.9        |

**Notes:**

1. Temperature and Precipitation are taken from Canadian Climate Normals 1981-2010
2. Water budget adjusted for latitude and length of daylight
3. Potential Evapotranspiration (PET) is calculated based on the Thornthwaite 1948 equation
4. Total Water Surplus (Thornthwaite, 1948) is calculated as total precipitation minus adjusted evapotranspiration



# Water Balance Calculations for Existing Conditions

Sheet 2 of 4



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: 10-May-22

| Catchment Parameters                       | EX-100       | EX-200       | EX-300       |  |  |  |  |  |  | Total        |
|--------------------------------------------|--------------|--------------|--------------|--|--|--|--|--|--|--------------|
| Drainage Area (m <sup>2</sup> )            | 21800        | 17600        | 17000        |  |  |  |  |  |  | 56400        |
| Pervious Area (m <sup>2</sup> )            | 21800        | 17600        | 16800        |  |  |  |  |  |  | 56200        |
| Impervious Area (m <sup>2</sup> )          | 0            | 0            | 200          |  |  |  |  |  |  | 200          |
| <b>Evapotranspiration Factors</b>          |              |              |              |  |  |  |  |  |  |              |
| Pervious PET Ratio                         | 0.68         | 0.68         | 0.68         |  |  |  |  |  |  | 0.68         |
| Impervious Evapotranspiration <sup>3</sup> | 0.20         | 0.20         | 0.20         |  |  |  |  |  |  | 0.20         |
| <b>Infiltration Factors</b>                |              |              |              |  |  |  |  |  |  |              |
| Topography Infiltration Factor             | 0.15         | 0.10         | 0.15         |  |  |  |  |  |  | 0.13         |
| Soil Infiltration Factor                   | 0.30         | 0.30         | 0.30         |  |  |  |  |  |  | 0.30         |
| Land Cover Infiltration Factor             | 0.11         | 0.14         | 0.10         |  |  |  |  |  |  | 0.12         |
| MOE Infiltration Factor                    | 0.56         | 0.54         | 0.55         |  |  |  |  |  |  | 0.55         |
| Actual Infiltration Factor                 | 0.56         | 0.54         | 0.55         |  |  |  |  |  |  | 0.55         |
| Run-Off Coefficient                        | 0.44         | 0.46         | 0.45         |  |  |  |  |  |  | 0.45         |
| Runoff from Impervious Surfaces            | 0.80         | 0.80         | 0.80         |  |  |  |  |  |  | 0.80         |
| <b>Inputs (mm/yr)</b>                      |              |              |              |  |  |  |  |  |  |              |
| Precipitation                              | 840.4        | 840.4        | 840.4        |  |  |  |  |  |  | 840.4        |
| Run-On                                     | 0.0          | 0.0          | 0.0          |  |  |  |  |  |  | 0.0          |
| Other Inputs                               | 0.0          | 0.0          | 0.0          |  |  |  |  |  |  | 0.0          |
| Total Inputs                               | 840.4        | 840.4        | 840.4        |  |  |  |  |  |  | 840.4        |
| <b>Outputs (mm/yr)</b>                     |              |              |              |  |  |  |  |  |  |              |
| Precipitation Surplus                      | 269.9        | 269.9        | 274.6        |  |  |  |  |  |  | 271.3        |
| Net Surplus                                | 269.9        | 269.9        | 274.6        |  |  |  |  |  |  | 271.3        |
| Evapotranspiration                         | 570.5        | 570.5        | 565.8        |  |  |  |  |  |  | 569.1        |
| Infiltration                               | 150.8        | 146.7        | 147.5        |  |  |  |  |  |  | 148.5        |
| Infiltration Features <sup>4</sup>         | 0.0          | 0.0          | 0.0          |  |  |  |  |  |  | 0.0          |
| <b>Total Infiltration</b>                  | <b>150.8</b> | <b>146.7</b> | <b>147.5</b> |  |  |  |  |  |  | <b>148.5</b> |
| Runoff Pervious Areas                      | 119.1        | 123.1        | 120.6        |  |  |  |  |  |  | 120.8        |
| Runoff Impervious Areas                    | 0.0          | 0.0          | 672.3        |  |  |  |  |  |  | 672.3        |
| Total Unadjusted Runoff                    | 119.1        | 123.1        | 127.1        |  |  |  |  |  |  | 122.8        |
| <b>Total Adjusted Runoff<sup>5</sup></b>   | <b>119.1</b> | <b>123.1</b> | <b>127.1</b> |  |  |  |  |  |  | <b>122.8</b> |
| <b>Total Outputs</b>                       | <b>840.4</b> | <b>840.4</b> | <b>840.4</b> |  |  |  |  |  |  | <b>840.4</b> |
| <b>Inputs (m<sup>3</sup>/yr)</b>           |              |              |              |  |  |  |  |  |  |              |
| Precipitation                              | 18321        | 14791        | 14287        |  |  |  |  |  |  | 47399        |
| Run-On                                     | 0            | 0            | 0            |  |  |  |  |  |  | 0            |
| Other Inputs                               | 0            | 0            | 0            |  |  |  |  |  |  | 0            |
| <b>Total Inputs</b>                        | <b>18321</b> | <b>14791</b> | <b>14287</b> |  |  |  |  |  |  | <b>47399</b> |
| <b>Outputs (m<sup>3</sup>/yr)</b>          |              |              |              |  |  |  |  |  |  |              |
| Precipitation Surplus                      | 5883         | 4749         | 4668         |  |  |  |  |  |  | 15300        |
| Net Surplus                                | 5883         | 4749         | 4668         |  |  |  |  |  |  | 15300        |
| Evapotranspiration                         | 12438        | 10042        | 9619         |  |  |  |  |  |  | 32098        |
| Infiltration                               | 3287         | 2582         | 2507         |  |  |  |  |  |  | 8376         |
| Infiltration Features <sup>4</sup>         | 0            | 0            | 0            |  |  |  |  |  |  | 0            |
| <b>Total Infiltration</b>                  | <b>3287</b>  | <b>2582</b>  | <b>2507</b>  |  |  |  |  |  |  | <b>8376</b>  |
| Runoff Pervious Areas                      | 2596         | 2167         | 2027         |  |  |  |  |  |  | 6790         |
| Runoff Impervious Areas                    | 0            | 0            | 134          |  |  |  |  |  |  | 134          |
| Total Unadjusted Runoff                    | 2596         | 2167         | 2161         |  |  |  |  |  |  | 6924         |
| Total Adjusted Runoff <sup>5</sup>         | 2596         | 2167         | 2161         |  |  |  |  |  |  | 6924         |
| <b>Total Outputs</b>                       | <b>18321</b> | <b>14791</b> | <b>14287</b> |  |  |  |  |  |  | <b>47399</b> |

## Notes:

1. Water Balance Calculations area in based on methodology described in the Conservation Authority Guidelines for Hydrogeological Assessments (June 2013)
2. Annual Precipitation and Evapotranspiration values were determined using the Thornthwaite (1948) method for monthly water budget calculations
3. Evaporation from impervious areas was assumed to be 20% of Precipitation
4. Infiltration Features are calculated using daily Precipitation data and averaged over the number of years of available data. The entire Catchment is assumed to contribute with no infiltration occurring during months with a negative average temperature.
5. Total Adjusted Runoff is calculated as (Pervious Runoff + Impervious Runoff) - (Infiltration Features)

