LANARK COUNTY

PLANNING DEPARTMENT

July 20, 2023

TO:
Joanna Bowes, Town of Perth
Glen McDonald, Rideau Valley Conservation Authority
Terry McCann, County of Lanark, Public Works Department
Stephen Kapusta, Ministry of Transportation

RE: **Re-submission of a Draft Plan of Subdivision**
Part Southwest Half and Part Northeast Half Lot 3, Concession 2, Geographic Township of Drummond, being Part 1 on 27R-7125 and Part 1 on 27R-8420 except PL88, 27M-3, 27M-14, 27M-16, 27M-21, 27M-55 and Parts 3, 4 on 27R-7540, now in the Town of Perth, County of Lanark
County of Lanark File No. 09-T-21001
Perthmore Phase 6

The County of Lanark received a re-submission of a Draft Plan of Subdivision for Perthmore Phase 6.

The following provides a summary of the proposed revised application as included within the Planning Rationale Report, dated June 20, 2023:

- Updated draft plan now includes a 30m setback from the PSW;
- Draft plan reduced in scope with respect to land and road development (previously proposed municipal arterial roadway is no longer shown or referenced);
- Proposed development now includes a medium density apartment dwelling on Block 54;
- Preliminary overall concept plan has been prepared that shows the current proposal within the context of previous and future phases of the Perthmore development;
- Lands to the northeast of the subject lands, and to the rear of lots 34 to 48, are no longer considered for development; and
- Proposed parkland on Block 57 has been enlarged to ensure that parkland dedication requirements have been satisfied

The following reports have been included in the re-submission and are provided for your review:

- Status Letter from the County of Lanark, dated February 22, 2023.
- Comment Response Letter from McIntosh Perry, dated June 23, 2023.
- Draft Plan of Subdivision, dated May 10, 2023.
- Planning Rationale Report, prepared by McIntosh Perry, dated June 20, 2023.
- Zoning Bylaw Amendment Sketch, prepared by McIntosh Perry, dated May 18, 2023.
- Environmental Impact Statement, prepared by McIntosh Perry, dated June 22, 2023.
- Preliminary Servicing & Stormwater Management Report, prepared by McIntosh Perry, dated June 23, 2023.
- Overall Concept Plan, prepared by McIntosh Perry, dated March 2023.

Should you have any questions or concerns, do not hesitate to contact me at 1-613-267-4200 Ext 1502 or jralph@lanarkcounty.ca.

Yours truly,

Jasmin Ralph, MPA
Clerk

cc: Maurice Decaria, owner Perthmore Enterprises Inc.
Vithulan Vivekanandan, McIntosh Perry
Benjamin Clare, McIntosh Perry
Grant Machan, Town of Perth
Michael Touw, CAO, Town of Perth
Kurt Greaves, CAO, County of Lanark
Algonquins of Ontario

MCINTOSH PERRY

June 23, 2023

Kristy Warwick
Clerical Assistant Planning
Lanark County
99 Christie Rd.
K7H 3C6

Dear Ms. Warwick:

Re: Perthmore Subdivision Phase 6
Draft Plan of Subdivision (File No. 09-T-21001)
Zoning Amendment Application (File D14-PE-12-20)
Part Lot 3, Concession 2, Geographic Township of Drummond (Now Town of Perth)

This letter addresses the following comments received in response to the August 5, 2022 resubmission package in support of the Draft Plan of Subdivision application, received February 23, 2023.

- Rideau Valley Conservation Authority
  - Natural Hazards, O.Reg 174-06, Source Protection Comments dated February 23, 2023.
  - Stormwater Management Comments dated December 20, 2022, revised February 14, 2023.
  - Planning and Engineering – Technical Review Memorandum, dated February 10, 2023.
- Town of Perth
  - Environmental Services Comments dated October 7, 2022.
  - Development Services Comments, undated.
- Agency Comments
  - Hydro One, dated September 22, 2022.
  - Enbridge, dated April 5, 2021.
  - Ministry of Transportation, dated September 28, 2022
- Compiled Public Comments, dated October 6, 2022.

115 Walgreen Road, R.R.3. Carp, ON K0A 1L0 | T. 613-836-2184 | F. 613-836-3742
info@mcintoshperry.com | www.mcintoshperry.com

Please note that this comment response is also intended to address comments related to the Zoning By-law Amendment application provided by the Town of Perth and others. Accordingly, Town staff have been circulated on this resubmission.

The following plans and reports, which have been prepared or updated in order to address comments received, are submitted together with this comment-response letter.

- Comment Response Letter
- Revised Planning Rationale
- Revised Stormwater Management Report
- Revised Environmental Impact Study
- Overall Concept Plan
- Revised Draft Plan
- Revised Zoning By-law Amendment Sketch

Our office's responses to comments received are provided within the paragraphs below.

RIDEAU VALLEY CONSERVATION AUTHORITY

Natural Hazards, O.Reg 174-06, Source Protection Comments dated February 23, 2023

Ontario Regulation 174/06

1. As addressed in previous comments the majority of the subject property is located within areas regulated by RVCA in accordance with Ontario Regulation 174/06. This regulation is titled "Development, Interference with Wetlands, Alterations to Shoreline and Watercourses" and is made under Section 28 of the Conservation Authorities Act. In considering development within the 120-metre adjacent lands of a regulated wetland RVCA's policies state that development may be permitted if "it has been determined that there is no interference with the hydrologic functions of the wetland or that the impacts to hydrologic function are mitigated in a manner acceptable to the RVCA."

   It is understood approval of a revised wetland boundary by MNRF is pending. Our office would recommend that before any application is approved by either the subdivision or zoning approval authority that there be clarification of the status of the boundary and confirmation of the regulatory boundaries of both the PSW and floodplain and their respective setbacks. This will provide confirmation of the floodplain and wetland boundaries within which development is not permitted, and which lots may require development permits from the Conservation Authority due to encroachment into the 120 metre adjacent lands.

   MP Response: *Further to October 20, 2022 correspondence from the MNRF, the Provincially Significant Wetland boundary has been updated. Accordingly, the draft plan has been revised to show the updated boundary. The 1:100-year regulatory floodplain obtained from the RVCA is also now shown on the plans.*

Planning Rationale

1. The report indicates that zoning will go from R1 and EP to R3 and R4, it is noted that the lots indicated on the zoning schedule (Appendix B) are not consistent with those indicated with the draft plan of subdivision, specifically blocks 59 and 58.

   MP Response: *The Zoning By-law Amendment sketch has been revised to correspond with the latest iteration of the Draft Plan of Subdivision.*

2. The rationale provides that an updated Preliminary Servicing and Stormwater Management Report includes a water balance analysis to address 1.6.6.7 of the PPS. A review from technical staff indicated that it is not demonstrated how the water balance has been utilized to develop the stormwater management plan, it is also noted that low-impact development methods shou;d be integrated within the stormwater management plan. Clarification is required within both the EIS and water balance to address cumulative impacts on the wetland.

   MP Response: *The EIS has been updated to address impacts on the wetland.*

3. With respect to Section 5.3 of the Town's Official Plan, it is not clear that natural hydrological characteristics have been maintained as targets within the water balance to ensure that hydrologic functions/linkages are maintained.

   MP Response: *Site-specific water balance targets has been identified and Low Impact Developments are incorporated into Stormwater Management plan to meet those targets.*

Draft Plan of Subdivision

1. The boundary of the current and proposed boundary of the Perth Long Swamp PSW should be plotted on the draft plan as should the 120-metre adjacent lands.

   MP Response: *The setback on the draft plan has been revised so that it is consistent with the recommendations of the EIS. Specifically, the 30 metre setback is shown where development is proposed within 120 metres of the PSW.*

2. The boundary of the 1:100-year regulatory floodplain and its 15 m regulatory setback should also be plotted on this plan.

   MP Response: *The 1:100-year regulatory floodplain is now shown on the draft plan.*

3. The schedule of areas on the draft plan indicates Block 57 as a future street and Block 58 as parkland. However, Block 57 is also identified as parkland within the portion of the plan indicating the subdivision of lots. This should be updated for clarity.

   MP Response: *As shown on the revised Draft Plan of Subdivision, the Parkland will be located on Block 57. It should be noted that the current Draft Plan no longer contains Block 58.*

4. It is understood that the arterial road indicated in the draft plan is no longer being pursued by the Town of Perth. The proposed road should be removed from the draft plan for clarity.

   MP Response: *The arterial road has been removed.*

Discussion

In reviewing the submitted Draft plan of subdivision, Environmental Impact Statement and Preliminary Servicing and Stormwater Management Report the use of the "other lands owed by applicants" specifically the lands east of lots 34-48 and west of lots 49-54 is unclear and raises questions regarding future use.

MP Response*: Additional lands owned by the proponent to the northwest will be subject to separate Planning Act applications and additional studies for future development. It should be noted that development is no longer proposed on the lands to the northeast.*

A clear understanding of the use of these lands is required to address any cumulative impacts on the hydrologic function of the PSW and lands within the regulated area. Furthermore, without a clear understanding of the use of these lands, it is uncertain if potential hydrologic impacts, such as flooding, and erosion have been appropriately addressed with respect to section 1.6.6.7 of the PPS.

MP Response: *Lands northeast of lots 34-48 are not being considered for future development. The lands northwest of lots 49-54 will be developed in the future and can be addressed generally in the cumulative impacts of the EIS however exact details are unknown at this time and should be addressed as part of future development. It is not expected that this development will impact the hydrologic function of the PSW.*

Our office would reiterate that geotechnical information will be required to confirm that there are no risks associated with proposed future development or confirm that hazardous soils are not present or can be mitigated in accordance with provincial standards.

MP Response: *Comment noted. A geotechnical investigation will be provided at the appropriate juncture.*

Recommendations and Considerations

1. A discussion regarding the lands between the PSW and proposed lots, specifically lots 34-48 is recommended and should consider the cumulative impact of any future development of the PSW and its hydrologic function, the proposed wetland setback should be assessed with regard to any additional impacts.

   MP Response: *Lands northeast of lots 34-48 are not being considered for future development. The lands northwest of lots 49-54 will be developed in the future and have been addressed generally in the cumulative impacts of the EIS however exact details are unknown at this time and should be addressed as part of future development. It is not expected that this development (lots 49-54) will impact the hydrologic function of the PSW. Consideration is being given as part of the subdivision plan to retain as* *much of the rear yard vegetation as possible within lots 34 – 48. The subdivision has been redesigned so that no drainage features are required at the rear of these lots.*

2. Identification of specific targets within the water balance to ensure hydrological functions are maintained, these targets should be addressed by the stormwater management plan. Low-impact development features should be integrated within the stormwater management design to achieve these targets. Additional details are provided within a technical review of the stormwater management report. Our office is available to discuss these details prior to any future revision.

   MP Response: *Site-specific water balance targets has been identified and an integrated Stormwater Management plan was developed incorporating Low Impact Developments to meet the identified water balance targets.*

Preliminary Servicing and Stormwater Management Report

1. The water budget assessment does not but should provide specific targets for the stormwater management plan. See related items from the April 2021 memo, including those about the preservation of wetland hydrology etc.

   MP Respo*nse: Impacts of the proposed development on the wetland have been evaluated and mitigation measures are provided in form of Low Impact Developments.*

   Low impact development (LID) measures have not been but should be included directly in the stormwater management plan and design as per long-term direction from the province and current professional engineering standards. The current stormwater plan, which relies only on an end-of-pipe solution, is therefore insufficient.

   a. The referenced best practices (roof leaders and swales) are also insufficient to address the provinces requirements for a treatment-train approach. Additional LID should be included and they should not be considered separate best practices but integral to SWM.

   b. Water budget targets from above and types of LID would likely pertain to distributed infiltration, the preservation or creation and protection of specific types and sizes of pervious and vegetated areas, amended top-soils etc.

   MP Response: *A treatment train approach was implemented to incorporate the Low Impact Development designs into the overall Stormwater Management Strategy and Site-specific Water Balance.*

2. There appears to be or may be conflict between the proposals for tree retention etc. and the location / design of LID. Further, easements will likely be required to maintain LID features.

   MP Response*: The Stormwater Management Plan has been revised to reflect the comment.*

Additional Servicing and Stormwater Management Comments

1. Many of the comments from RVCA's April 2021, memorandum remain valid and these should be considered once the water budget assessment is fully integrated into the stormwater management plan. This memorandum should therefore be considered in direction reference to RVCA's 2021 technical comments.

   MP Response: *The comments received from the Rideau Valley Conservation Authority in April 2021 were largely concerned with the proximity of development to the Provincially Significant Wetlands, and mapped floodplain. The current resubmission has considered and addressed previous comments received.*

2. Given that the available water budget has not been used in the stormwater management plan, it has not been reviewed in any significant way at this time.

   MP Response: *The site-specific water balance targets has been identified and implemented into the overall SWM strategy.*

3. It is noted that pages from another report (for a project in Metcalfe) were mistakenly included in the submission, so a full review could also not be completed for that reason.

   MP Response: *The report has been revised.*

Planning and Engineering – Technical Review Memorandum

1. The bulk of the information contained in the revised EIS remains essentially the same as that in the original submission for the Perthmore Estates Subdivision Phase 6 (Dec. 18, 2020).