# Water Balance Calculations for Proposed Conditions

Sheet 3 of 4



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: 10-May-22

| Catchment Parameters                       | PR-100       | PR-101       | PR-200       | PR-201       | PR-202       | PR-300       |  |  |  |  | Total        |
|--------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--|--|--|--|--------------|
| Drainage Area (m <sup>2</sup> )            | 2400         | 12800        | 21400        | 7400         | 9300         | 2300         |  |  |  |  | 55600        |
| Pervious Area (m <sup>2</sup> )            | 900          | 11500        | 12500        | 6800         | 9300         | 2000         |  |  |  |  | 43000        |
| Impervious Area (m <sup>2</sup> )          | 1500         | 1300.0       | 8900         | 600          | 0            | 300          |  |  |  |  | 12600        |
| Evapotranspiration Factors                 |              |              |              |              |              |              |  |  |  |  |              |
| Pervious PET Ratio                         | 0.68         | 0.68         | 0.68         | 0.68         | 0.68         | 0.68         |  |  |  |  | 0.68         |
| Impervious Evapotranspiration <sup>3</sup> | 0.20         | 0.20         | 0.20         | 0.20         | 0.20         | 0.20         |  |  |  |  | 0.20         |
| Infiltration Factors                       |              |              |              |              |              |              |  |  |  |  |              |
| Topography Infiltration Factor             | 0.10         | 0.15         | 0.20         | 0.10         | 0.10         | 0.15         |  |  |  |  | 0.14         |
| Soil Infiltration Factor                   | 0.30         | 0.30         | 0.30         | 0.30         | 0.30         | 0.30         |  |  |  |  | 0.30         |
| Land Cover Infiltration Factor             | 0.10         | 0.10         | 0.10         | 0.10         | 0.20         | 0.10         |  |  |  |  | 0.12         |
| MOE Infiltration Factor                    | 0.50         | 0.55         | 0.60         | 0.50         | 0.60         | 0.55         |  |  |  |  | 0.57         |
| Actual Infiltration Factor                 | 0.50         | 0.55         | 0.60         | 0.50         | 0.60         | 0.55         |  |  |  |  | 0.57         |
| Run-Off Coefficient                        | 0.50         | 0.45         | 0.40         | 0.50         | 0.40         | 0.45         |  |  |  |  | 0.43         |
| Runoff from Impervious Surfaces            | 0.80         | 0.80         | 0.80         | 0.80         | 0.80         | 0.80         |  |  |  |  | 0.80         |
| Inputs (mm/yr)                             |              |              |              |              |              |              |  |  |  |  |              |
| Precipitation                              | 840.4        | 840.4        | 840.4        | 840.4        | 840.4        | 840.4        |  |  |  |  | 840.4        |
| Run-On                                     | 0.0          | 0.0          | 0.0          | 0.0          | 0.0          | 0.0          |  |  |  |  | 0.0          |
| Other Inputs                               | 0.0          | 0.0          | 0.0          | 0.0          | 0.0          | 0.0          |  |  |  |  | 0.0          |
| Total Inputs                               | 840.4        | 840.4        | 840.4        | 840.4        | 840.4        | 840.4        |  |  |  |  | 840.4        |
| Outputs (mm/yr)                            |              |              |              |              |              |              |  |  |  |  |              |
| Precipitation Surplus                      | 521.4        | 310.7        | 437.2        | 302.5        | 269.9        | 322.3        |  |  |  |  | 361.1        |
| Net Surplus                                | 521.4        | 310.7        | 437.2        | 302.5        | 269.9        | 322.3        |  |  |  |  | 361.1        |
| Evapotranspiration                         | 319.0        | 529.7        | 403.2        | 537.9        | 570.5        | 518.1        |  |  |  |  | 479.3        |
| Infiltration                               | 50.6         | 133.3        | 94.6         | 124.0        | 161.9        | 129.1        |  |  |  |  | 118.2        |
| Infiltration Features <sup>4</sup>         | 334.4        | 235.0        | 246.5        | 250.0        | 0.0          | 0.0          |  |  |  |  | 196.7        |
| <b>Total Infiltration</b>                  | <b>385.0</b> | <b>368.3</b> | <b>341.1</b> | <b>374.0</b> | <b>161.9</b> | <b>129.1</b> |  |  |  |  | <b>314.9</b> |
| Runoff Pervious Areas                      | 134.9        | 121.4        | 107.9        | 134.9        | 107.9        | 121.4        |  |  |  |  | 117.0        |
| Runoff Impervious Areas                    | 672.3        | 672.3        | 672.3        | 672.3        | 0.0          | 672.3        |  |  |  |  | 672.3        |
| Total Unadjusted Runoff                    | 470.8        | 177.4        | 342.7        | 178.5        | 107.9        | 193.3        |  |  |  |  | 242.9        |
| <b>Total Adjusted Runoff<sup>5</sup></b>   | <b>136.4</b> | <b>-57.6</b> | <b>96.2</b>  | <b>-71.5</b> | <b>107.9</b> | <b>193.3</b> |  |  |  |  | <b>46.2</b>  |
| <b>Total Outputs</b>                       | <b>840.4</b> | <b>840.4</b> | <b>840.4</b> | <b>840.4</b> | <b>840.4</b> | <b>840.4</b> |  |  |  |  | <b>840.4</b> |
| Inputs (m <sup>3</sup> /yr)                |              |              |              |              |              |              |  |  |  |  |              |
| Precipitation                              | 2017         | 10757        | 17985        | 6219         | 7816         | 1933         |  |  |  |  | 46726        |
| Run-On                                     | 0            | 0            | 0            | 0            | 0            | 0            |  |  |  |  | 0            |
| Other Inputs                               | 0            | 0            | 0            | 0            | 0            | 0            |  |  |  |  | 0            |
| <b>Total Inputs</b>                        | <b>2017</b>  | <b>10757</b> | <b>17985</b> | <b>6219</b>  | <b>7816</b>  | <b>1933</b>  |  |  |  |  | <b>46726</b> |
| Outputs (m <sup>3</sup> /yr)               |              |              |              |              |              |              |  |  |  |  |              |
| Precipitation Surplus                      | 1251         | 3977         | 9357         | 2238         | 2510         | 741          |  |  |  |  | 20075        |
| Net Surplus                                | 1251         | 3977         | 9357         | 2238         | 2510         | 741          |  |  |  |  | 20075        |
| Evapotranspiration                         | 766          | 6780         | 8628         | 3981         | 5306         | 1192         |  |  |  |  | 26651        |
| Infiltration                               | 121          | 1707         | 2024         | 918          | 1506         | 297          |  |  |  |  | 6572         |
| Infiltration Features <sup>4</sup>         | 803          | 3008         | 5275         | 1850         | 0            | 0            |  |  |  |  | 10935        |
| Total Infiltration                         | 924          | 4715         | 7299         | 2767         | 1506         | 297          |  |  |  |  | 17508        |
| Runoff Pervious Areas                      | 121          | 1396         | 1349         | 918          | 1004         | 243          |  |  |  |  | 5031         |
| Runoff Impervious Areas                    | 1008         | 874          | 5984         | 403          | 0            | 202          |  |  |  |  | 8471         |
| Total Unadjusted Runoff                    | 1130         | 2271         | 7333         | 1321         | 1004         | 445          |  |  |  |  | 13503        |
| Total Adjusted Runoff <sup>5</sup>         | 327          | -737         | 2058         | -529         | 1004         | 445          |  |  |  |  | 2567         |
| <b>Total Outputs</b>                       | <b>2017</b>  | <b>10757</b> | <b>17985</b> | <b>6219</b>  | <b>7816</b>  | <b>1933</b>  |  |  |  |  | <b>46726</b> |

## Notes:

1. Water Balance Calculations area in based on methodology described in the Conservation Authority Guidelines for Hydrogeological Assessments (June 2013)
2. Annual Precipitation and Evapotranspiration values were determined using the Thornthwaite (1948) method for monthly water budget calculations
3. Evaporation from impervious areas was assumed to be 20% of Precipitation
4. Infiltration Features are calculated using daily Precipitation data and averaged over the number of years of available data. The entire Catchment is assumed to contribute with no infiltration occurring during months with a negative average temperature.
5. Total Adjusted Runoff is calculated as (Pervious Runoff + Impervious Runoff) - (Infiltration Features)

# Water Balance Assessment

Sheet 4 of 4



Project No: 21-10985  
Project Name: Heritage Line Preliminary SWM  
Designed/Checked By: SO/KS  
Date: 10-May-22

| Characteristic                    | Existing    | Proposed<br>No Mitigation | Change        | Proposed<br>With Mitigation | Change        |
|-----------------------------------|-------------|---------------------------|---------------|-----------------------------|---------------|
| <b>Inputs (m<sup>3</sup>/yr)</b>  |             |                           |               |                             |               |
| Precipitation                     | 47399       | 46726                     | -1.4%         | 46726                       | -1.4%         |
| Run-On                            | 0           | 0                         | 0.0%          | 0                           | 0.0%          |
| Other Inputs                      | 0           | 0                         | 0.0%          | 0                           | 0.0%          |
| Total Inputs                      | 47399       | 46726                     | -1.4%         | 46726                       | -1.4%         |
| <b>Outputs (m<sup>3</sup>/yr)</b> |             |                           |               |                             |               |
| Precipitation Surplus             | 15300       | 20075                     | 31.2%         | 20075                       | 31.2%         |
| Net Surplus                       | 15300       | 20075                     | 31.2%         | 20075                       | 31.2%         |
| Evapotranspiration                | 32098       | 26651                     | -17.0%        | 26651                       | -17.0%        |
| Infiltration                      | 8376        | 6572                      | -21.5%        | 6572                        | -21.5%        |
| Infiltration Features             | 0           | 0                         | 0.0%          | 10935                       | 0.0%          |
| <b>Total Infiltration</b>         | <b>8376</b> | <b>6572</b>               | <b>-21.5%</b> | <b>17508</b>                | <b>109.0%</b> |
| Runoff Pervious Areas             | 6790        | 5031                      | -25.9%        | 5031                        | -25.9%        |
| Runoff Impervious Areas           | 134         | 8471                      | 6200.0%       | 8471                        | 6200.0%       |
| <b>Total Runoff</b>               | <b>6924</b> | <b>13503</b>              | <b>95.0%</b>  | <b>2567</b>                 | <b>-62.9%</b> |
| Total Outputs                     | 47399       | 46726                     | -1.4%         | 46726                       | -1.4%         |

## Nitrate Dilution Calculations

|                                       |                  |
|---------------------------------------|------------------|
| Total Dilution Area                   | 5.56 ha          |
| No. of Lots                           | 16               |
| Sewage Flow per Lot                   | 1000 L/day       |
| Total Daily Sewage Loading            | 16,000 L/day     |
| Nitrate in Septic Effluent            | 40 mg/L          |
| Background Nitrates                   | 0.063 mg/L       |
| Stormwater Effluent Nitrates          | 0 mg/L           |
| <b>Infiltration Rates</b>             |                  |
| Infiltration Rate (Clean Water)       | 133.3 mm/year    |
| Infiltration Rate (Clean Water)       | 18,006 L/day     |
| Infiltration Rate (Stormwater)        | 196.7 mm/year    |
| Infiltration Rate (Stormwater)        | 29,960 L/day     |
| <b>Nitrate Concentrations</b>         |                  |
| Nitrate Loading - Development         | 640,000 mg/day   |
| Nitrate Loading - Rainfall            | 1,134 mg/day     |
| Nitrate Loading - Runoff              | 0 mg/day         |
| Total Nitrate Loading                 | 641,134 mg/day   |
| Dilution - Development                | 16,000 L/day     |
| Dilution - Groundwater Recharge       | 47,966 L/day     |
| Total Dilution                        | 63,966 L/day     |
| <b>Boundary Nitrate Concentration</b> | <b>10.0 mg/L</b> |

| Infiltration Factor Calculations for EX-100                                       |                                                    | Sheet 1 of 1 |
|-----------------------------------------------------------------------------------|----------------------------------------------------|--------------|
|  | <b>Project No:</b> 21-10985                        |              |
|                                                                                   | <b>Project Name:</b> Heritage Line Preliminary SWM |              |
|                                                                                   | <b>Designed/Checked By:</b> SO/KS                  |              |
|                                                                                   | <b>Date:</b> 10-May-22                             |              |

| Topography                            |                    |
|---------------------------------------|--------------------|
| Average Slope                         | 2.59%              |
| Slope Description                     | Rolling/Hilly Land |
| <b>Topography Infiltration Factor</b> | <b>0.15</b>        |

| Soils                              |               |             |
|------------------------------------|---------------|-------------|
| Hydrologic Soil Group <sup>2</sup> | B             | Total       |
| Soil Type                          | Otonabee Loam |             |
| Area (ha)                          | 2.18          | 2.18        |
| <b>Soil Infiltration Factor</b>    | <b>0.30</b>   | <b>0.30</b> |

| Cover                  |           |                           |
|------------------------|-----------|---------------------------|
| Land Use               | Area (ha) | Cover Infiltration Factor |
| Agriculture            | 1.99      | 0.10                      |
| Range                  |           |                           |
| Grass                  | 0.19      | 0.20                      |
| Woods                  |           |                           |
| Wetland                |           |                           |
| Bare Earth (>70% Rock) | 2.18      | <b>0.11</b>               |
| Impervious             |           |                           |
| Total <sup>3</sup>     | 2.18      | <b>0.11</b>               |

|                                   |             |
|-----------------------------------|-------------|
| <b>MOE Infiltration Factor</b>    | <b>0.56</b> |
| <b>Actual Infiltration Factor</b> | <b>0.56</b> |

**Notes:**

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

| Infiltration Factor Calculations for EX-200                                       |                                                    | Sheet 1 of 1 |
|-----------------------------------------------------------------------------------|----------------------------------------------------|--------------|
|  | <b>Project No:</b> 21-10985                        |              |
|                                                                                   | <b>Project Name:</b> Heritage Line Preliminary SWM |              |
|                                                                                   | <b>Designed/Checked By:</b> SO/KS                  |              |
|                                                                                   | <b>Date:</b> 10-May-22                             |              |

| Topography                            |             |
|---------------------------------------|-------------|
| Average Slope                         | 14.31%      |
| Slope Description                     | Hilly Land  |
| <b>Topography Infiltration Factor</b> | <b>0.10</b> |

| Soils                              |               |             |
|------------------------------------|---------------|-------------|
| Hydrologic Soil Group <sup>2</sup> | B             | Total       |
| Soil Type                          | Otonabee Loam |             |
| Area (ha)                          | 1.76          | 1.76        |
| <b>Soil Infiltration Factor</b>    | <b>0.30</b>   | <b>0.30</b> |

| Cover                  |           |                           |
|------------------------|-----------|---------------------------|
| Land Use               | Area (ha) | Cover Infiltration Factor |
| Agriculture            | 0.99      | 0.10                      |
| Range                  |           |                           |
| Grass                  | 0.77      | 0.20                      |
| Woods                  |           |                           |
| Wetland                |           |                           |
| Bare Earth (>70% Rock) | 1.76      | <b>0.14</b>               |
| Impervious             |           |                           |
| Total <sup>3</sup>     | 1.76      | <b>0.14</b>               |

|                                   |             |
|-----------------------------------|-------------|
| <b>MOE Infiltration Factor</b>    | <b>0.54</b> |
| <b>Actual Infiltration Factor</b> | <b>0.54</b> |

**Notes:**

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

| Infiltration Factor Calculations for EX-300                                       |                                                    | Sheet 1 of 1 |
|-----------------------------------------------------------------------------------|----------------------------------------------------|--------------|
|  | <b>Project No:</b> 21-10985                        |              |
|                                                                                   | <b>Project Name:</b> Heritage Line Preliminary SWM |              |
|                                                                                   | <b>Designed/Checked By:</b> SO/KS                  |              |
|                                                                                   | <b>Date:</b> 10-May-22                             |              |

| Topography                            |                    |
|---------------------------------------|--------------------|
| Average Slope                         | 1.39%              |
| Slope Description                     | Rolling/Hilly Land |
| <b>Topography Infiltration Factor</b> | <b>0.15</b>        |

| Soils                              |               |             |
|------------------------------------|---------------|-------------|
| Hydrologic Soil Group <sup>2</sup> | B             | Total       |
| Soil Type                          | Otonabee Loam |             |
| Area (ha)                          | 1.70          | 1.70        |
| <b>Soil Infiltration Factor</b>    | <b>0.30</b>   | <b>0.30</b> |

| Cover                  |           |                           |
|------------------------|-----------|---------------------------|
| Land Use               | Area (ha) | Cover Infiltration Factor |
| Agriculture            | 1.63      | 0.10                      |
| Range                  |           |                           |
| Grass                  | 0.05      | 0.20                      |
| Woods                  |           |                           |
| Wetland                | 0.02      |                           |
| Bare Earth (>70% Rock) |           |                           |
| Impervious             | 0.02      |                           |
| Total <sup>3</sup>     | 1.68      | <b>0.10</b>               |

|                                   |             |
|-----------------------------------|-------------|
| <b>MOE Infiltration Factor</b>    | <b>0.55</b> |
| <b>Actual Infiltration Factor</b> | <b>0.55</b> |

**Notes:**

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

| Infiltration Factor Calculations for PR-100                                       |                                                    | Sheet 1 of 2 |
|-----------------------------------------------------------------------------------|----------------------------------------------------|--------------|
|  | <b>Project No:</b> 21-10985                        |              |
|                                                                                   | <b>Project Name:</b> Heritage Line Preliminary SWM |              |
|                                                                                   | <b>Designed/Checked By:</b> SO/KS                  |              |
|                                                                                   | <b>Date:</b> 10-May-22                             |              |

| Topography                            |             |
|---------------------------------------|-------------|
| Average Slope                         | 3.00%       |
| Slope Description                     | Hilly Land  |
| <b>Topography Infiltration Factor</b> | <b>0.10</b> |

| Soils                              |               |             |
|------------------------------------|---------------|-------------|
| Hydrologic Soil Group <sup>2</sup> | B             | Total       |
| Soil Type                          | Otonabee Loam |             |
| Area (ha)                          | 0.24          | 0.24        |
| <b>Soil Infiltration Factor</b>    | <b>0.30</b>   | <b>0.30</b> |

| Cover                  |           |                           |
|------------------------|-----------|---------------------------|
| Land Use               | Area (ha) | Cover Infiltration Factor |
| Agriculture            | 0.09      | 0.10                      |
| Range                  |           |                           |
| Grass                  |           |                           |
| Woods                  |           |                           |
| Wetland                | 0.15      |                           |
| Bare Earth (>70% Rock) |           |                           |
| Impervious             | 0.15      |                           |
| Total <sup>3</sup>     | 0.09      | <b>0.10</b>               |

|                                   |             |
|-----------------------------------|-------------|
| <b>MOE Infiltration Factor</b>    | <b>0.50</b> |
| <b>Actual Infiltration Factor</b> | <b>0.50</b> |

**Notes:**

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

**Infiltration Features for PR-100****Sheet 2 of 2****Project No:** 21-10985**Project Name:** Heritage Line Preliminary SWM**Designed/Checked By:** SO/KS**Date:** 10-May-22**Infiltration Features Summary**

|                                   |                             |
|-----------------------------------|-----------------------------|
| Total Storage Volume <sup>1</sup> | 28.0 m <sup>3</sup>         |
| Contributing Area <sup>2</sup>    | 2400 m <sup>2</sup>         |
| Pervious Area                     | 900 m <sup>2</sup>          |
| Impervious Area                   | 1500 m <sup>2</sup>         |
| Maximum Drawdown                  | 48 hrs                      |
| <b>Average Infiltration</b>       | <b>803 m<sup>3</sup>/yr</b> |
| <b>Volume<sup>3</sup></b>         | <b>334.4 mm/yr</b>          |