   MP Response: *Acknowledged.*

2. This reviewer can accept this general conclusion but wishes to advise that this is dependent upon the applicant and his agents providing additional mitigation measures to minimize the effect of the reported loss upon the identified significant wildlife habitat/woodland; for example, retention of as much existing vegetation as is feasible within the rear yards of lots 34 through 48. Additionally, it is advised that any unavoidable loss of tree/vegetation cover should be compensated for, as noted in the revised EIS Section 5.3.1 (p.31) where, for example, it states that "It is proposed to off-set most or all of the loss of vegetation by planting within any under-vegetated areas within the proposed 30m-buffer adjacent to the Perth Long Swamp (for those areas within the revised plan of subdivision) and within non-functional areas of the Stormwater Pond block as wildlife habitat, where access is not required. Enhancing the RVCA File No. 21-PER-SUB-004 23 February 2023 Page 2 of 3 wetland buffers and creating habitat associated with the stormwater pond is expected to off-set the loss of primarily fringe habitat proposed for removal." It is further advised that all of the above is to be properly documented in a Tree-Vegetation Compensation/Saving Plan in keeping with the intent of the Town of Perth O.P. Policy 8.6.4.h.3.v. requiring identification of mitigation measures for the loss of natural heritage features.

   MP Response: *The EIS has been updated to include more specific wording. Plans to mitigate any unavoidable loss of tree/vegetation will be sought as a condition of draft plan approval.*

3. The other important planning matter remaining unresolved is the revised EIS's silence about any future plans the applicant may have for those lands located between the proposed 30 m wetland buffer and Blocks 56, 57, 58 and Lots 34 through 48 shown on the revised draft plan of subdivision and labelled as "Other Lands Owned by the Applicant." This omission should be addressed now through an analysis of the cumulative impacts of the revised subdivision proposal along with any future development planned within this area identified as Significant Wildlife Habitat on EIS Figure 5.

   MP Response: *The subdivision has been redesigned to remove any development within the remainder of the significant woodlands/wildlife habitat.*

4. Why propose and show a 30-metre wetland buffer on the revised draft plan of subdivision that will only provide protection to those areas located between Blocks 56 and 58, Street A and the provincially significant Perth Long Swamp? This would suggest that the applicant is intending to development this area and have pre-approval granted for a 30 meter buffer for subsequent development without such an analysis having been completed in advance of that occurring; this is considered to be a premature recommendation until such time that this matter has been addressed and prior to approval of the current draft plan of subdivision.

   MP Response: *The setback on the draft plan has been revised in response to the comment, and so that it is consistent with the recommendations of the EIS. Specifically, the 30 metre setback is shown where development is proposed within 120 metres of the PSW.*

5. It is this reviewer's opinion that any decision regarding a wetland buffer/setback should be withheld until such time that there is more certainty about these two outstanding major planning issues. As such, it is advised that the 30 metre wetland protective zone be removed from the revised plan, except for that part touching upon Block 56 and the most southerly extent of Street A.

   MP Response: *Pursuant to this and other comments, the setback on the draft plan has been revised and clarity regarding the lands in question has been provided.*

6. Assuming that all the above can be amicably addressed by the applicant and his agents, this reviewer will be in a position to advise the planning authority that the revised draft plan can be approved with regards to meeting the applicable natural heritage policies contained in the Town of Perth Official Plan, which is conditional upon the applicant satisfying the following conditions of draft plan approval.

   - Construction of rear yard fencing that is wildlife friendly for those lots backing onto significant wildlife habitat/woodland.

   - Please note that as previously stated, no comments have been provided regarding impacts to Species at Risk as this is a delegated responsibility of the province of Ontario.

MP Response: *We believe the EIS and subdivision redesign has addressed the above concerns. Maintaining vegetation at the rear of lots 34 – 48 is being considered. Installation of fencing may affect retention of vegetation. Please confirm the desire to implement rear yard fencing with the retention of woodland vegetation. The applicant is open to recommendations for this concern.*

TOWN OF PERTH

Environmental Services

1. Comprehensive Development Plan: As the Perthmore Development has matured into a nearly a 40-year development, staff have approved development in a piecemeal format to support advancement of the subdivision. As the subdivision nears a completion horizon, a number of considerations have surfaced and caused staff and approval agencies challenges since the larger picture remained unresolved (stormwater, pedestrian movements, street logistics, etc). I submit that an overall plan of the remaining developable area was requested and required for future approvals. The current submission is limited to Phase 6 and lacks the overall conceptual plan of the remaining area. Perth staff met with the developer and two (2) engineering/planning representatives working on the Perthmore subdivision and relayed at that meeting that a comprehensive conceptual plan was required for any future submission. Perth Council has been firm with seeking a comprehensive plan from developers to gauge the overall logistical considerations involved in all development.

   MP Response: *An overall/comprehensive conceptual development plan has been provided to Staff, and revisions have been made pursuant to Town Staff input provided during an April 18, 2023 meeting and otherwise.*

2. Tertiary Entrance/Arterial Road: In the discussion with the developer referenced above , it was also conveyed that an additional entrance is required prior to any additional development. Though the developer continues to overlook this requirement, previous Perth approval staff have identified the requirement for the tertiary entrance for several years leading to this next phase. The traffic loading, especially from construction traffic has put an undue strain on the residential streets and has also increased the community concern about trucks, noise, and debris on the roadway.

   MP Response: *A Sensitivity Analysis prepared by Mcintosh Perry (dated March 12, 2020), and previously accepted by the Town, confirms that a tertiary entrance is not required for the proposed development. MP Traffic Engineering Staff re-confirmed this finding in relation to the adjusted development proposal as communicated to Staff by way of an October 12 e-mail. It has recently been communicated by Staff that primary purpose of the tertiary entrance in the near term would be to serve as a construction access, to divert traffic away from existing local roads, particularly Perthmore Street. McIntosh Perry suggests that a Construction Management Plan would be a conventional and appropriate tool to address subdivision construction concerns, and that this could be identified as a condition of draft plan approval.*

3. Stormwater review documents: The information in the package references a catchment that is not in the Perth area. I have asked Jason Sharp from MCIP to review the information, and a resubmission may be required.

   MP Response: *The report has been revised.*

4. I request that Items 1 and 2 get rectified prior to advancing with a comprehensive review of the current submission. There are a number of interconnections (traffic evaluation, catchment areas, future capacity) that need to be addressed with a fulsome submission package for the remaining development lands.

   MP Response: *Items 1 and 2 have been addressed in the resubmission. We respectfully ask that the Town finalize their review and move forward with recommending conditions of draft plan approval.*

Development Services

1. With respect to the Environmental Impact Statement updated August 5, 2022, further revision is required. It continues to make mention of the future development of the arterial road in several locations and comes to conclusions about habitat significant based on this road. The intention of re-submission was to explore and assess what impacts, if any would occur when the arterial road is removed and to consider impacts when a tertiary entrance is added.

   MP Response: *The arterial road has not been used in the assessment of the impacts of Phase 6. It has been considered in the cumulative impacts as potential future development.*

2. The Town of Perth respectfully submits that the location of parkland being located in a preservation area for wildlife/woodland habitat is inappropriate. Additionally, we would like to see a more comprehensive plan to see other submissions for density, parkland, servicing, etc.

   MP Response: *The proposed park has been adjusted. Furthermore, initial support for a park 'hub' has been expressed adjacent to the proposed 30 metre buffer from the Long Swamp Provincially Significant Wetland (PSW). It is expected that parkland serving future subdivision approvals (i.e. Phase 7) will also be proposed in this area.*

3. The EIS notes that re-assessment is required for areas 50m around butternut species. We have not seen the re-assessment. Has it been submitted?

   MP Response: *The butternuts noted on the map are not in close proximity to Phase 6. However, a butternut review should be completed prior to any construction activities in undisturbed areas. The re-assessment should occur in advance of the construction works and following draft plan approval. No butternuts were observed in the area to be cleared in 2022.*

4. With respect to the Planning Rationale, no discussion of the tertiary entrance has been provided. The town is not currently in a position to circulate the zoning submission as it does not reflect the current changes to the revised draft plan submission. The changes to the EIS have not been reflected or discussed in the planning rationale report. The report further notes Block 58 as parkland, but also indicate4s preservation of habitat. Rezoning stormwater block 55 from EP to R3? Why does storm pond need and R3 zone. Please revise and explain in more detail.

   MP Response: *The Planning Rationale has been revised in order to address the items noted above. Block 55 will be developed with a Stormwater Management pond and, as part of the proposed Plan of Subdivision, it is typical in our experience for such lands to be zoned the same as the rest of the development. The* *parkland has been located adjacent to the 30 metre setback from the Perth Long Swamp intentionally. The following is recommended in Section 6.1 of the EIS:*

> Educational signs and other materials are to be provided for the future park lands (Block 58) which are within and adjacent to natural features.

5. The draft plan still indicates the arterial road. As the developer is aware the Town of Perth has removed this from its strategic plan and all related by-laws. As such the draft plan should be revised to indicate this.

   MP Response: *The arterial road has been removed from the draft plan.*

6. Additionally, the draft plan is required to indicate a tertiary entrance as discussed at length during preconsultation meetings with the developer and both of their consultants recently and in many past renditions of various phases. The tertiary entrance is a requirement for this phase particularly in consideration of access to provincial highway. Traffic loading especially from construction traffic has put an undue strain on residential streets and has caused public concern about trucks, noise and debris on the roadways.

   MP Response: *Please refer to the above response to Environmental Services Comment 2.*

7. Blocks 55 and 56 and lots 29-48 are directly in significant wildlife habitat. Until the EIS is revised appropriately, these blocks should not be included in the draft plan.

   MP Response: The EIS addresses significant wildlife habitat. *A TPP will be provided as per RVCA comments.*

8. It appears as though the developer is intended to move the existing stormpond to Block 55. What is the plan for the existing stormpond lands, they do not have road access. The Town has no interest in rezoning from EP to 3 without an understanding of what is to occur. Again, a more fulsome overall plan needs to be provided.

   MP Response: *The SWM plan has now been revised.*

   As previously noted, it is typical for stormwater management ponds to share the same zone category as the remainder of the development / neighbourhood.

9. It is noted by Environmental Services that in review of the Stormwater documents that the package references a catchment that is not in the Perth area. A re-submission may be required.

   MP Response: *The report has been revised.*

10. A comprehensive concept plan of full build out is required zto help better understand stormwater, pedestrian movements, street logistics, parkland, etc.

    MP Response: *An overall conceptual plan that situates the current phase of development within the wider context of the Perthmore development has been provided to and discussed with Staff.*

11. No major review of these items or others has been completed against the Official Plan or Zoning By-law as it is of the opinion of the planner and the engineer that the submission is ont ready for continued review or additional circulation without the above information being provided. Updates to drawings and studies are required. This is not a formal and complete comment on this application.

    MP Response: *McIntosh Perry has responded to the comments provided by the Town of Perth by way of both the Comment Response Document and revised drawings and studies. As such, we look forward to receiving the conditions of draft plan approval at the appropriate juncture.*

OTHER AGENCY COMMENTS

Hydro One

1. Hydro One has no comments at this time.

   MP Response: *Acknowledged. Could the appropriate staff/person at the Town of Perth or County obtain conditions of draft plan approval from Hydro One?*

Enbridge

1. Enbridge Gas Inc. does not object to the proposed application(s) however, we reserve the right to amend or remove development conditions. This response does not constitute a pipe locate, clearance for construction or availability of gas.

MP Response: *Acknowledged. Could the appropriate staff/person at the Town of Perth or County obtain conditions of draft plan approval from Enbridge?*

2. In the event that easement(s) are required to service this development, and any future adjacent developments, the applicant will provide the easement(s) to Enbridge Gas Inc. at no cost.

   MP Response: *Acknowledged.*

Ministry of Transportation

1. When are they proposing in connecting the future road to Highway 7? The developer would need to do a pre-consultation with the Ministry of Transportation.

   MP Response: *A connection to Highway 7 will be pursued in the future whenever it is determined to be necessary to support development by transportation engineers. It is acknowledged that Pre-Consultation with the MTO will be required at that juncture.*

PUBLIC COMMENTS

Perthmore Community Association

1. There seems to be some confusion in McIntosh Perry's submission between the location of block 58 int June 29th Zoning plan and the zoning bylaw amendment drawing.

   MP Response: *Block 58 has been removed in the revised Draft Plan of Subdivision and the Zoning By-law Amendment Sketch.*

2. The proposed park assuming Block 58 is the park only represents under half of the remaining greenfield site of 15.8 hectares. The PCA would advocate for 1 new large park more centrally located to service the entire Phase VI (the 93 households + future as of yet unidentified).

   MP Response: *Following a review, it is noted by MP that the proposed park satisfies the minimum parkland requirements as required by relevant municipal and provincial policy.*

3. As this submission is only for half of the remaining greenfield site in Perthmore. Is there a road / utility layout that would show a complete view? Is there still the possibility for the 3rd exit to connect to hwy 7? Is there a need for a future pumphouse for the high density that would be built in the future towards hwy 7?

   MP Response: *Further to discussions with staff, and as previously noted, an overall conceptual plan that situates the current phase of development within the wider context the Perthmore development has been prepared.*

4. What would be the next process steps? Is there a deadline schedule? When does the town comment on the zoning? When would public input be appropriate? And finally as a community association is there anything that we can do to help in the process.

   MP Response: *We defer to Town Staff for a response to this comment.*

Stewart and Linda Bates

1. R1 to R3 – Are these classes only bungalows and semi's as MacIntosh Perry state? We're ok if that is the case. If R3 allows for more dense development i.e. so called stackedtown houses such as constructed on Senators Gate Dr, then restrictions should betighter i.e R1. This would restrict inappropriate increases in density, and a repeat of past mistakes.