**Notes:**

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'PETERBOROUGH A' from 1981-2010



| Infiltration Factor Calculations for PR-101                                       |                                                    | Sheet 1 of 2 |
|-----------------------------------------------------------------------------------|----------------------------------------------------|--------------|
|  | <b>Project No:</b> 21-10985                        |              |
|                                                                                   | <b>Project Name:</b> Heritage Line Preliminary SWM |              |
|                                                                                   | <b>Designed/Checked By:</b> SO/KS                  |              |
|                                                                                   | <b>Date:</b> 10-May-22                             |              |

| Topography                            |                    |
|---------------------------------------|--------------------|
| Average Slope                         | 2.09%              |
| Slope Description                     | Rolling/Hilly Land |
| <b>Topography Infiltration Factor</b> | <b>0.15</b>        |

| Soils                              |               |             |
|------------------------------------|---------------|-------------|
| Hydrologic Soil Group <sup>2</sup> | B             | Total       |
| Soil Type                          | Otonabee Loam |             |
| Area (ha)                          | 1.28          | 1.28        |
| <b>Soil Infiltration Factor</b>    | <b>0.30</b>   | <b>0.30</b> |

| Cover                  |           |                                  |
|------------------------|-----------|----------------------------------|
| Land Use               | Area (ha) | <b>Cover Infiltration Factor</b> |
| Agriculture            | 1.15      | 0.10                             |
| Range                  |           |                                  |
| Grass                  |           |                                  |
| Woods                  |           |                                  |
| Wetland                | 0.13      |                                  |
| Bare Earth (>70% Rock) |           |                                  |
| Impervious             | 0.13      |                                  |
| Total <sup>3</sup>     | 1.15      | <b>0.10</b>                      |

|                                   |             |
|-----------------------------------|-------------|
| <b>MOE Infiltration Factor</b>    | <b>0.55</b> |
| <b>Actual Infiltration Factor</b> | <b>0.55</b> |

**Notes:**

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

**Infiltration Features for PR-101****Sheet 2 of 2****Project No:** 21-10985**Project Name:** Heritage Line Preliminary SWM**Designed/Checked By:** SO/KS**Date:** 10-May-22**Infiltration Features Summary**

|                                   |                              |
|-----------------------------------|------------------------------|
| Total Storage Volume <sup>1</sup> | 328.0 m <sup>3</sup>         |
| Contributing Area <sup>2</sup>    | 12800 m <sup>2</sup>         |
| Pervious Area                     | 11500 m <sup>2</sup>         |
| Impervious Area                   | 1300 m <sup>2</sup>          |
| Maximum Drawdown                  | 48 hrs                       |
| <b>Average Infiltration</b>       | <b>3008 m<sup>3</sup>/yr</b> |
| <b>Volume<sup>3</sup></b>         | <b>235.0 mm/yr</b>           |

**Notes:**

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'PETERBOROUGH A' from 1981-2010

| Infiltration Factor Calculations for PR-200                                       |                                                    | Sheet 1 of 2 |
|-----------------------------------------------------------------------------------|----------------------------------------------------|--------------|
|  | <b>Project No:</b> 21-10985                        |              |
|                                                                                   | <b>Project Name:</b> Heritage Line Preliminary SWM |              |
|                                                                                   | <b>Designed/Checked By:</b> SO/KS                  |              |
|                                                                                   | <b>Date:</b> 10-May-22                             |              |

| Topography                            |              |
|---------------------------------------|--------------|
| Average Slope                         | 0.30%        |
| Slope Description                     | Rolling Land |
| <b>Topography Infiltration Factor</b> | <b>0.20</b>  |

| Soils                              |               |             |
|------------------------------------|---------------|-------------|
| Hydrologic Soil Group <sup>2</sup> | B             | Total       |
| Soil Type                          | Otonabee Loam |             |
| Area (ha)                          | 2.14          | 2.14        |
| <b>Soil Infiltration Factor</b>    | <b>0.30</b>   | <b>0.30</b> |

| Cover                  |           |                           |
|------------------------|-----------|---------------------------|
| Land Use               | Area (ha) | Cover Infiltration Factor |
| Agriculture            | 1.25      | 0.10                      |
| Range                  |           |                           |
| Grass                  |           |                           |
| Woods                  |           |                           |
| Wetland                | 0.89      |                           |
| Bare Earth (>70% Rock) |           |                           |
| Impervious             | 0.89      |                           |
| Total <sup>3</sup>     | 1.25      | <b>0.10</b>               |

|                                   |             |
|-----------------------------------|-------------|
| <b>MOE Infiltration Factor</b>    | <b>0.60</b> |
| <b>Actual Infiltration Factor</b> | <b>0.60</b> |

**Notes:**

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

**Infiltration Features for PR-200****Sheet 2 of 2****Project No:** 21-10985**Project Name:** Heritage Line Preliminary SWM**Designed/Checked By:** SO/KS**Date:** 10-May-22**Infiltration Features Summary**

|                                   |                              |
|-----------------------------------|------------------------------|
| Total Storage Volume <sup>1</sup> | 170.0 m <sup>3</sup>         |
| Contributing Area <sup>2</sup>    | 21400 m <sup>2</sup>         |
| Pervious Area                     | 12500 m <sup>2</sup>         |
| Impervious Area                   | 8900 m <sup>2</sup>          |
| Maximum Drawdown                  | 48 hrs                       |
| <b>Average Infiltration</b>       | <b>5275 m<sup>3</sup>/yr</b> |
| <b>Volume<sup>3</sup></b>         | <b>246.5 mm/yr</b>           |

**Notes:**

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'PETERBOROUGH A' from 1981-2010

| Infiltration Factor Calculations for PR-201                                       |                                                    | Sheet 1 of 2 |
|-----------------------------------------------------------------------------------|----------------------------------------------------|--------------|
|  | <b>Project No:</b> 21-10985                        |              |
|                                                                                   | <b>Project Name:</b> Heritage Line Preliminary SWM |              |
|                                                                                   | <b>Designed/Checked By:</b> SO/KS                  |              |
|                                                                                   | <b>Date:</b> 10-May-22                             |              |

| Topography                            |             |
|---------------------------------------|-------------|
| Average Slope                         | 11.60%      |
| Slope Description                     | Hilly Land  |
| <b>Topography Infiltration Factor</b> | <b>0.10</b> |

| Soils                              |               |             |
|------------------------------------|---------------|-------------|
| Hydrologic Soil Group <sup>2</sup> | B             | Total       |
| Soil Type                          | Otonabee Loam |             |
| Area (ha)                          | 0.74          | 0.74        |
| <b>Soil Infiltration Factor</b>    | <b>0.30</b>   | <b>0.30</b> |

| Cover                  |           |                           |
|------------------------|-----------|---------------------------|
| Land Use               | Area (ha) | Cover Infiltration Factor |
| Agriculture            | 0.68      | 0.10                      |
| Range                  |           |                           |
| Grass                  |           |                           |
| Woods                  |           |                           |
| Wetland                | 0.06      |                           |
| Bare Earth (>70% Rock) |           |                           |
| Impervious             | 0.06      |                           |
| Total <sup>3</sup>     | 0.68      | <b>0.10</b>               |

|                                   |             |
|-----------------------------------|-------------|
| <b>MOE Infiltration Factor</b>    | <b>0.50</b> |
| <b>Actual Infiltration Factor</b> | <b>0.50</b> |

**Notes:**

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

**Infiltration Features for PR-201****Sheet 2 of 2****Project No:** 21-10985**Project Name:** Heritage Line Preliminary SWM**Designed/Checked By:** SO/KS**Date:** 10-May-22**Infiltration Features Summary**

|                                   |                              |
|-----------------------------------|------------------------------|
| Total Storage Volume <sup>1</sup> | 203.0 m <sup>3</sup>         |
| Contributing Area <sup>2</sup>    | 7400 m <sup>2</sup>          |
| Pervious Area                     | 6800 m <sup>2</sup>          |
| Impervious Area                   | 600 m <sup>2</sup>           |
| Maximum Drawdown                  | 48 hrs                       |
| <b>Average Infiltration</b>       | <b>1850 m<sup>3</sup>/yr</b> |
| <b>Volume<sup>3</sup></b>         | <b>250.0 mm/yr</b>           |

**Notes:**

1. Total Storage Volume from all Infiltration Features in the catchment
2. The entire catchment contributes flow to the Infiltration Features
3. Average Infiltration Volume is calculated using daily climate data and averaged over the number of years of available data. No benefit is assumed for Infiltration Features during months with a negative average temperature.
4. Daily climate data is taken from Environment Canada Station 'PETERBOROUGH A' from 1981-2010

| Infiltration Factor Calculations for PR-202                                       |                                                    | Sheet 1 of 1 |
|-----------------------------------------------------------------------------------|----------------------------------------------------|--------------|
|  | <b>Project No:</b> 21-10985                        |              |
|                                                                                   | <b>Project Name:</b> Heritage Line Preliminary SWM |              |
|                                                                                   | <b>Designed/Checked By:</b> SO/KS                  |              |
|                                                                                   | <b>Date:</b> 10-May-22                             |              |

| Topography                            |             |
|---------------------------------------|-------------|
| Average Slope                         | 11.60%      |
| Slope Description                     | Hilly Land  |
| <b>Topography Infiltration Factor</b> | <b>0.10</b> |

| Soils                              |               |             |
|------------------------------------|---------------|-------------|
| Hydrologic Soil Group <sup>2</sup> | B             | Total       |
| Soil Type                          | Otonabee Loam |             |
| Area (ha)                          | 0.93          | 0.93        |
| <b>Soil Infiltration Factor</b>    | <b>0.30</b>   | <b>0.30</b> |

| Cover                  |           |                           |
|------------------------|-----------|---------------------------|
| Land Use               | Area (ha) | Cover Infiltration Factor |
| Agriculture            | 0.93      | 0.20                      |
| Range                  |           |                           |
| Grass                  |           |                           |
| Woods                  |           |                           |
| Wetland                |           |                           |
| Bare Earth (>70% Rock) | 0.93      | 0.20                      |
| Impervious             |           |                           |
| Total <sup>3</sup>     | 0.93      | <b>0.20</b>               |

|                                   |             |
|-----------------------------------|-------------|
| <b>MOE Infiltration Factor</b>    | <b>0.60</b> |
| <b>Actual Infiltration Factor</b> | <b>0.60</b> |

**Notes:**

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only

| Infiltration Factor Calculations for PR-300                                       |                                                    | Sheet 1 of 1 |
|-----------------------------------------------------------------------------------|----------------------------------------------------|--------------|
|  | <b>Project No:</b> 21-10985                        |              |
|                                                                                   | <b>Project Name:</b> Heritage Line Preliminary SWM |              |
|                                                                                   | <b>Designed/Checked By:</b> SO/KS                  |              |
|                                                                                   | <b>Date:</b> 10-May-22                             |              |

| Topography                            |                    |
|---------------------------------------|--------------------|
| Average Slope                         | 0.80%              |
| Slope Description                     | Rolling/Hilly Land |
| <b>Topography Infiltration Factor</b> | <b>0.15</b>        |

| Soils                              |               |             |
|------------------------------------|---------------|-------------|
| Hydrologic Soil Group <sup>2</sup> | B             | Total       |
| Soil Type                          | Otonabee Loam |             |
| Area (ha)                          | 0.23          | 0.23        |
| <b>Soil Infiltration Factor</b>    | <b>0.30</b>   | <b>0.30</b> |

| Cover                  |           |                           |
|------------------------|-----------|---------------------------|
| Land Use               | Area (ha) | Cover Infiltration Factor |
| Agriculture            | 0.20      | 0.10                      |
| Range                  |           |                           |
| Grass                  |           |                           |
| Woods                  |           |                           |
| Wetland                | 0.03      |                           |
| Bare Earth (>70% Rock) |           |                           |
| Impervious             | 0.03      |                           |
| Total <sup>3</sup>     | 0.20      | <b>0.10</b>               |

|                                   |             |
|-----------------------------------|-------------|
| <b>MOE Infiltration Factor</b>    | <b>0.55</b> |
| <b>Actual Infiltration Factor</b> | <b>0.55</b> |

**Notes:**

1. Infiltration Factors are derived from Table 3.1, MOE SWM Design Manual 2003
2. Hydrologic Soil Group obtained from Design Chart H2-6A, M.T.O. Drainage Manual, 1980.
3. Composite Infiltration Factors are calculated using pervious areas only



## Appendix G

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Drawings



SUMMARY CHART  
SECTION 51(17) PLANNING ACT

|                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| (a) THE BOUNDARIES OF THE LAND PROPOSED TO BE SUBDIVIDED, CERTIFIED BY AN ONTARIO LAND SURVEYOR;                                                                                                                                                                                                                                                                                                                                                   | AS REFERENCED ON DRAFT PLAN                                         |
| (b) THE LOCATIONS, WIDTHS AND NAMES OF THE PROPOSED HIGHWAYS WITHIN THE PROPOSED SUBDIVISION AND OF EXISTING HIGHWAYS ON WHICH THE PROPOSED SUBDIVISION ADJUTS;                                                                                                                                                                                                                                                                                    | AS REFERENCED ON DRAFT PLAN                                         |
| (c) ON A SMALL KEY PLAN, ON A SCALE OF NOT LESS THAN ONE CENTIMETRE TO 100 METRES, ALL OF THE LAND ADJACENT TO THE PROPOSED SUBDIVISION THAT IS OWNED BY THE APPLICANT OR IN WHICH THE APPLICANT HAS AN INTEREST, EVERY SUBDIVISION ADJACENT TO THE PROPOSED SUBDIVISION AND THE RELATIONSHIP OF THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED TO THE BOUNDARIES OF THE TOWNSHIP LOT OR OTHER ORIGINAL GRANT OF WHICH THE LAND FORMS THE WHOLE PART; | AS REFERENCED ON DRAFT PLAN                                         |
| (d) THE PURPOSE FOR WHICH THE PROPOSED LOTS ARE TO BE USED;                                                                                                                                                                                                                                                                                                                                                                                        | PROPOSED USE OF LOTS: LOTS 1-16 SINGLE DETACHED UNITS               |
| (e) THE EXISTING USES OF ALL ADJOINING LANDS;                                                                                                                                                                                                                                                                                                                                                                                                      | AS REFERENCED ON DRAFT PLAN                                         |
| (f) THE APPROXIMATE DIMENSIONS AND LAYOUT OF THE PROPOSED LOTS;                                                                                                                                                                                                                                                                                                                                                                                    | AS REFERENCED ON DRAFT PLAN                                         |
| (h) IF ANY AFFORDABLE HOUSING UNITS ARE BEING PROPOSED, THE SHAPE AND DIMENSIONS OF EACH PROPOSED AFFORDABLE HOUSING UNIT AND THE APPROXIMATE LOCATION OF EACH PROPOSED AFFORDABLE HOUSING UNIT IN RELATION TO OTHER PROPOSED RESIDENTIAL UNITS;                                                                                                                                                                                                   |                                                                     |
| (g) NATURAL AND ARTIFICIAL FEATURES SUCH AS BUILDINGS OR OTHER STRUCTURES OR INSTALLATIONS, RAILWAYS, HIGHWAYS, WATERCOURSES, DRAINAGE DITCHES, WETLANDS AND WOODED AREAS WITHIN OR ADJACENT TO THE LAND PROPOSED TO BE SUBDIVIDED;                                                                                                                                                                                                                |                                                                     |
| (h) THE AVAILABILITY AND NATURE OF DOMESTIC WATER SUPPLIES;                                                                                                                                                                                                                                                                                                                                                                                        | REFER TO FUNCTIONAL SERVICING REPORT                                |
| (i) THE NATURE AND POROSITY OF THE SOIL;                                                                                                                                                                                                                                                                                                                                                                                                           | REFER TO GEOTECHNICAL REPORT                                        |
| (j) EXISTING CONTOURS OR ELEVATIONS AS MAY BE REQUIRED TO DETERMINE THE GRADE OF THE HIGHWAYS AND THE DRAINWAYS OF THE LAND PROPOSED TO BE SUBDIVIDED;                                                                                                                                                                                                                                                                                             | REFER TO PRELIMINARY GRADING AND SERVICING PLAN                     |
| (k) THE MUNICIPAL SERVICES AVAILABLE OR TO BE AVAILABLE TO THE LAND PROPOSED TO BE SUBDIVIDED; AND                                                                                                                                                                                                                                                                                                                                                 | REFER TO FUNCTIONAL SERVICING REPORT AND STORMWATER MANAGEMENT PLAN |
| (l) THE NATURE AND EXTENT OF ANY RESTRICTIONS AFFECTING THE LAND PROPOSED TO BE SUBDIVIDED, INCLUDING RESTRICTIVE COVENANTS OR EASEMENTS. 1994, c. 23, s. 30; 1996, c. 4, s. 28 (3); 2016, c. 25, Sched. 4, s. 8 (1).                                                                                                                                                                                                                              | NO RESTRICTIONS ON SITE                                             |