   MP Response: *The proposed Residential Third Density (R3) zone will permit the single and semi detached dwellings as shown on the Draft Plan of Subdivision.*

2. We believe the Developer has 29.7 hectares in total. We understand the Province requires 5% of land for parks. We understand part of the land is wetland and trees. These should be protected, and the Developer should not be allowed to cut down any further trees!

MP Response: *An Environmental Impact Statement (EIS) has been completed in support of the proposed development. The EIS provides recommendations and mitigation measures to ensure that the intent of applicable natural heritage policies is upheld.*

3. Rather than requiring the Developer to provide 5% for parks in each section to be developed, why not make it a condition that they provide 5% of the total development now? They give up no more land in total! The Developer should level and grass the land so it could be used for soccer, and an outdoor rink in the wintertime. They should also provide a children playpark. These do not have to be of an Olympic standard.

   MP Response: *As provided by applicable policy, the required parkland is calculated in accordance with the total area affected by the current Draft Plan of Subdivision application.*

4. Sidewalks should be provided on all streets. There should also be a higher standard of street lighting than what was provided on Senators Gate Dr.

   MP Response: *Sidewalks and lighting will be provided pursuant to the Town of Perth requirements as required in applicable planning policies.*

5. We agree with MacIntosh Perry that the existing streets can take the additional traffic generated by 93 new units. We agree there is no need for a third road access at present.

   MP Response: *Comment acknowledged.*

6. We believe that the current Town Plan allows the Developer to build a further 226 units. Are the County and the Town going to hold them to this number? We wouldn't object over the life of the Plan for this number to increase by say 10%. We would object if say the unit numbers exceed 250. We are sure you appreciate if they carry on with the same density as this proposal is, then there will be many more than 226. The Developer should be required to provide much more open space. There is plenty of land here!

   MP Response: *We defer to Town Staff for a response to this comment.*

7. The Developers block 57 is obviously to provide a road access to the land between the cancelled bypass road and the housing on Street A. The Developer must see this as land for future development. If this requires further tree felling we would like this rejected. We have no objection to increasing the number of bungalows proposed, so their total number of units becomes 94, if access to this area is restricted to pedestrians only.

   MP Response: *Block 57 as shown on the previous site plan has been removed.*

8. If 4 of the semis are to have 8 dwellings, referred to as apartments, we would have no objection. If each of the 4 semis is to have 4 units each, then we would also have no objection, but the extra numbers should then come out of the 93 they are applying for.

   MP Response: *Semi-detached dwellings with basement apartments are proposed on Lots 50, 51, 52, and 53. Each semi-detached dwelling contains two units, resulting in a total number of 16 units on the lots in* *question. The total number of dwelling units is acknowledged accordingly within relevant application materials.*

9. The park shown as Block 58 is much less than 5% and is pathetically small. Our earlier suggestion should be pursued so there would be a much larger park Deeded to the Town. Otherwise, a much larger park than shown as Block 58 should be required. Our proposal could be located on the un-developed land behind the apartments and houses on Street A. A new access to this park could be constructed off Senators Gate adjacent to the existing apartments. We would have no objection to Block 58 being developed as residential if this larger park was provided.

   MP Response: *The proposed park as indicated on the Draft Plan of Subdivision satisfies applicable parkland requirements. The lands behind Lots 34-48 are constrained as they are considered significant wildlife habitat and the lands behind Lots 49 to 53 and Block 54 are subject to future development plans.*

10. We don't see any land being allocated by the Developer for affordable housing. We believe this is now Policy. We hope they are not being relieved of this duty.

    MP Response: *Eight basement dwelling units and fourteen apartment dwelling units have been incorporated as a result of discussions with Town Staff regarding the promotion of affordable housing units within the municipality.*

11. We do not think that the Developer should be allowed to make a capital contribution in lieu of parks. There is little open space in the subdivision and additional public space should be a must!

    MP Response: As previously noted, the proposed park on the Draft Plan of Subdivision satisfies the minimum parkland requirements. As such, no cash-in-lieu of parkland is required.

12. We note that Block 55 is for storm water management. Are the 2 areas of land marked vacant which adjoin Block 55 also part of the storm water management system?

    MP Response: *While the adjacent lands have been considered as part of the wider SWM strategy, there is no direct flow to these lands.*

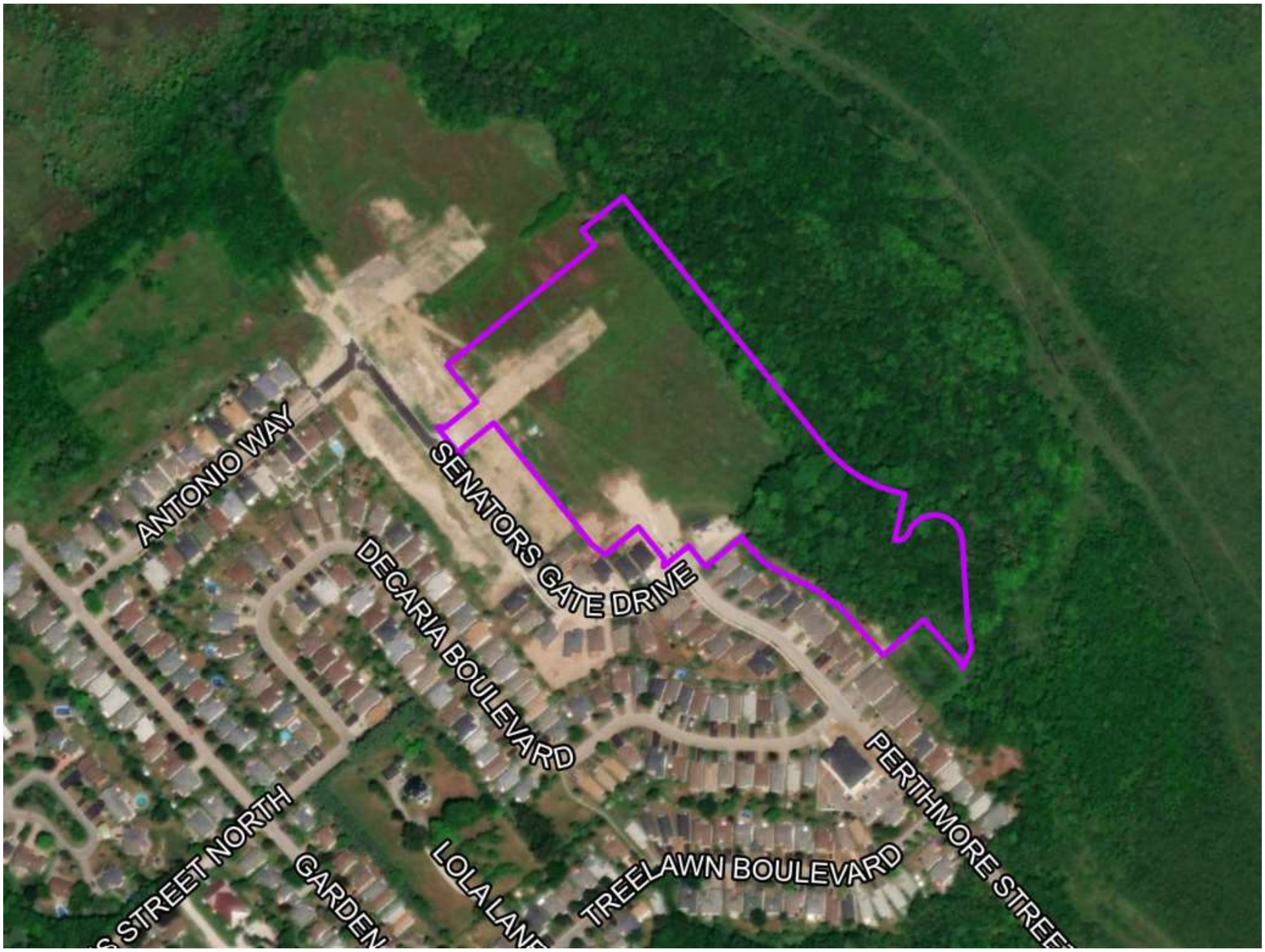
CONCLUSION

We trust that the responses provided above, and the enclosed resubmission items adequately address the comments provided by Agency Staff and that upon review of the documents provided, County Staff will be in a position to compile conditions of Draft Plan approval, and Town Staff will be in a position to advance the Zoning By-law Amendment application. Please do not hesitate to contact our office if any additional information is required.

Sincerely,

Vithulan Vivekanandan, MES Pl.
Planner

PLANNING RATIONALE REPORT
PERTHMORE ENTERPRISES INC.



Project No.: CCO-13-9668-02
June 20, 2023

Prepared for:

Perthmore Enterprises Inc.
80 Dufferin St.
P.O. Box 20054
Perth, ON
K7H 3M6

Prepared by:

McIntosh Perry Consulting Engineers Ltd.
3240 Drummond Conc. 5A
Perth, Ontario K7H 3C9

MCINTOSH PERRY

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

McIntosh Perry Consulting Engineers Limited (McIntosh Perry) has been retained as the agent for Perthmore Enterprises Inc. with respect to a proposed residential subdivision on lands legally described as PT SW1/2 AND PT NE1/2 LOT 3 CON2 DRUMMOND BEING PART 1 ON 27R7125 AND PT 1 ON 27R8420 EXCEPT PL88,27M3,27M14,27M16,27M21,27M55 AND PARTS 3,4 ON 27R7540 TOWN OF PERTH (the “subject lands”). The subject lands are located within the Urban Development Boundary in the Town of Perth, County of Lanark.

The subject lands and subdivision area are a 5.5 hectare portion of the broader 29.7 hectare land holding and are identified within Figure 1.

This Planning Rationale Report, initially provided to Lanark County by way of a December 23, 2020 Draft Plan of Subdivision submission, has previously been revised in response to changes in the draft plan of subdivision and feedback and comments received from the Town of Perth and the Rideau Valley Conservation Authority (RVCA). The latest revisions reflect comments received on February 23, 2023 in response to the August 5, 2022 resubmission package in support of the Zoning By-law Amendment and Draft Plan of Subdivision applications.

2.0 PROPOSED DEVELOPMENT

As shown on the Draft Plan of Subdivision at Appendix A, the proposed development is comprised of 34 lots that will be developed with single detached dwellings and 19 lots that will be developed with semi-detached dwellings, for a combined total of 53 proposed residential lots. In addition to the lots for single and semi-detached dwellings, Block 54 on the Draft Plan will be comprised of a medium density apartment building of three and a half storeys containing 14 units. Further, four semi-detached dwellings will contain basement apartment units. The proposed development will have a combined total of 94 dwelling units in total. The proposed lots for single detached dwellings range in area from 429 m^2 to 703 m^2, with frontages ranging from 12.25 m to 20.00 m. The proposed lots for semi-detached dwellings range in area from 649 m^2 to 685 m^2, with frontages ranging from 18.5 m to 21.32 m. The proposed lots will have frontages on newly created internal streets and on extensions of Perthmore Street and Senators Gate Drive. A proposed internal street (“Street A”) will extend from the western end of Senator’s Gate Drive and terminate at the north-easterly corner of the subdivision. Block 55 on the Draft Plan will be used for stormwater management purposes and Block 57 will be provided as parkland. Block 56 will be used as a turning circle situated at the north-easterly end of Street “A.” In addition to a Plan of Subdivision application, a concurrent Zoning By-law Amendment application seeks to rezone the subject lands from Residential First Density (R1h) and Environmental Protection Area (EP) to Residential Third Density (R3), Residential Fourth Density (R4), and Open Space (OS).

The subject lands are located in the northeast corner of the Town of Perth in the Perthmore Glen community. The subject lands are adjacent to Perth Long Swamp to the east, which is designated a Natural Heritage Feature and Provincially Significant Wetland in the Town of Perth Official Plan. The updated draft plan now includes a 30 m setback from the Provincially Significant Wetland in order to maintain and protect surrounding natural heritage features. The subject lands are bordered to the north by remnant lands, Highway 7 and the Township of Drummond/ North Elmsley. The proposed development is bordered to the south and west by existing and similar residential subdivisions, comprising of previous phases of the Perthmore development. While the original draft plan (dated December 10, 2020) submission included a proposed arterial road and an increased number of lots, subsequent iterations have resulted in a draft plan that is significantly reduced in scope with regards to land and road development. The previously proposed municipal arterial roadway is no longer shown or referenced. The proposed development also now includes a medium density apartment dwelling, on Block 54.

Following discussions with Town Staff, the most recent revisions to the draft plan coincide with the submission of a preliminary overall development concept that places the current proposal within the context of previous and future phases of the Perthmore development. As shown on these plans, the lands to the northeast of the subject lands, and to the rear of lots 34 to 48, are no longer considered for development. Furthermore, the proposed parkland on Block 57 has been enlarged to ensure that parkland dedication requirements have been satisfied. A future phase of development is proposed to the northwest of the subject lands and, depending on traffic engineering requirements, may involve a connection to Highway 7. Development approvals for future phases will be addressed separately from the current Draft Plan of Subdivision and Zoning By-law Amendment approvals processes.

LEGEND

Site Boundary

100 50 0 100

Scale 1:6,000 Metres

CLIENT: PERTHMORE ENTERPRISES INC.

PROJECT: PERTHMORE SUBDIVISION

TITLE: SUBJECT LANDS

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:	PP-13-9668
Date	Jun., 05, 2023
GIS	AH
Checked By	AG

FIGURE: 1

REFERENCE

GIS data provided by the Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry, 2023.

C:\Users\M.Grunstra\McIntosh Perry\GIS - Documents\Projects\2013\PP\PP-13-9668-01\aprx\KeyMap\PP-13-9668_Sitelayout.aprx

3.0 PRE-CONSULTATION & INITIAL APPLICATIONS

A pre-consultation meeting was held with Lanark County, Town of Perth and Rideau Valley Conservation Authority (RVCA) staff on January 23, 2019. The following technical studies were requested as part of the submission package for the Plan of Subdivision application.

- Planning Rationale;
- Preliminary Servicing and Stormwater Management Report;
- Traffic Impact Report; and
- Environmental Impact Statement (EIS)

Since the initial pre-consultation meeting, meetings have continued with Town of Perth staff, both in advance of and following the December 2020 submissions.

The updated draft plan responds to the above discussions as well as the comments provided by the Rideau Valley Conservation Authority. Comments were mainly concerned with potential impacts of the proposed development, future arterial road, and stormwater management strategies, and associated conformity with Town, County, and Provincial policies.

4.0 PLANNING POLICY & REGULATORY FRAMEWORK

4.1 Provincial Policy Statement, 2020

The 2020 Provincial Policy Statement (PPS) provides policy direction on land use planning matters of provincial interest. Table 1 below provides a summary of how the proposed development has been designed in accordance with the policy direction provided within the PPS.

PROVINCIAL POLICY STATEMENT, 2020		
Policy Section	**Policy Description**	**Comments**
1.1.1	• Healthy, liveable and safe communities are sustained by: a) Promoting efficient development and land use patterns which sustain the financial well-being of the Province and municipalities over the long term; b) Accommodating an appropriate affordable and market-based range and mix of residential types; c) Avoiding development and land use patterns which may cause environmental or public health and safety concerns; h) promoting development and land use patterns that conserve biodiversity;	- ***The proposed development is located within the Urban Settlement Boundary as indicated on Schedule A of the Town's Official Plan.*** - ***The proposed development contributes single detached, semi-detached, secondary, and apartment dwellings to the mix of residential types in the Town.*** - ***An updated Environmental Impact Statement (EIS) has been prepared by McIntosh Perry and submitted in support of the proposed development in order to address the Provincially Significant Wetland and Natural Heritage features.***

PROVINCIAL POLICY STATEMENT, 2020		
Policy Section	**Policy Description**	**Comments**
1.1.3	• Promote efficient development patterns, protect resources, promote green spaces, ensure effective use of infrastructure and public service facilities and minimize unnecessary public expenditures. • Settlement Areas shall be the focus of growth and development • Land use patterns within settlement areas shall be based on and densities and a mix of land uses which: a) Efficiently use land and resources; b) Are appropriate for, and efficiently use, the infrastructure and public facilities which are planned or available, and avoid the need for their unjustified and/or uneconomic expansion;	- ***The proposed development is located adjacent to an existing built-up area in the Urban Settlement Boundary.*** - ***The proposed development will contribute additional single and semi-detached dwellings, along with secondary and apartment dwellings, to the mix of residential uses in the Town.*** - ***The density of the development has been designed for the efficient use of land and infrastructure. The development represents a logical extension of municipal infrastructure and will be serviced by municipal water and wastewater services.***
1.4.3	• Planning authorities shall provide for an appropriate range and mix of housing options and densities to meet projected market-based and affordable housing needs of current and future residents of the regional market by: b) permitting and facilitating: 1) all housing options required to meet the social, health, economic and well-being requirements of current and future residents; c) directing the development of new housing towards locations where appropriate levels of infrastructure and public service facilities are or will be available to support current and projected needs.	- ***The proposed development provides single-detached and semi-detached dwellings, along with secondary and apartment dwellings, to the mix of housing options in the Town.*** - ***The density of the development has been designed for the efficient use of land and infrastructure. The development represents a logical extension of municipal infrastructure and will be serviced by municipal water and wastewater services.*** - ***A Preliminary Servicing and Stormwater Management Report has been submitted in support of the proposed development. The Report provides preliminary servicing options for the proposed subdivision and recommends that Best Management Practices (BMPs) be employed wherever possible.***
1.5.1	• Healthy, active communities should be promoted by: b) planning and providing for a full range and equitable distribution of publicly-accessible built and natural settings for recreation, including facilities, parklands, public spaces, open space areas, trails and linkages, and, where practical, water based resources; d) recognizing provincial parks, conversation reserves, and other protected areas, and minimizing negative impacts on these areas.	- ***An updated Environmental Impact Statement (EIS) has been prepared by McIntosh Perry and submitted in support of the proposed development in order to address the Provincially Significant Wetland and Natural Heritage features.*** - ***The proposed development includes Block 57 to be used as parkland dedication accessible to the community.***

PROVINCIAL POLICY STATEMENT, 2020		
Policy Section	**Policy Description**	**Comments**
1.6.6.2	• Municipal sewage services and municipal water services are the preferred form of servicing for settlement areas to support protection of the environment and minimize potential risks to human health and safety. • Within settlement areas with existing municipal sewage services and municipal water services, intensification and redevelopment shall be promoted wherever feasible to optimize the use of the services.	- ***The proposed development is located within the Urban Settlement Boundary and will be fully serviced by municipal water and wastewater services.*** - ***A Preliminary Servicing and Stormwater Management Report has been submitted in support of the proposed development. The Report provides preliminary servicing options for the proposed subdivision and recommends that Best Management Practices (BMPs) be employed wherever possible.***
1.6.6.6	• Planning authorities may allow lot creation only if there is confirmation of sufficient reserve sewage system capacity and reserve water system capacity within municipal sewage services and municipal water services.	- ***A Preliminary Servicing and Stormwater Management Report has been submitted in support of the proposed development. The Report provides preliminary servicing options for the proposed subdivision and recommends that Best Management Practices (BMPs) be employed wherever possible.***
1.6.6.7	• Planning for stormwater management shall: a) be integrated with planning for sewage and water services and ensure that systems are optimized, feasible and financially viable over the long term; b) minimize, or, where possible, prevent increases in contaminant loads; c) minimize erosion and changes in water balance, and prepare for the impacts of a changing climate through the effective management of stormwater, including the use of green infrastructure; d) mitigate risks to human health, safety, property and the environment; e) maximize the extent and function of vegetative and pervious surfaces; and f) promote stormwater management best practices, including stormwater attenuation and re-use, water conservation and efficiency, and low impact development.	- ***A Preliminary Servicing and Stormwater Management Report, that includes a water balance analysis, has been submitted in support of the proposed development. The Report provides preliminary servicing options for the proposed subdivision and recommends that Best Management Practices (BMPs) be employed wherever possible.*** - ***The updated Environmental Impact Statement also addresses impact on the Environment including the adjacent Provincially Significant Wetland, from which a minimum 30 metre buffer is proposed.***
2.1.1	• Natural features and areas shall be protected for the long term.	- ***An updated Environmental Impact Statement (EIS) has been prepared by McIntosh Perry and submitted in support of the proposed development in order to address the Provincially Significant Wetland and Natural***

PROVINCIAL POLICY STATEMENT, 2020		
Policy Section	**Policy Description**	**Comments**
		Heritage features to ensure their long term protection.
2.1.4	• Development and site alteration shall not be permitted in: a) Significant wetlands in Ecoregions 5E, 6E, and 7E; and	- ***The updated EIS addresses and evaluates any impacts on significant wetlands, significant woodlands, and other natural features including Species-at-Risk (SAR) and recommends appropriate mitigation measures.***
2.1.5	• Development and site alteration shall not be permitted in: b) Significant woodlands in Ecoregions 6E and 7E	
2.1.7	• Development and site alteration shall not be permitted in the habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.	
2.1.8	• Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5, and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.	
2.2.1	• Planning authorities shall protect, improve or restore the quality and quantity of water by: I) Ensuring stormwater management practices minimize stormwater volumes and contaminant loads, and maintain or increase the extent of vegetative and pervious surfaces.	- ***A Preliminary Servicing and Stormwater Management Report has been submitted in support of the proposed development. The Report provides preliminary servicing options for the proposed subdivision and recommends that Best Management Practices (BMPs) be employed wherever possible.***

Table 1: Provincial Policy Statement (2020) – Policy Summary

Overall, the development, as proposed, is consistent with matters of Provincial interest, as expressed in the 2020 Provincial Policy Statement.

4.2 Lanark County Sustainable Communities Official Plan

The subject lands are designated as Settlement Area, as per the Lanark County Sustainable Communities Official Plan (SCOP). The SCOP provides that 70% of future development is anticipated to take place in designated settlement areas.

The SCOP contains policies that direct the Official Plans of the lower-tier municipalities, such as the Town of Perth, to designate Settlement Areas and to provide policies and direction that will allow for the efficient development of the designated Settlement Areas. Accordingly, the Town of Perth has incorporated these policies and the subject lands are within the Perth Urban Settlement Boundary. The overall objective of the

Settlement Area designation in terms of residential land use is to "ensure the provision of an adequate supply of residential land" and to "provide for a range and mix of low, medium and high density housing types in accordance with servicing capacities" (Section 2.3.1).

Based on the forgoing, the proposed development of Phase 6 of the Perthmore Subdivision is in conformity with the goals and objectives of the Settlement Area designation of the Lanark County Sustainable Communities Official Plan.

4.3 Town of Perth Official Plan

The subject lands are designated *Residential Area* and *Environmental Protection Area* within the Town Official Plan, as illustrated on Figure 2.

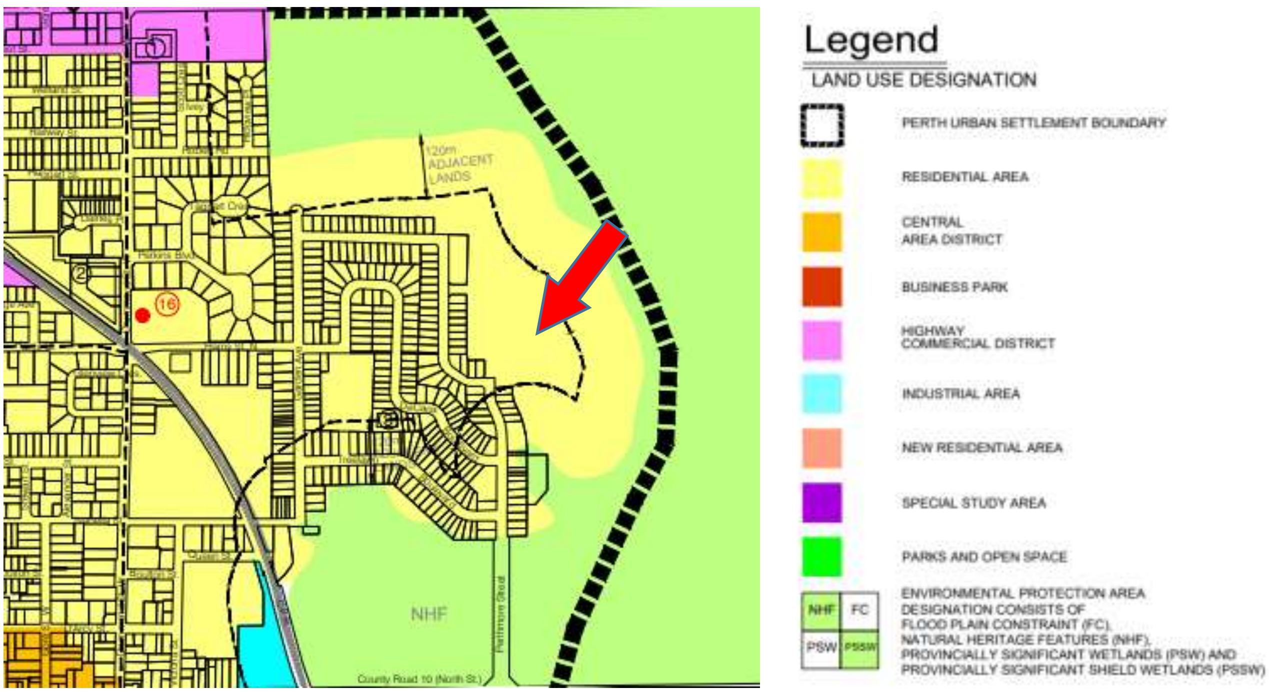


Figure 2: Extract from Schedule A, Land Use Plan

Key Official Plan policies that apply to the proposed subdivision are summarized and responded to in the table below:

TOWN OF PERTH OFFICIAL PLAN POLICIES		
Policy Section	**Policy Description**	**Comments**
3.2 Housing	• The land supply for housing will be met through a combination of intensification, redevelopment and green-field development	- ***The proposed development constitutes greenfield development, and is an acceptable form of development required to meet land supply for housing.***