LAND USE SCHEDULE

10985 - HERITAGE LINE, KEENE

| LOT/BLOCK            | LOT AREA (ha/acre) | FRONTAGE (m) | INTENDED USE                  |
|----------------------|--------------------|--------------|-------------------------------|
| 1                    | 0.27/0.67          | 58.5         | SINGLE DETACHED DWELLING      |
| 2                    | 0.24/0.59          | 24.2         | SINGLE DETACHED DWELLING      |
| 3                    | 0.45/1.11          | 22.0         | SINGLE DETACHED DWELLING      |
| 4                    | 0.74/1.83          | 29.10        | SINGLE DETACHED DWELLING      |
| 5                    | 0.33/0.82          | 51.6         | SINGLE DETACHED DWELLING      |
| 6                    | 0.37/0.91          | 52.8         | SINGLE DETACHED DWELLING      |
| 7                    | 0.28/0.64          | 71.5         | SINGLE DETACHED DWELLING      |
| 8                    | 0.30/0.74          | 44.1         | SINGLE DETACHED DWELLING      |
| 9                    | 0.22/0.54          | 38.3         | SINGLE DETACHED DWELLING      |
| 10                   | 0.20/0.49          | 35.5         | SINGLE DETACHED DWELLING      |
| 11                   | 0.22/0.54          | 42.60        | SINGLE DETACHED DWELLING      |
| 12                   | 0.20/0.49          | 39.6         | SINGLE DETACHED DWELLING      |
| 13                   | 0.23/0.57          | 26.0         | SINGLE DETACHED DWELLING      |
| 14                   | 0.22/0.54          | 22.2         | SINGLE DETACHED DWELLING      |
| 15                   | 0.22/0.54          | 22.3         | SINGLE DETACHED DWELLING      |
| 16                   | 0.22/0.54          | 22.4         | SINGLE DETACHED DWELLING      |
| NORTH COMMON ELEMENT | 0.16/0.40          |              | STORMWATER DRAINAGE/STORAGE   |
| ROAD COMMON ELEMENT  | 0.77/1.90          |              | ROADWAY SERVICING DEVELOPMENT |
| TOTAL SITE AREA =    |                    |              | 5.63 ha / 13.91 acre          |

LEGAL DESCRIPTION

PART OF LOTS 13 & 14  
CONCESSION 6  
GEOGRAPHIC TOWNSHIP OF OTONABEE  
NOW IN THE  
TOWNSHIP OF OTONABEE-SOUTH MONAGHAN  
COUNTY OF PETERBOROUGH

SURVEYOR'S CERTIFICATE

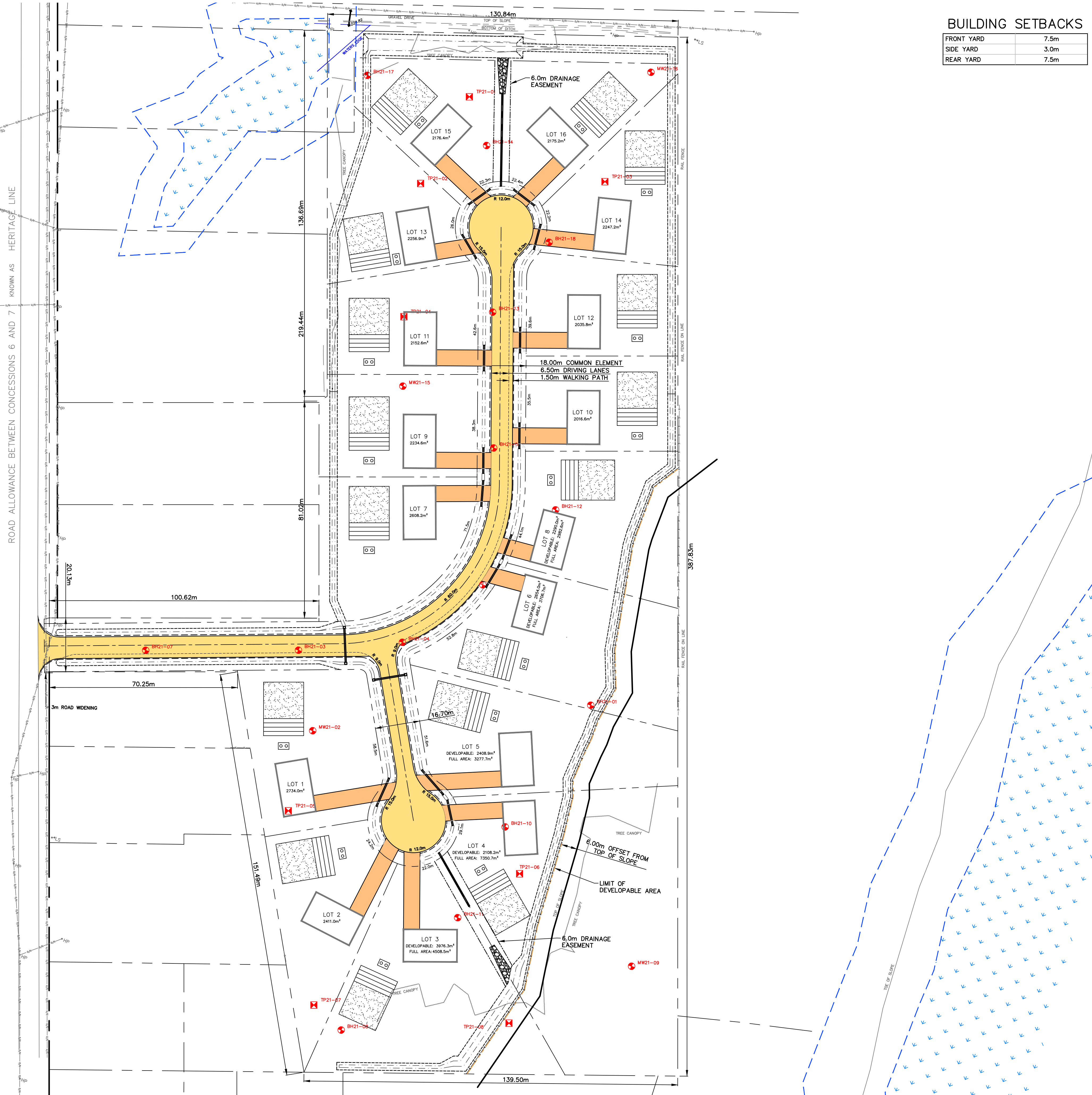
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE SUBDIVIDED AS SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO THE ADJACENT LAND ARE ACCURATELY AND CORRECTLY SHOWN.

DATE SHAWN M. O'CONNOR  
ONTARIO LAND SURVEYOR

OWNER'S CERTIFICATE

I AUTHORIZE D.M. WILLS ASSOCIATES LIMITED TO PREPARE AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE COUNTY OF PETERBOROUGH FOR APPROVAL CERTIFY THAT:

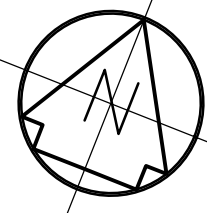
DATED THIS DAY OF 2022



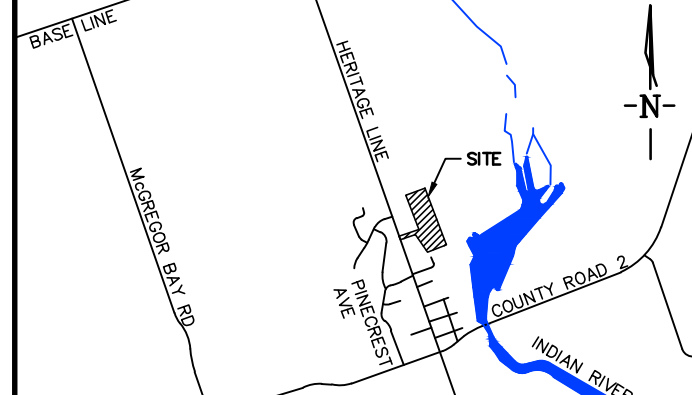
BUILDING SETBACKS

|            |      |
|------------|------|
| FRONT YARD | 7.5m |
| SIDE YARD  | 3.0m |
| REAR YARD  | 7.5m |

BM1 - 206.93m  
N: 4902490.35m  
E: 728461.29m  
KEENE PUBLIC SCHOOL, TABLET  
IN NORTHEAST FACE OF  
CONCRETE FOUNDATION WALL



KEY PLAN



| REVISIONS |                      |          |
|-----------|----------------------|----------|
| No.       | Description          | Date     |
| 1         | ZBA - 2ND SUBMISSION | 22/06/29 |
| 1         | ZBA - 1ST SUBMISSION | 21/09/02 |

| METRIC                                                             |                                  |
|--------------------------------------------------------------------|----------------------------------|
| Dimensions are in METRES and/or MILLIMETRES unless otherwise shown |                                  |
| LEGEND                                                             |                                  |
| TO BE READ IN CONJUNCTION WITH OPSD 100 SERIES                     |                                  |
|                                                                    | PROPOSED HEAVY DUTY ASPHALT      |
|                                                                    | PROPOSED MEDIUM DUTY ASPHALT     |
|                                                                    | UNEVALUATED WETLAND              |
|                                                                    | EX. BUILDING                     |
|                                                                    | EX./PR. EDGE OF PAVEMENT         |
|                                                                    | EX./PR. ROAD CENTERLINE          |
|                                                                    | EX./PR. SHOULDER/GRAVEL          |
|                                                                    | EX./PR. WATER VALVE              |
|                                                                    | EXISTING HYDRO POLE              |
|                                                                    | EX. OVERHEAD HYDRO               |
|                                                                    | EX. UNDERGROUND HYDRO            |
|                                                                    | EX./PR. DITCH                    |
|                                                                    | PR. SWALE                        |
|                                                                    | PR. CULVERT                      |
|                                                                    | PR. CATCH BASIN                  |
|                                                                    | EX./PR. WATERMAIN                |
|                                                                    | R.O.W.                           |
|                                                                    | PROPERTY LINE                    |
|                                                                    | EXISTING VEGETATION              |
|                                                                    | PROPOSED HOUSE WITH 2 CAR GARAGE |
|                                                                    | SEPTIC TANK                      |
|                                                                    | TILE FIELD AND MANTLE            |