TOWN OF PERTH OFFICIAL PLAN POLICIES		
Policy Section	**Policy Description**	**Comments**
	• Green-field housing will be directed to the future extension of Perthmore Glen to the east	- ***The proposed development is an extension of and complements the existing residential development in the Perthmore Glen Community.***
5.2 Sewage and Water	• (a) All development or redevelopment within the Town to be serviced by municipal water and sewer services and that sufficient water and sewage plant capacity is available to accommodate the new development and will not create environmental or surcharging problems	- ***The updated Preliminary Servicing and Stormwater Management Report provides preliminary municipal servicing options for the proposed subdivision, including water and sewer infrastructure.***
5.3 Stormwater Management and Drainage	• Stormwater management shall be required for all urban development as a preventative approach • Principles which council intends to utilize in its approach to stormwater management are as follows: - That natural hydrogeological characteristics are maintained, and where possible, enhanced - That the natural infiltration of water on lands which are developed is maximized - That proposed development will not result in increased downstream flooding or erosion or cause adverse effects on receiving waters by appropriate management of stormwater volumes and contaminant loading - To ensure that alterations to natural drainage systems are prohibited or at least minimized by maximizing the retention of natural vegetation and by leaving stream channels in their natural form - That sanitary and stormwater sewers are separated - That a sustainable environmental approach is utilized in protecting water resources	- ***The updated Preliminary Servicing and Stormwater Management Report recommends best practices and notes that enhanced stormwater quantity and quality control will be achieved.***
5.5 Transportation	• The scale and design of sidewalks, road, and street networks should support a variety of transportation modes such as walking, cycling and motorized vehicles • Local road are intended to:	- ***Proposed internal streets will provide access to multiple transportation modes, including cycling, walking and motorized vehicles, and the width of the road allowance is 20 m.***

TOWN OF PERTH OFFICIAL PLAN POLICIES		
Policy Section	**Policy Description**	**Comments**
	- Have a corridor/allowance width of 18.5 to 20 m which may increase to 22 m or more at intersections; - Carry low volumes of traffic at low speeds (40-50 km/hr); - Provide direct access to abutting property as their primary function; and - Include on-street parking • Sidewalks may be constructed on one side for any local road or collector and on two sides for any arterial road • The Town may require a traffic impact study to assess the impacts of any potential development on traffic and related facilities	- ***Proposed internal streets will accommodate traffic at low speeds and provide access to the proposed residential lots.*** - ***The road allowance width within the proposed development is sufficient to permit sidewalks to accommodate pedestrian flows.*** - ***Detailed roads cross sections will be provided at the detailed design phase of development following Draft Plan approval.*** - ***A Traffic Impact Study has been prepared by McIntosh Perry in support of the proposed development. The Report concludes that the proposed development is expected to have minimal impact on the traffic operations of the adjacent road network and provides mitigation measures with respect to intersection control and optimization of signal timings.***
8.1.1 Residential Areas	• New neighbourhoods with a mix of housing types designed to meet a range of housing needs • Lotting patterns will be designed to ensure convenient vehicular and pedestrian flows and access to schools, parks and commercial areas • Forms of development shall be compact, energy efficient and fully serviced • Efforts will be made to maintain existing natural features and/or beautify residential areas with trees and landscaped open space areas	- ***The proposed development consists of single detached, semi-detached, secondary, and apartment residential dwellings and will contribute to a mix of housing types.*** - ***Proposed internal streets will provide access to vehicular and pedestrian flows.*** - ***The proposed development will be fully serviced by municipal water and wastewater services.*** - ***Block 57 of the proposed development is provided as parkland, accessible for use by the public and surrounding community.***
8.1.3 Residential Area Designation	• To provide for an appropriate range and mix of housing types and densities to meet the projected requirements of current and future residents • To provide for compact, energy efficient development that is fully serviced	- ***The proposed development incorporates a range of dwelling types that will contribute to a mix of housing types.*** - ***The proposed development will be fully serviced by municipal water and wastewater services.***

TOWN OF PERTH OFFICIAL PLAN POLICIES		
Policy Section	**Policy Description**	**Comments**
	• To maintain generally ground-oriented housing form (e.g. 4 storeys' or less) • To ensure that the built form, massing and profile of new and redevelopment housing is well integrated and compatible in design with existing house and that a compatible transition between existing housing and new residential or non-residential sues is achieved	- ***The proposed single, semi-detached, secondary and apartment residential units will be largely ground oriented. All dwellings will be fewer than 4 storeys in height.*** - ***The proposed development will be well integrated and compatible with previous phases of the subdivision.***
8.1.3.1 Range of Permitted uses	• 1. To provide for an appropriate range and mix of housing types and densities to meet the projected requirements of current and future residents	- ***The proposed development provides single-detached and semi-detached dwellings to the mix of housing options presently available in the Town.***
8.1.3.5 Housing Mix	• Recognizing that it is in the Town's interest to create a sustainable community where public infrastructure is used in an efficient manner, neighbourhoods are functional, and an adequate range and mix of housing types are available to meet the current and projected needs of all citizens • The housing mix targes are intended for the community as a whole and are not intended to be inflexibly applied • Neighbourhoods are intended to feature a variety of housing types, values and occupancies and will be designed to ensure compatible transition between housing types • New medium and high density residential developments should be located so that densities increase gradually from lower-density residential environments	- ***The development which is proposed to be serviced by public infrastructure provides a mix of housing. It is noted that basement dwelling units and an apartment dwelling containing fourteen units have been incorporated, as a result of discussions with Town Staff regarding the promotion of affordable housing units within the municipality.*** - ***The various dwelling types are proposed in appropriate locations within the subdivision and as it concerns neighboring development.***
8.1.3.10 Residential Design Principles	• Maintain visual landmarks, energy conservation, human scale, pedestrian access, adequate lighting, parking within short walking distance of destination, barrier free access, fire protection, noise attenuation, landscaping and open space, regard for microclimate conditions and building compatibility	- ***The development will continue to be reviewed as the approvals processes continue, including subdivision registration and building permitting. It is anticipated that associated requirements will be satisfied by way of detailed engineering design / clearance of Draft Plan conditions and by way of the building permitting process.***
8.1.3.20	• Parks, open space and natural areas are intended to serve a variety of purposes in the community, including:	- ***The proposed development includes Block 57 as parkland and it is noted that the updated***

TOWN OF PERTH OFFICIAL PLAN POLICIES		
Policy Section	**Policy Description**	**Comments**
Parks, Open Space and Natural Areas	- Natural areas and urban wilderness; - Areas which may be subject to environmental constraints, e.g. significant wetlands wildlife corridors and flood plains - Heritage sites and landscapes • Neighbourhood Parks shall be primarily dedicated to neighbourhood level facilities. It is the intent to further develop Perthmore Park during the life of this Plan to serve Perthmore residential area. No other new neighbourhood parks are proposed at this time	***Environmental Impact Statement speaks to the preservation of habitat within Block 57 as well as educational signage associated with the Perth Long Swamp.***
8.6.4 *Natural Heritage Features Policies*	• Natural heritage features are intended to be protected over the long term as a legacy to future generations • Development and site alteration shall not be permitted in the Perth Long Swamp, the Blue Berry Creek Wetland, and the Grant's creek Wetland. • Development and site alteration will not be permitted in adjacent lands to these significant wetlands unless it has been demonstrated, through the preparation of an Environmental Impact Study (EIS) as required in Section 8.5.4 e. EIS of this Plan, that there will be no negative impacts on the natural features or on the ecological functions for which a specific wetland area is identified. • Development and site alteration shall not be permitted in significant wildlife habitat. Development and site alteration shall not be permitted on adjacent lands to these natural heritage features unless it has been demonstrated through the preparation of an EIS as required in Section 8.5.4 e. – EIS of this Plan, that there will be no negative impacts on the natural features or on their ecological functions.	- ***Section 8.6.4 of the Perth Official Plan is referred to and addressed throughout the updated Environmental Impact Statement (EIS), which provides recommendations including mitigation measures intended to uphold associated policies.*** - ***The recommendations and mitigation measures include incorporating a minimum 30 metre setback from the Perth Long Swamp PSW, planting of additional forest edge habitat, preservation of vegetation within the proposed park, and habitat enhancement within the proposed stormwater management pond block.***
9.12.15.1 *Plans of Subdivision*	• Land development shall take place primarily by plan of subdivision where three or more lots or blocks are proposed • Regard shall be given to the requirements for an impact assessment for subdivisions proposed in the vicinity of identified natural heritage features (designated wetlands), archeological or cultural heritage resources or natural or human-made hazards	- ***The proposed development will occur by a plan of subdivision.*** - ***An updated Environmental Impact Statement (EIS) has been prepared by McIntosh Perry and submitted in support of the proposed development. The updated EIS aligns with the protection of the***

TOWN OF PERTH OFFICIAL PLAN POLICIES		
Policy Section	**Policy Description**	**Comments**
	• There are adequate municipal services and utilities available to support the proposed development, and more specifically, but without limiting the preceding, the Town has adequate residual sanitary sewage treatment, sanitary sewage collection and water supply capacity available to dedicate to the full extent of development proposed	***Provincially Significant Wetland and Natural Heritage features.*** - ***The proposed development will be fully serviced by municipal water and wastewater services, as communicated within the updated Preliminary Servicing and Stormwater Management Report; the Report provides preliminary servicing options and recommends that Best Management Practices (BMPs) be employed wherever possible.***

Table 2: Town of Perth Official Plan Policies

Based on the forgoing, the proposed development conforms to and is consistent with applicable polices of the Town of Perth Official Plan.

5.0 REGULATORY CONTROLS

5.1 Town of Perth Zoning By-law No. 3358

The subject lands are zoned Residential First Density (R1h) and Environmental Protection Area (EP), as per the Town of Perth Zoning By-law 3358. A Zoning By-law Amendment application was previously submitted, and by way of the updated development proposal now proposes to rezone residential lots 1-53 to Residential Third Density (R3) and Block 54 to Residential Fourth Density (R4).

As per the zoning requirements provided in Sections 8 and 9 of the Zoning By-law, single-detached dwelling and semi-detached dwelling are permitted uses in the R3 Zone, and apartment dwellings are permitted uses in the R4 Zone. The proposal meets all other known zone requirements within the Zoning By-law. The majority of the Stormwater Management Pond (Block 55) will be rezoned from Residential First Density (R1h) to Residential Third Density (R3), while the remaining portions of Block 55 will be rezoned from Environmental Protection (EP) to Residential Third Density (R3). The proposed park (Block 57) will be rezoned from Residential First Density (R1h) to Open Space (OS).

A Zoning Schedule is provided at Appendix B.

6.0 SUMMARY OF TECHNICAL STUDIES

6.1 Environmental Impact Statement

An Environmental Impact Statement (EIS) was prepared by McIntosh Perry Consulting Engineers Ltd. (dated August 5, 2022) in support of the proposed development. The EIS assesses the existing land use to determine the potential impacts to natural heritage features from the proposed development, including SAR and SAR habitat. The EIS provides recommendations and mitigation measures to minimize or eliminate environmental impacts and to help achieve ecological and environmental improvements, and concludes that adherence to the proposed measures will ensure that the intent of applicable natural heritage policies are satisfied. The proposed development acknowledges the proximity of the Provincially Significant Wetland and has been adjusted accordingly. The draft plan includes a new lot configuration and a Stormwater Management facility that has a 30 m setback from the Provincially Significant Wetland.

6.2 Preliminary Servicing and Stormwater Management Report

A Conceptual Stormwater Management and Servicing Options Report (Report) was completed by McIntosh Perry Consulting Engineers Ltd. (dated August 3, 2022) in support of the proposed development. The Report provides preliminary servicing options for the development in accordance with the recommendations and guidelines provided by the Rideau Valley Conservation Authority (RVCA), the Ministry of the Environment, Conservation and Parks (MECP), and the Town of Perth. The Report presents an overall servicing scheme for the entire development to ensure that existing and available services will adequately service the proposed development.

The Report provides that a proposed Stormwater Management pond will be installed in Block 55 of the draft plan. The facility will be designed as a wet pond and will provide enhanced stormwater quantity and quality control. The report further provides that watermains will be installed throughout the subdivision and will have multiple connection points to existing infrastructure. A proposed sanitary sewer will also be installed throughout the subdivision and will gravity drain throughout the existing subdivision infrastructure through multiple connections. The report also notes that sediment and erosion protection measures will be installed as soon as ground conditions warrant and permit and shall remain in place until construction is complete and vegetation is re-established. The report provides that the entire subdivision will employ Best Management Practices (BMPs) wherever possible and recommends that the Town approve the Preliminary Servicing and Stormwater management Report in support of the Draft Plan of Subdivision.

6.3 Traffic Impact Study

A Traffic Impact Study was completed by McIntosh Perry in support of the proposed development (dated August 2022). The Report evaluates anticipated traffic impacts of the development to the surrounding traffic network. The Report notes that the existing road network within the study is currently operating well, and expects the proposed development to generate 62 new vehicle trips during the AM Peak Hour, and 82 new vehicle trips in the PM Peak Hour at full buildout. In comparing the 2035 horizon scenario for the total traffic to the background traffic scenario, the Report concludes that the proposed development is expected to have minimal impact on the traffic operations of the adjacent road network and that the existing traffic network operates at satisfactory conditions. The report provides mitigation measures with respect to intersection control and optimization of signal timings, and recommends that traffic operations continue to be monitored and appropriate changes be made to the network throughout the buildout year of 2035.

7.0 CONCLUSION

The proposed development is consistent with the Provincial Policy Statement and conforms to the applicable policies, goals and objectives of the Lanark County Sustainable Communities Official Plan and the Town of Perth Official Plan. The proposed lots and blocks illustrated on the Draft Plan of Subdivision will comply with the requirements of the Town of Perth Zoning By-law No. 3358 once the Zoning By-law Amendment application is approved.

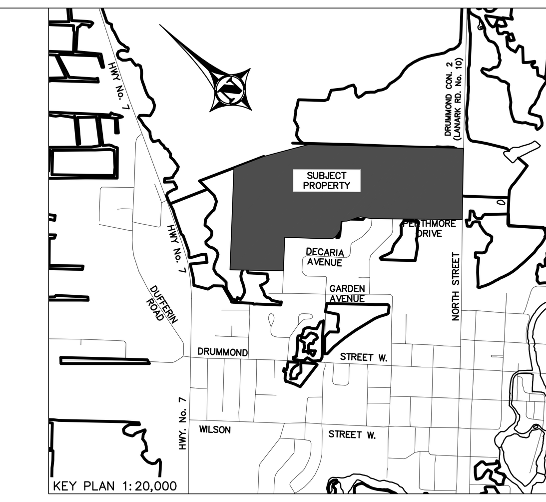
Respectfully submitted,

Prepared By:	Reviewed By:
Vithulan Vivekanandan, MES Pl. Planner	Benjamin Clare, MCIP RPP Practice Area Lead, Planning Services

u:\perth\mpce jobs\mpce projects\2013\pp-13-9668 perthmore development co - subdivision of remnant lands\perthmore phase 6\05 - reports & submissions\01 - reports\01 - planning\2022 resubmission\2023.05.xx - revised pr\revised pr.docx

APPENDIX A

Draft Plan of Subdivision



DRAFT PLAN OF SUBDIVISION

OF
PART OF THE NORTHEAST HALF LOT 3
CONCESSION 2
GEOGRAPHIC TOWNSHIP OF DRUMMOND
NOW IN THE TOWN OF PERTH
COUNTY OF LANARK

TO BE SUBDIVIDED INTO:

LOTS 1,3,4,6,8,9,11,12,14,16,17,18,19,21,22,24,26,27,28,29,30,31,32,33,34,37,38 40,41,43,45,46,48,49 FOR SINGLE DETACHED RESIDENTIAL DWELLINGS

LOTS 2,5,7,10,13,15,20,23,25,35,36,39,42,44,47,50,51,52,53 FOR SEMI-DETACHED RESIDENTIAL DWELLINGS

BLOCK 54 FOR MEDIUM DENSITY
BLOCK 55 FOR STORMWATER MANAGEMENT
BLOCK 56 FOR STREET A CUL-DE-SAC
BLOCK 57 FOR PARKLAND

STREET A - 20 METRES WIDE
PERTHMORE STREET - 20 METRES WIDE
SENATORS GATE DRIVE - 20 METRES WIDE

APPLICANT AND PROPERTY OWNER

PERTHMORE ENTERPRISES INC.
C/O MAURICE DeCARIA
P.O. BOX 20054
PERTH, ON, K7H 3M6

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE THE PREPARATION AND SUBMISSION OF THIS PLAN TO THE COUNCIL OF THE COUNTY OF LANARK.

DATE

MAURICE DeCARIA
PERTHMORE ENTERPRISES INC.
I HAVE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE

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

DATE

JOHN GAUTHIER, O.L.S.

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT

A. AS SHOWN ON THE DRAFT PLAN
B. AS SHOWN ON THE DRAFT PLAN
C. AS SHOWN ON THE DRAFT PLAN
D. AS DESCRIBED ON THE TITLE BLOCK
E. AS SHOWN ON THE DRAFT PLAN
F. AS SHOWN ON THE DRAFT PLAN
G. AS SHOWN ON THE DRAFT PLAN
H. PIPED MUNICIPAL WATER SUPPLY IS AVAILABLE TO SERVICE THE PROPERTY
I. GENERALLY SANDY/SILTY SOILS, WITH GRAVEL AND SHALLOW BEDROCK
J. AS SHOWN ON THE DRAFT PLAN
K. PIPED MUNICIPAL WATER AND WASTEWATER SERVICES ARE AVAILABLE TO SERVICE THE PROPERTY
L. NO RESTRICTIONS APPLY

SCHEDULE OF AREAS

LOT/BLOCK	AREA (m^2)	TYPE
1	468	SINGLE DETACHED
2	674	SEMI-DETACHED
3	481	SINGLE DETACHED
4	472	SINGLE DETACHED
5	673	SEMI-DETACHED
6	429	SINGLE DETACHED
7	665	SEMI-DETACHED
8	587	SINGLE DETACHED
9	589	SINGLE DETACHED
10	649	SEMI-DETACHED
11	482	SINGLE DETACHED
12	430	SINGLE DETACHED
13	675	SEMI-DETACHED
14	430	SINGLE DETACHED
15	675	SEMI-DETACHED
16	522	SINGLE DETACHED
17	674	SINGLE DETACHED
18	528	SINGLE DETACHED
19	589	SINGLE DETACHED
20	649	SEMI-DETACHED
21	482	SINGLE DETACHED
22	430	SINGLE DETACHED
23	675	SEMI-DETACHED
24	430	SINGLE DETACHED
25	675	SEMI-DETACHED
26	522	SINGLE DETACHED
27	524	SINGLE DETACHED
28	657	SINGLE DETACHED
29	703	SINGLE DETACHED
30	515	SINGLE DETACHED
31	596	SINGLE DETACHED
32	514	SINGLE DETACHED
33	547	SINGLE DETACHED
34	483	SINGLE DETACHED
35	682	SEMI-DETACHED
36	682	SEMI-DETACHED
37	603	SINGLE DETACHED
38	702	SINGLE DETACHED
39	685	SEMI-DETACHED
40	535	SINGLE DETACHED
41	522	SINGLE DETACHED
42	675	SEMI-DETACHED
43	430	SINGLE DETACHED
44	675	SEMI-DETACHED
45	430	SINGLE DETACHED
46	482	SINGLE DETACHED
47	649	SEMI-DETACHED
48	482	SINGLE DETACHED
49	456	SINGLE DETACHED
50	649	SEMI-DETACHED
51	649	SEMI-DETACHED
52	649	SEMI-DETACHED
53	649	SEMI-DETACHED
BLOCK 54	1,928	MEDIUM DENSITY
BLOCK 55	4,809	STORMWATER MANAGEMENT
BLOCK 56	701	STREET A CUL-DE-SAC
BLOCK 57	2,776	PARKLAND
TOTAL LOT/BLOCK AREA (m^2)		**40,590**

STREET	AREA (m^2)	LENGTH (m)
STREET A	9,997	500
PERTHMORE STREET	3,310	163
SENATORS GATE DRIVE	1,436	70
TOTAL SUBDIVISION AREA (m^2)		**55,333.41**

BEARINGS & ELEVATIONS

BEARINGS ARE GRID BEARINGS DERIVED FROM REAL TIME NETWORK OBSERVATIONS, AND ARE REFERRED TO THE CENTRAL MERIDIAN OF MTM ZONE 9 (76° 30' WEST LONGITUDE) NAD 83 (CSRS) (1197.0).

ELEVATIONS AND TOPOGRAPHIC FEATURES SHOWN ON THIS PLAN HAVE BEEN DERIVED FROM DIGITAL IMAGERY FILES RECEIVED FROM THE ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY (MNRF) DATED 2019.

SCALE 1 : 500

0 10 20 30 40 50 Metres

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

TABLE OF P.I.N.'S	
NUMBER	BLOCK 05165-
P1	0760(LT)
P2	0694(LT)
P3	0693(LT)
P4	0692(LT)
P5	0691(LT)
P6	0690(LT)
P7	0689(LT)
P8	0688(LT)
P9	0687(LT)
P10	0685(LT)
P11	0684(LT)
P12	0683(LT)
P13	0682(LT)
P14	0681(LT)
P15	0680(LT)
P16	0679(LT)
P17	0678(LT)
P18	0743(LT)
P19	0744(LT)
P20	0745(LT)
P21	0746(LT)
P22	0741(LT)
P23	0740(LT)
P24	0739(LT)
P25	0738(LT)
P26	0729(LT)
P27	0737(LT)

LEGEND AND NOTES
(IF APPLICABLE)

□	DENOTES	MONUMENT PLANTED
■	DENOTES	MONUMENT FOUND
IB	DENOTES	IRON BAR
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
RPL	DENOTES	ROCK PLUG
RIB	DENOTES	ROUND IRON BAR
WIT	DENOTES	WITNESS
ACC.	DENOTES	ACCEPTED
(1352)	DENOTES	B.W. KERR, OLS
(MPS)	DENOTES	McINTOSH PERRY SURVEYING INC.
(OU)	DENOTES	UNKNOWN ORIGIN
(S/T)	DENOTES	SUBJECT TO
BF	DENOTES	BOARD FENCE
CLF	DENOTES	CHAIN LINK FENCE
PWF	DENOTES	POST AND WIRE FENCE
RF	DENOTES	RAIL FENCE
N,S,E,W	DENOTES	NORTH, SOUTH, EAST, WEST
R.P.	DENOTES	REGISTERED PLAN
	DENOTES	EXISTING LEGAL FABRIC
	DENOTES	PROPOSED LOT/BLOCK BOUNDARY
18.50	DENOTES	PROPOSED LOT/BLOCK DIMENSION
133.75	DENOTES	ORIGINAL GROUND CONTOUR (MNRF MAPPING)
	DENOTES	MNRF PROVINCIALLY SIGNIFICANT WETLAND
	DENOTES	30m SETBACK FROM MNRF PSW
	DENOTES	100yr FLOODPLAIN (FROM RVCA)

REVISIONS

No.	DESCRIPTION	DATE	BY

McINTOSH PERRY
SURVEYING INC.
3240 Drummond Con. 5A, R.R. #7, Perth, ON K7H 3C9
Tel: 613-267-6524 Fax: 613-267-7992
www.mcintoshperry.com

PROJECT				DRAWN: SH
PERTHMORE DEVELOPMENT				CHECKED: JG
DATE: MAY 10, 2023	PAPER SIZE: 36" x 54"	SCALE: 1:500	PROJECT No.: 19-4081	DWG. No.: 01

U:\PERTH\MPSI CORRESPONDENCE\2019 JOBS\19-4081 MPCE _PERTHMORE_BOUNDARY PLAN\DRAFT PLAN\CAD\DRAWINGS\UPDATED (MAY.2023)\D19-4081 DRAFT PLAN_REV-3_WORKING (MAY.10.2023).DWG
May 10, 2023 1:52:23 PM

APPENDIX B

Zoning Schedule

LEGEND

ENVIRONMENTAL PROTECTION AREA	EP
RESIDENTIAL FIRST DENSITY HOLDING	R1h
RESIDENTIAL THIRD DENSITY	R3
OPEN SPACE	OS
RESIDENTIAL FOURTH DENSITY	R4

NORTH:

STAMP:

No.	Revision/Issue	Date

McINTOSH PERRY
3240 Drummond Cons 5A, R.R. #7, Perth, ON K7H 3C9
Tel: 613-267-6524 Fax: 613-267-7992
www.mcintoshperry.com

Designed by:
Drawn by: SH
Checked By: BC
Scale: 1:500

Client: PERTHMORE DEVLOPMENT CO. LTD
Project: PERTHMORE ESTATES - PHASE 6

Drawing Title: ZONING BYLAW AMENDMENT SKETCH

Check and verify all dimensions before proceeding with the work
Do not scale drawings

Date: MAY.18.2023
Project Number: PP-13-9668
Drawing Number: 01

PRELIMINARY SERVICING AND STORMWATER MANAGEMENT REPORT
PERTHMORE SUBDIVISION - PHASE 6

Project No.: 0PP-13-9668-01
June 23, 2023

Prepared for:

Perthmore Development Co.
P.O. Box 20054
80 Dufferin Street
Perth, ON K7H 0B5

Prepared by:

McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Road
Carp, Ontario K0A 1L0

McINTOSH PERRY

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by Perthmore Developments Co. to prepare this Preliminary Servicing and Stormwater Management Report in support of the Draft Plan of Subdivision Application for Phase 6 of the Perthmore Subdivision in Perth, Ontario.

The main purpose of this report is to present preliminary servicing options for the development in accordance with the recommendations and guidelines provided by the Ministry of the Environment, Conservation and Parks (MECP), Rideau Valley Conservation Authority (RVCA) and the Town of Perth (Town). This report will address the servicing for the entire development so that an overall servicing scheme can be presented, ensuring that existing and available services will adequately service the proposed development.

1.2 Site Description

The subject property is generally located within the northeastern quadrant of the Town of Perth and south of Provincial Highway 7. The property is legally described as Part of the northeast and southwest halves of Lot 3 and the southwest half of Lot 4, Concession 2, within the geographic Township of Drummond now in the Town of Perth and part of Block 15 registered plan 27M-21. This phase of development encompasses approximately 5.40 hectares and is bound by vacant land to the north and east, and by the existing phases of the subdivision immediately to the south and west. Refer to the Draft Plan of Subdivision in Appendix 'A' for more details.

The topography of the site varies with a ridge generally bisecting the property near the western limit and splitting the drainage in easterly and westerly directions. The elevation generally slopes off near the eastern limit at the proposed cul-de-sac of Street A. The land is generally overgrown with a variety of grass, shrubs and bush along with some trees located at the northeast portion of the site. At the time of writing of this report, portions of the property have been cleared or are in the process of being cleared.

Phase 6 is made up of 53 lots with 34 single family homes, 38 semi-detached units (18 lots) and 1 apartment block with 14 units. There is also approximately 725 meters of associated municipal roadway and municipal services. The Town and the RVCA will be reviewing and approving this report as part of the Draft Plan of Subdivision Application.