**WILLS**  
D.M. Wills Associates Limited  
150 Jameson Drive  
Peterborough, Ontario  
Canada K9J 0B9  
P. 705.742.2297  
F. 705.748.9944  
E. wills@dmwills.com

Project Name/Location

HERITAGE LINE  
RESIDENTIAL

KEENE, ONTARIO

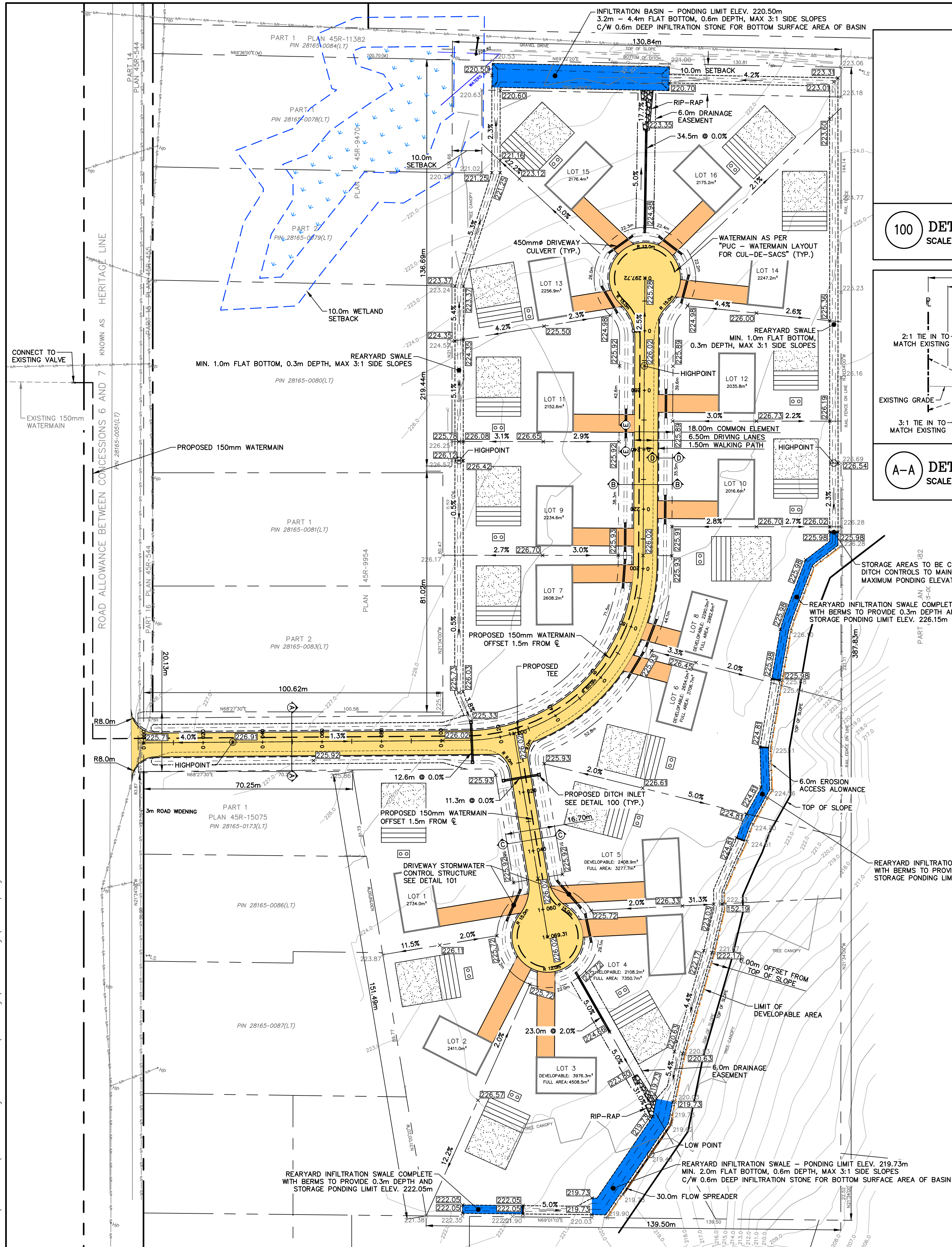
Drawing Title

DRAFT PLAN

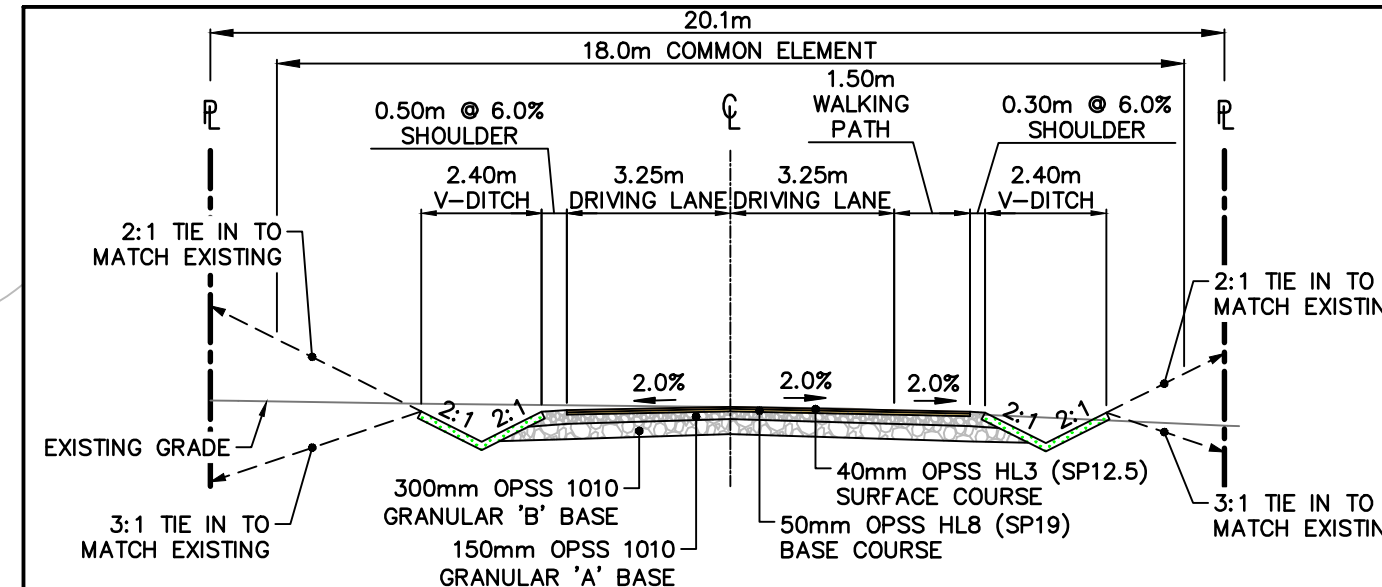
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| Drawn By: M.B.     | SCALE: Horiz. 1:750       | Vert. -- |
| Designed By: M.B.  | Issue Date: JUNE 28, 2022 |          |
| Checked By: J.D.F. | Project No.: Z1-10985     | Sht. No. |
| Engineer: A.M.     | Dwg File No.: 10985-SP    | 400      |

NOT FOR CONSTRUCTION



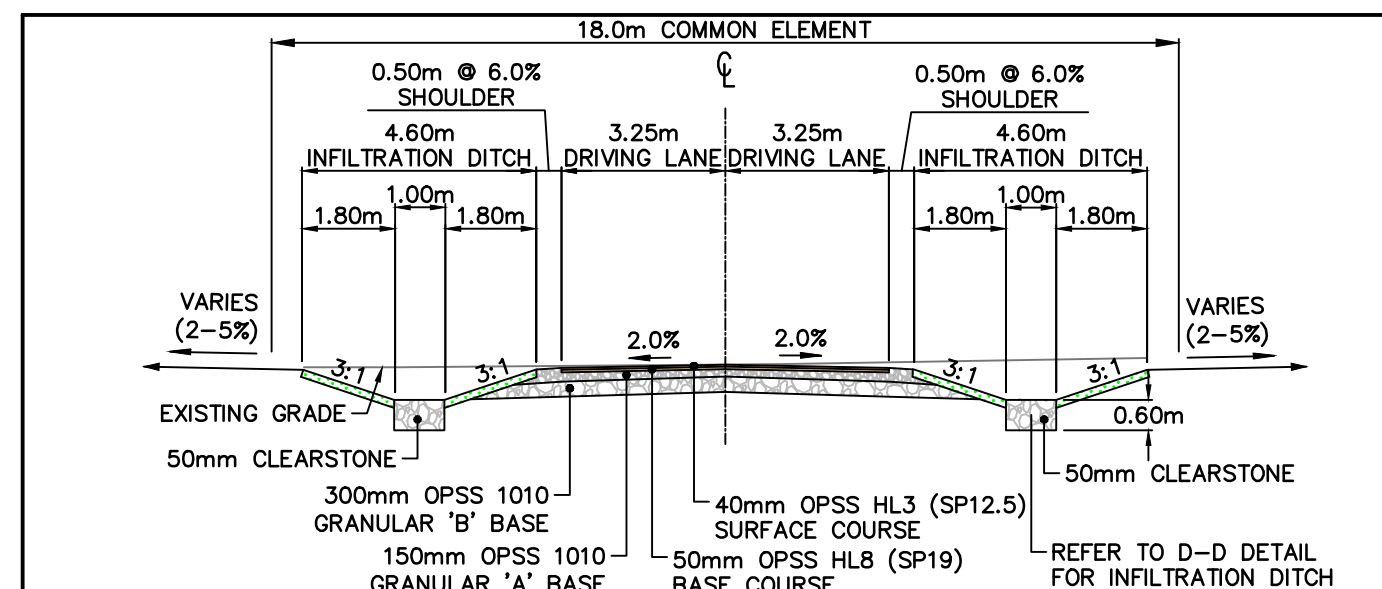


100 DETAIL - TYPICAL DITCH INLET - CROSS CULVERT  
SCALE = 1:75

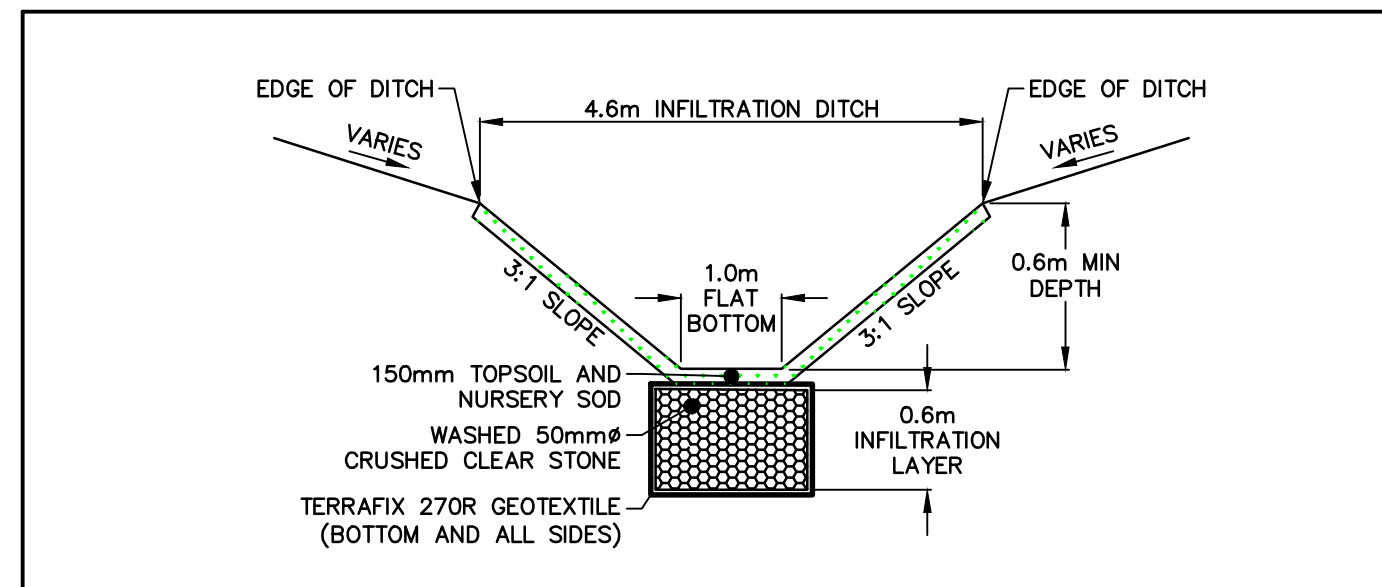


A-A DETAIL - TYPICAL CROSS SECTION  
SCALE = 1:150 STA. 0+000 - 0+100

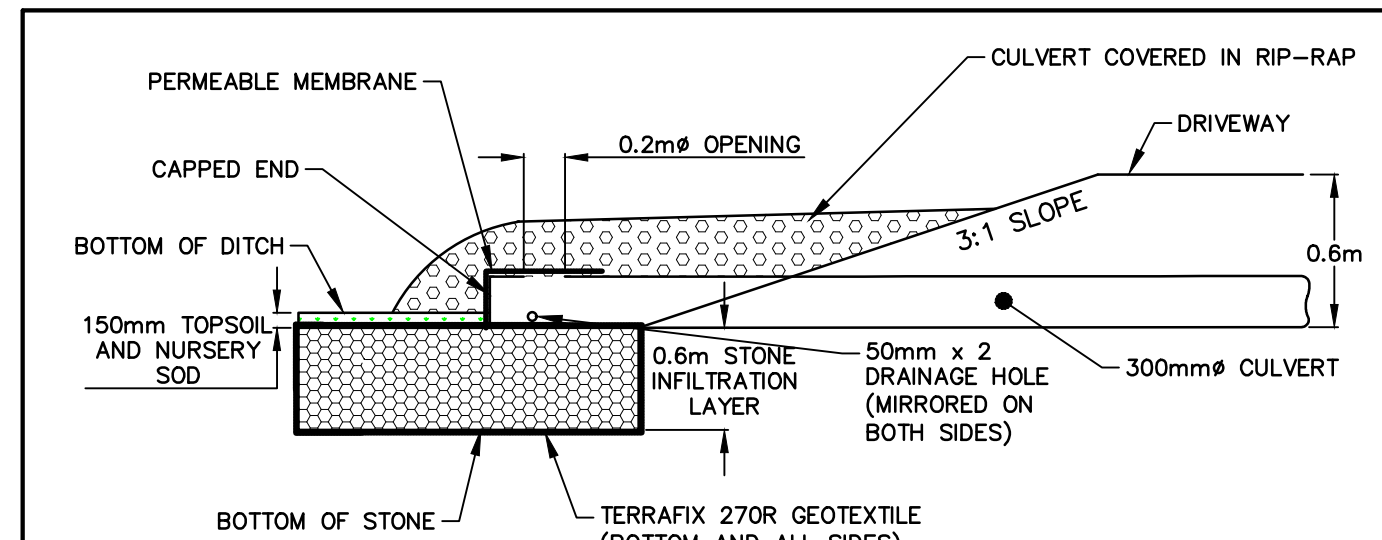
B-B DETAIL - TYPICAL CROSS SECTION  
SCALE = 1:150 STA. 0+100 - 0+300



C-C DETAIL - TYPICAL CROSS SECTION  
SCALE = 1:150 STA. 1+000 - 1+040



D-D DETAIL - TYPICAL CROSS SECTION  
SCALE = N.T.S.



101 DETAIL - TYPICAL CROSS SECTION  
SCALE = N.T.S.

BM1 - 206.93m  
N: 4902490.35m  
E: 726461.29m  
KEENE PUBLIC SCHOOL, TABLET  
IN NORTHEAST FACE OF  
CONCRETE FOUNDATION WALL

TRUE NORTH

KEY PLAN

REVISIONS

| No. | Description          | Date     |
|-----|----------------------|----------|
| 1   | ZBA - 2ND SUBMISSION | 22/06/29 |
| 1   | ZBA - 1ST SUBMISSION | 21/09/02 |

METRIC

LEGEND

PROPOSED HEAVY DUTY ASPHALT

PROPOSED MEDIUM DUTY ASPHALT

PROPOSED DRAINAGE STORAGE AREA

UNEVALUATED WETLAND

EX. BUILDING

EX./PR. EDGE OF PAVEMENT

EX./PR. ROAD CENTERLINE

EX./PR. EDGE OF SHOULDER/RAVEL

EX./PR. WATER VALVE

EXISTING HYDRO POLE

EX. OVERHEAD HYDRO

EX. UNDERGROUND HYDRO

EX./PR. DITCH

PR. SWALE

PR. CULVERT

PR. CATCH BASIN

EX./PR. WATERMAIN

R.O.W

PROPERTY LINE

EXISTING VEGETATION

TEE

PROPOSED HOUSE WITH 2 CAR GARAGE

SEPTIC TANK

TILE FIELD AND MANTLE

EX./PR. ELEVATION

WILLS

D.M. Wills Associates Limited  
150 Jameson Drive  
Peterborough, Ontario  
Canada K9J 0B9  
P. 705.742.2297  
F. 705.748.9944  
E. wills@dmwills.com

Project Name/Location

HERITAGE LINE RESIDENTIAL  
KEENE, ONTARIO

Drawing Title

PRELIMINARY SERVING AND GRADING PLAN

Drawn By: M.B. SCALE: Horiz. 1:750 Vert. --

Designed By: M.B. Issue Date: JUNE 27, 2022

Checked By: J.D.F. Project No.: 21-10985 Sht. No.:

Engineer: A.M. Dwg File No.: 10985-SP 500

NOT FOR CONSTRUCTION