2.0 BACKGROUND INFORMATION

Background studies that have been completed for the site include review of as-built drawings, a topographical survey of the site, along with servicing and stormwater reports from previous phases of the development.

Various as-built drawings, design drawings and design calculations for the existing subdivision services were reviewed in order to determine proper servicing schemes for the site.

A topographic survey of the site was completed by MPSI dated August 2020 and was used to identify the existing drainage characteristics and to delineate catchment areas.

The following reports have previously been completed and are available under separate cover:

- Drainage Design Report – Perthmore Subdivision Phase 3 prepared by McIntosh Hill dated March 1998.
- Sanitary Sewer Report – Perthmore Subdivision Phase 3 prepared by McIntosh Hill dated February 1998.
- Stormwater Management Report – Perthmore Subdivision Phase 4 prepared by McIntosh Perry dated September 12, 2002
- Preliminary Stormwater Management Report – Perthmore Subdivision Phase 5 prepared by McIntosh Perry dated February 17, 2004

3.0 EXISTING SERVICES

Phase 6 of the Perthmore Subdivision will be serviced partially via existing services and infrastructure within the existing phases of the development. The majority of the proposed development will be serviced by the newly proposed storm sewers and an associated stormwater management facility.

Existing services within Senators Gate Drive include a 200mm sanitary sewer, a 200mm watermain and a 450mm storm sewer. Existing services within Perthmore Street include a 200mm sanitary sewer, a 300mm watermain and a 525mm storm sewer. Stubs have been left at the intersection of Senators Gate Drive and Perthmore Street. There are stubs extending in both the northeast and northwest directions. Stubs have also been left at the intersection of Senators Gate Drive and Street B. The storm sewer at this intersection is a 300mm and the sanitary and water are both 200mm in diameter.

A newly proposed stormwater management pond will be constructed to service Phase 6. Previous discussions of reconstructing the Phase 5 pond have been eliminated due to sizing constraints that push the pond too close to the existing wetland. The proposed facility is located outside of the wetland setback.

Gas, hydro, cable and telephone utilities are available nearby and locations will be confirmed from respective utility companies during detailed design process.

4.0 SERVICING PLAN

4.1 Proposed Servicing Overview

The overall servicing of Phase 6 of the subdivision will be accomplished through multiple connections to the existing stubs as detailed below. See below for more details pertaining to each specific service.

4.2 Watermain Design

Water servicing for the proposed development will be accomplished through connections at three locations: to the existing 200mm stub at the intersection of Senators Gate Drive and Street A and to the existing 300mm and 200mm stubs at the intersection of Senators Gate Drive and Perthmore Street. The watermain will be 200mm in diameter throughout Phase 6. Flow control valves will be installed as required. See *Drawing 100 – General Plan of Services* for details pertaining to the layout of the watermain.

Fire hydrants will be located on-site as required. The fire hydrants will be spaced 90m to 180m apart in order to meet municipal firefighting requirements. The fire hydrants will be owned and operated by the Town. Individual water services will be installed and will be Pex conforming to AWWA C904. Curb stops will be installed on all water services on the property line, away from driveways and any aboveground utilities. All watermains and associated structures will be designed and constructed per the design criteria detailed in the Design Guidelines for Drinking-Water Systems 2008 by the MECP and constructed per the Ontario Provincial Standard Details (OPSD's).

The watermain is designed to have a minimum of 2.4m cover and when crossing over or under utilities the watermain will have a minimum 0.3m clearance. A minimum horizontal separation of 2.5m (from pipe wall to pipe wall) will be maintained between the proposed watermain and storm/sanitary mains.

Water demands have been calculated per MECP Design Guidelines for Drinking-Water Systems 2008. The population for Phase 6 is calculated as 243.4 people creating the following demands:

- Average Day Flow = 47.33 L/min
- Max. Day Flow = 130.15 L/min
- Peak Hourly Flow = 195.46 L/min

Water demands which account for the anticipated population from the future development areas have also been completed using a population of 570.4 people creating the following demands:

- Average Day Flow = 110.91 L/min
- Max. Day Flow = 305.01 L/min
- Peak Hourly Flow = 458.06 L/min

See *Water Demands Sheets 1 and 2* in Appendix 'B' of this report for more details.

Prior to connecting to the municipal water distribution system, it is essential to determine whether the system has adequate capacity and that the overall impact to the existing system is minimal. A WaterCAD model will be generated at the detailed design stage to confirm the capacity, pressure and size of pipes required to service the proposed site.

4.3 Sanitary Sewer Design

The sanitary sewers for the proposed development will flow by gravity to the existing sanitary sewers. Sanitary connections will be made to the stubs at the intersection of Senators Gate Drive and Perthmore Street. See *Drawing 100 – General Plan of Services* for details pertaining to the layout of the sanitary sewers.

The sanitary sewers within the new phase of development are 200mm diameter will be installed throughout with a minimum full flow target velocity (cleansing velocity) of 0.6 m/s and a full flow velocity of not more than 3.0 m/s. All sewers and associated structures will be designed and constructed per the design criteria detailed in the Design Guidelines for Sewage Works 2008 by the MECP and constructed per the Ontario Provincial Standard Details (OPSD's).

Design parameters for Phase 6 include an extraneous infiltration rate of 0.33 L/s/ha. Daily per capita flow rates of 280 L/p/d and residential densities of 3.4 persons per single unit, 2.7 persons per semi-detached units, 1.8 persons per apartment unit and 60 persons per net hectare of futured development blocks were used in the design of this development. The residential peaking factor used is based on the Harmon Equation, with a maximum of 4.0 and a minimum of 2.0.

Phase 6 of the subdivision has been accounted for in the design of sanitary sewers of previous phases. As noted above the new phase of the subdivision will have multiple sanitary outlets. Ultimately the flows will be directed towards the Treelawn Boulevard and to Garden Avenue sewer outlets. Within the *Perthmore Development Phase III – Sanitary Sewer Report*, dated February 1998 by McIntosh Hill, the Treelawn Boulevard and Garden Avenue Sewers have been sized to accommodate the full buildout of the Perthmore Subdivision.

It was assumed the total number of lots being serviced by the Treelawn Boulevard sewer would be 258 lots with a total flow of 17.6 L/s for the full build-out of the development. According to the previous report, the existing 200mm sanitary sewer within Treelawn Boulevard is sloped at 0.40%, therefore the total capacity of the pipe is approximately 21.6 L/s. Phase 6 of the development will generate a total flow of 5.07 L/s to be captured by the Treelawn Boulevard sanitary sewer.

See *Sanitary Sewer Design Sheet* and *PP-13-9668-01 – Sanitary Drainage Areas - SAN* in Appendix 'C' of this report for more details.

4.4 Storm Sewer Design

Stormwater runoff will be conveyed through curb and gutter and rear-yard swale networks towards catch basins, where it will be captured and conveyed into the new storm sewer network. The storm sewers are designed with a minimum of 1.5m cover. The storm sewer network within the subdivision is designed to accommodate a storm event with a 5-year return period. Storms in excess of this event will result in surcharging at catch basin and road sag locations. Stormwater runoff during these major events will be conveyed via overland flow routes within rear-yard swales and along the roadway, as is typical in subdivisions of this nature. A detailed lot grading and drainage plan will be prepared during the detailed design stage outlining the proposed drainage pattern within the subdivision.

The storm sewers within Phase 6 will flow via gravity to a newly proposed stormwater management facility located to the south of the Street A cul-de-sac at the eastern boundary of the property. Storm sewers stubs will be provided in support of the future medium/high-density residential development areas which have been detailed in Section 5.5. Future development areas will require additional design to be carried out during their respective designs. See Drawing 100 – General Plan of Services for details pertaining to the layout of the storm sewers.

The storm sewers within this phase of development range in diameter from 250mm to 975mm and are designed with a minimum full flow target velocity (cleansing velocity) of 0.8 m/s (cleansing velocity) and a full flow velocity of not more than 3.0 m/s. No storm sewer will have a slope less than 0.1%. Appropriately sized maintenance holes will be installed at every change in pipe size or direction and will be spaced no more than 120m apart in order to facilitate cleaning and maintenance. All sewers and associated structures will be designed and constructed per the design criteria detailed in the Design Guidelines for Sewage Works 2008 by the MECP and constructed per the Ontario Provincial Standard Details (OPSD's).

A preliminary storm sewer design sheet was created using the rational method, which allows for the proper sizing of the storm pipes within the development. Drainage area information, along with respective pipe slopes and other necessary information was utilized to evaluate the performance of the storm sewer network. The time of concentration calculated for the storm sewer system is based on a 20-minute inlet time. Rainfall intensities were obtained from Intensity-Duration-Frequency (IDF) curves for the Town of Perth from the Ministry of Transportation (MTO).

The preliminary storm sewer design sheet identifies the 5-year flow that is conveyed through each pipe section of the storm sewer network. The peak flow and peak velocity are the maximum results based on gravity flow. Included in the sheet is the full flow capacity of the pipe and the associated full flow velocity when the pipe is under gravity flow condition. The peak flow was checked against the full flow capacity to ensure that each storm sewer pipe can convey the 5-year flow unrestricted.

The proposed storm sewer layout and approach is further detailed in Section 5.0 *Proposed Stormwater Management.*

See *Storm Sewer Design Sheet* and *PP-13-9668-01 - Storm Drainage Areas - STM* in Appendix D of this report for more details regarding pipe sizing.

4.5 Site Utilities

All relevant utility companies will be contacted prior to construction in order to confirm adequate utility servicing for the site. Existing utilities are present in prior phases of the development and will be extended to provide service for this phase.

4.6 Service Locations/Cover

The minimum cover for the sanitary, storm and water mains will be as follows:

Service	Minimum Cover
Sanitary Sewer	1.8m
Storm Sewer	1.5m
Watermain	2.4m

All minimum cover requirements are as per municipal standards. Separation distances between the storm, water and sanitary will be maintained as per the MECP requirements.

5.0 PROPOSED STORMWATER MANAGEMENT

5.1 Design Criteria and Methodology

In the absence of a subwatershed plan for this area, the MECP *Stormwater Management Planning and Design Manual* (March 2003) is used to govern the management of stormwater. This methodology promotes stormwater management from an environmentally sustainable perspective. The intent of the stormwater management plan is to provide adequate stormwater treatment for both quantity and quality control.

Stormwater Best Management Practices (BMPs) will be implemented at the “lot level” and “conveyance” locations. These concepts are explained further in Section 5.7.1. To summarize, roof water will be directed to grass surfaces that in turn will be collected in grassed swales or in rear yard/roadway catchbasins prior to entering into the proposed storm sewer network.

An existing stormwater management (SWM) pond is located on the northeast side of Perthmore Street as shown on Figure 1, below. As part of development of this subsequent phase, this SWM facility will remain intact and a standalone SWM pond will be constructed to address the water quality and quantity control requirements for this tributary drainage area.

5.2 Overall SWM Strategy

As the existing stormwater pond will continue to serve Phase 5, this new phase will look to direct all runoff towards an end of pipe facility. The ultimate outlet for this site will remain consistent in being the Perth Long Swamp. However, previous submissions for the Perthmore Subdivision Phase 6 Stormwater Management Plan encountered challenges due to the need for the reconstruction of the existing Phase 5 pond. The required surficial area to accommodate a stormwater management (SWM) facility capable of adequately handling the volume of runoff from Phase 5 was extensive, leading to an expansion towards the wetland boundary.

Unfortunately, this expansion was deemed unacceptable by the Rideau Valley Conservation Authority (RVCA). In response to this, a new strategy has been devised to locate the new pond outside of the wetland boundary while ensuring it possesses the necessary capabilities to handle the stormwater management requirements of Phase 6 in isolation.

A Visual OTTHMO Version 5 (VO5) model was assembled for the analysis. The VO5 hydrologic model requires various measured and calculated input parameters. The calculations of these input parameters area detailed below.

5.3 Pre-Development Drainage

5.3.1 General

Since the pre-development land use was rural, the NASHYD command was employed in the VO5 model to calculate the runoff flows. NASHYD is used to simulate runoff flows with NASH instantaneous unit hydrograph. This hydrograph is made of a cascade of "n" linear reservoirs. The n (number of linear reservoirs) parameter was set at 3, in the model, and the rainfall losses were computed by the SCS CN procedure.

5.3.2 Time of Concentration/Time to Peak

The Time of Concentration (Tc), for the pre-development drainage basins, was calculated using the Airport Formula.

$$\mathbf{T_c = 3.26 * (1.1 - C) * L^{0.5} * S_w^{-0.33}}$$

Where:

Tc = time of concentration in minutes
C = runoff coefficient
L = watershed length in metres
S_w = watershed slope in percentage

From the Tc value, the Time to Peak (Tp) value was calculated as 0.67 times Tc. The parameters employed in the calculation of Tc and Tp for the single drainage basins is shown in **Table 1**.

Table 1 – Time of Concentration and Time to Peak

Sub-Catchment	Area	Flow Length	Fall	Slope	Tc[1]	Tp[2]
	ha	m	m	%	min	hrs
Area 1	12.20	435	7	1.61	54.6	0.61

Notes:

1. Airport Formula
2. 0.67×Tc

5.3.3 SCS Curve Number

The Curve Number (CN) is the most important parameter in determining surface runoff when the SCS equation is used. **Table 2** shows the parameters and the resulting CN value for Area 1.

Table 2 – Hydrologic Parameters

Sub-Catchment	Land Use / Soil Type	Land Use / Soil Type	Land Use / Soil Type	Land Use / Soil Type	Runoff	CN[2]	Ia
	Pasture B (ha)	Pasture C (ha)	Forest B (ha)	Forest C (ha)	Coefficient[1]	(AMC II)	mm
Area 1	5.45	1.76	1.56	3.20	0.16	64.0	6.9

Notes:

3. MTO Drainage Management Manual – Design Chart 1.07
4. MTO Drainage Management Manual – Design Chart 1.09

5.3.4 Rainfall

For the rainfall input to the VO5 model, the 12-hour SCS rainfall distribution, representing a high volume lower intensity storm, and a 4 hour Chicago rainfall distribution, representing a high intensity "thunder storm" type of rainfall event were used ion the analysis. The Intensity-Duration-Frequency (IDF) curve was obtained from the Ministry of Transportation (MTO) IDF Curve Lookup tool with the location centred over the property.

5.4 Pre-Development Results

Employing the above noted parameters and the VO5 hydrologic model, **Table 3** shows the calculated pre-development flow values for the 12-hour SCS and 4-hour Chicago rainfall hyetographs. These flow values will be used for the water quantity control assessment of the proposed SWM facility.

Table 3 – Pre-Development Calculated Peak Flows

Return Period (Yrs)	12 hour SCS (m^3/s)	4 hour Chicago (m^3/s)
2	0.114	0.053
5	0.211	0.105
10	0.278	0.149
25	0.383	0.210
50	0.463	0.262
100	0.560	0.317

5.5 Post-Development Drainage

As discussed in Section 5.2, the proposed stormwater management (SWM) facility will serve the entirety of the Phase 6 development. The proposed SWM facility will receive runoff from future medium and high-density areas accounted for which will require their own site-specific stormwater management design, as the development of those blocks undergoes site plan control. Runoff from these controlled areas will still be directed to the ponds and therefore, undergo a further reduction of peak flow rates. These areas have been broken down into three distinct blocks given the location of current proposed roadway connections.

They are labelled:

- **West Block,** located at the west portion of the site along the rear of Lots 49 to 53 (includes Block 54);
- **Central Block,** located at the north central portion of the site along the rear of Lots 38 to 48; and
- **East Block,** located at the northeastern portion of the site along the rear of Lots 34 to 37.

It is important to note that Phase 7 of the Perthmore development is planned for the west block, and it will have its own stormwater management (SWM) facility to handle its drainage needs before discharging into the Phase 6 SWM facility. No development is being proposed for the Centre and east blocks, and they will continue to drain towards the proposed SWM facility following the existing conditions. Therefore, the SWM facility has been appropriately sized to accommodate the flows from all these blocks, ensuring comprehensive stormwater management for the entire Perthmore Subdivision.

5.5.1 Post-Development Parameters

For the post-development hydrologic analysis, since the proposed development is fully urban with full municipal services, the STANHYD command was used in the VO5 model. **Table 4** shows the post-development input parameters for the VO5 model. The three blocks (West, Central and East) are slated for high density residential development and therefore the total imperviousness and directly connected parameters were set accordingly. The previous phases and the remaining sub-catchments, in the proposed additional phase, are slated or have been constructed as single-family residential development. The total imperviousness and directly connected parameters were calculated based on a typical lot in the existing development area. The flow lengths for the pervious area were assumed to be 10 m and the flow lengths for the impervious area were calculated by the standard equation in the VO5 model as shown in the notes below the **Table 4**. Lastly, the slopes used in the model for pervious and impervious areas were assumed to be 2.0% and 1.0% respectively.

Table 4 – Post-Development Hydrologic Model Parameters

					Pervious Area				Impervious Area			
Sub-Catchment	Area	Total Imp.	Directly Connected	CN	Slope	Flow Length	Manning n	Ia	Slope	Flow Length[1]	Manning n	Depression Storage
	ha	%	%		%	m		mm	%			mm
West Block [4]	3.43	70.0	60.0	59.0	2.0	10.0	0.25	5.0	1.0	150.0	151.2	0.013
Central Block[4]	1.56	70.0	60.0	59.0	2.0	10.0	0.25	5.0	1.0	150.0	102.0	0.013
East Block [4]	0.65	70.0	60.0	75.0	2.0	10.0	0.25	5.0	1.0	100.0	65.8	0.013
Block 70	0.83	0.0	0.0	75.0	2.0	10.0	0.25	10.0	1.0	75.0	74.4	0.013
SWM Block[2,4]	0.41	0.0	0.0	75.0	2.0	10.0	0.25	5.0	1.0	50.0	52.3	0.013
Developed Portions[3,4]	5.32	50.0	35.0	59.0	2.0	10.0	0.25	5.0	1.0	350.0	188.3	0.013

Notes:
1. Flow Length=SquareRoot (Area/1.5)-(Area m2)
2. Block 71
3. 604(1) - 0.56ha, 604(2) - 0.23ha, 606 - 1.07ha, 608 - 0.79ha, 609 - 0.16ha, 612 - 1.21ha, 614 - 0.25ha, 617 - 0.48ha, RY1 - 0.32ha and RY2 - 0.25ha
4. To Pond

5.6 Quantity Control

The quantity control for the site will mainly be provided by the proposed end of pipe facility. For the three blocks the hydrologic modelling assumes that the peak flows, up to and including the 100-year storm event, from the blocks will flow through the Phase 6 SWM facility. It is also noted, the west block outflow from future phases has to be restricted to existing levels through on-site SWM quantity controls within the block. The preliminary calculation of the required on-site detention storage is 1,100 m^3 for the West Block. The imperviousness value for the SWM block was assumed to be high, since and rainfall on the block would be converted to direct runoff.

Tables 5 and **6** show the calculated post-development (uncontrolled) and controlled flow values outletting from the proposed SWM facility. As the 12hr SCS storm resulted in higher outflows and more storage requirements, the results are shown below, however, the 4-year Chicago storm data can be found in **Appendix F**.

Table 5 – Post-Development Calculated Flows – Uncontrolled

12-hour SCS Uncontrolled								
Return Period	West Block	Central Block	East Block	Block 70	SWM Block	Developed Portions	Total	Pre-dev
Yrs.	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.215	0.035	0.019	0.022	0.011	0.184	0.284	0.114
5	0.306	0.068	0.037	0.043	0.020	0.278	0.456	0.211
10	0.384	0.090	0.049	0.056	0.027	0.355	0.611	0.278
25	0.481	0.124	0.067	0.077	0.037	0.447	0.794	0.383
50	0.551	0.150	0.081	0.092	0.044	0.542	0.953	0.463
100	0.634	0.181	0.098	0.110	0.053	0.631	1.121	0.560

Table 6 – Post-Development Calculated Flows – Controlled

12-hour SCS Controlled									
Return Period	West Block [1]	Central Block	East Block	Block 70	SWM Block	Developed Portions	Outflow From Pond	Outflow From Site	Pre-dev
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.029	0.035	6.250	0.022	0.011	0.184	0.084	0.087	0.114
5	0.042	0.068	6.250	0.043	0.020	0.278	0.191	0.198	0.211
10	0.050	0.090	6.250	0.056	0.027	0.355	0.264	0.279	0.278
25	0.063	0.124	6.250	0.077	0.037	0.447	0.336	0.356	0.383
50	0.072	0.150	6.250	0.092	0.044	0.542	0.386	0.411	0.463
100	0.083	0.181	6.250	0.110	0.053	0.631	0.436	0.467	0.560

Notes:
1. Restricted flow from the West Block SWM facility.

The proposed stormwater management facility has been designed to have sufficient storage to attenuate the post-development peak flows leaving the site. The estimate of the active storage requirements based on the proposed SWM facility has been performed in VO6 and the results are provided in the **Table 7** below. To provide the quantity control as shown in the table would require a total of 1,614 m3 of detention storage. Further details of the SWM facility are available within **Appendix F**, which were used to ensure the conceptual pond met all MECP design criteria. Further pond details will be developed and confirmed during detailed design.

Table 7 – Quantity Control Storage Requirements

Catchment ID	5-Year Restricted Flow (m^3/s)	5-Year Required Active Storage (m^3)	100-Year Restricted Flow (m^3/s)	100-Year Required Active Storage (m^3)
Phase 6, Centre, East and West Blocks, and SWM Block	0.191	849	0.436	1,614

5.6.1 Major Drainage Route

The pipe network within the subdivision will be designed to accommodate the 5-year storm. Storm events greater that 5-year will make use the roadway as the major drainage route, and this will be incorporated into the grading plan design. The roadway will direct these flows to the proposed SWM pond. Rear yard drainage swales and easements will be incorporated to provide additional overflow capacity.

5.6.2 Peak Flow Comparison Summary

The stormwater pond to be constructed on-site will be equipped with a permanent multi-stage outlet flow control structure designed to restrict the outflow rates to meet the quantity control objectives. Based on the available storage and the discharge through the control structure, the peak flow rates to the respective outlets were modelled in VO6 and are summarized below.

Table 8 – Peak Flowrates Comparison Summary

12-hour SCS Storm Event				
	POST	PRE		
Return Period	Outflow From Site	Outflow from Site	Post to Pre	Post to Pre
Yrs.	m^3/s	m^3/s	Δ	%
2	0.087	0.114	-0.027	23.7%
5	0.198	0.211	-0.013	6.2%
10	0.279	0.278	0.001	-0.4%
25	0.356	0.383	-0.027	7.0%
50	0.411	0.463	-0.052	11.2%
100	0.467	0.560	-0.093	16.6%

The **Table 8** confirms that the proposed SWM facility will restrict the post-development flow rates to existing levels. The elevation and sizing details of the flow controls can be finalized during the detailed design phase of the development.

5.7 Quality Control

Water quality control will be provided by the proposed SWM facility. The facility will be designed as a wet pond to provide an enhanced level of water quality control (80% T.S.S. removal). Table 3.2 in the *Stormwater Management Planning and Design Manual* was used to calculate the required storage volume. The weighted impervious level for the total tributary drainage area is 46%. Therefore, interpreting between the specific storage volumes shown in Table 3.2, a total 165 m^3/ha of storage volume is required to provide an enhanced level of treatment. Given the upstream individual storage requirements for West Block, the MECP Manual notes (Section 3.3.2) that when upstream storage facilities exist, the extended detention can be increased from 40m^3/ha to 80m^3/ha to ensure that the flooding of downstream ponds does not occur. This increase to the extended detention reduces the permanent pool volume, as the majority of the runoff reaching the site has already achieved the 80% TSS removal from the upstream facilities. With that, the permanent pool for this site is required to be 966 m^3 with an extended detention volume (458 m^3) can be combined with the water quantity volume detailed.

Therefore, the total storage volume required for the proposed SWM facility would be approximately 3,700 m^3. As noted, conceptual pond details are included in Appendix F, which include forebay calculations, 25mm event and extended detention drawdown, pond cleanout, emergency spillway, outlet control device sizing and stage storage discharge tables that were used in modelling the site in VO5. All these features meet MECP requirements and will be further vetted and refined through the detailed design. The total permanent pool volume to be provided will exceed the minimum volume requirement for quality control.

Table 9 - MECP Table 3.2 Quality Control Storage Requirements

Extended Detention Volume Accounted	Permanent Pool Volume Required	Permanent Pool Volume Provided
80 m^3/ha	165 m^3/ha	1048 m^3
458 m^3	966 m^3	

5.7.1 Best Management Practices

The entire subdivision will employ Best Management Practices (BMPs) wherever possible. The intent of implementing stormwater BMPs throughout the entire development is to ensure that water quality and quantity concerns are addressed at all stages of the development. Stormwater BMPs will be implemented at lot, conveyance and end of pipe levels.

Lot level BMPs include the directing of roof leaders onto grassed areas, minimizing ground slopes and maintaining as much of the lot as possible in a natural state. Roof leaders will flow to grass areas, which will provide an opportunity for initial filtration of any sediment and provide an opportunity for absorption and ground water recharge. Recent recommendations by a number of Conservation Authorities and the MECP suggest that yard grading as flat as 0.5% be implemented to promote infiltration. The target range for finished ground slopes will be 1% - 5% where possible. This range of slope will still provide an opportunity for the absorption and filtration process.

The conveyance system to be employed within the subdivision is a combination of side/rear swales and road catchbasins. All swales will be constructed at minimal gradient where possible, thus promoting absorption and infiltration, as well as providing some opportunity for particle filtration. The gradient of the system will be enough to ensure the continuous flow of stormwater, limiting any standing water. Rip-rap will be placed at erosion-prone areas and all disturbed areas shall be landscaped as soon as possible.

6.0 LOW IMPACT DEVELOPMENT

As the practice of SWM has evolved, increasing emphasis has been placed on treating the runoff as close as possible to the source using a sequence of treatment methods called “treatment train approach”. As a result, Low Impact Development approaches were established to mimic the existing natural hydrologic environment and to allow the rainwater to infiltrate, filter and evaporate close to the source.

Typical LID practices include Rainwater harvesting, green roofs, downspout disconnection, soak away pits, infiltration trenches and chambers, bio-retention, vegetated filter strips, enhanced grass swales and permeable pavements.

6.1 Treatment Train

Based on the type of the proposed development and the available geotechnical information, downspout disconnections, enhanced grass swales and infiltration basins are the most suitable LID features for the site.

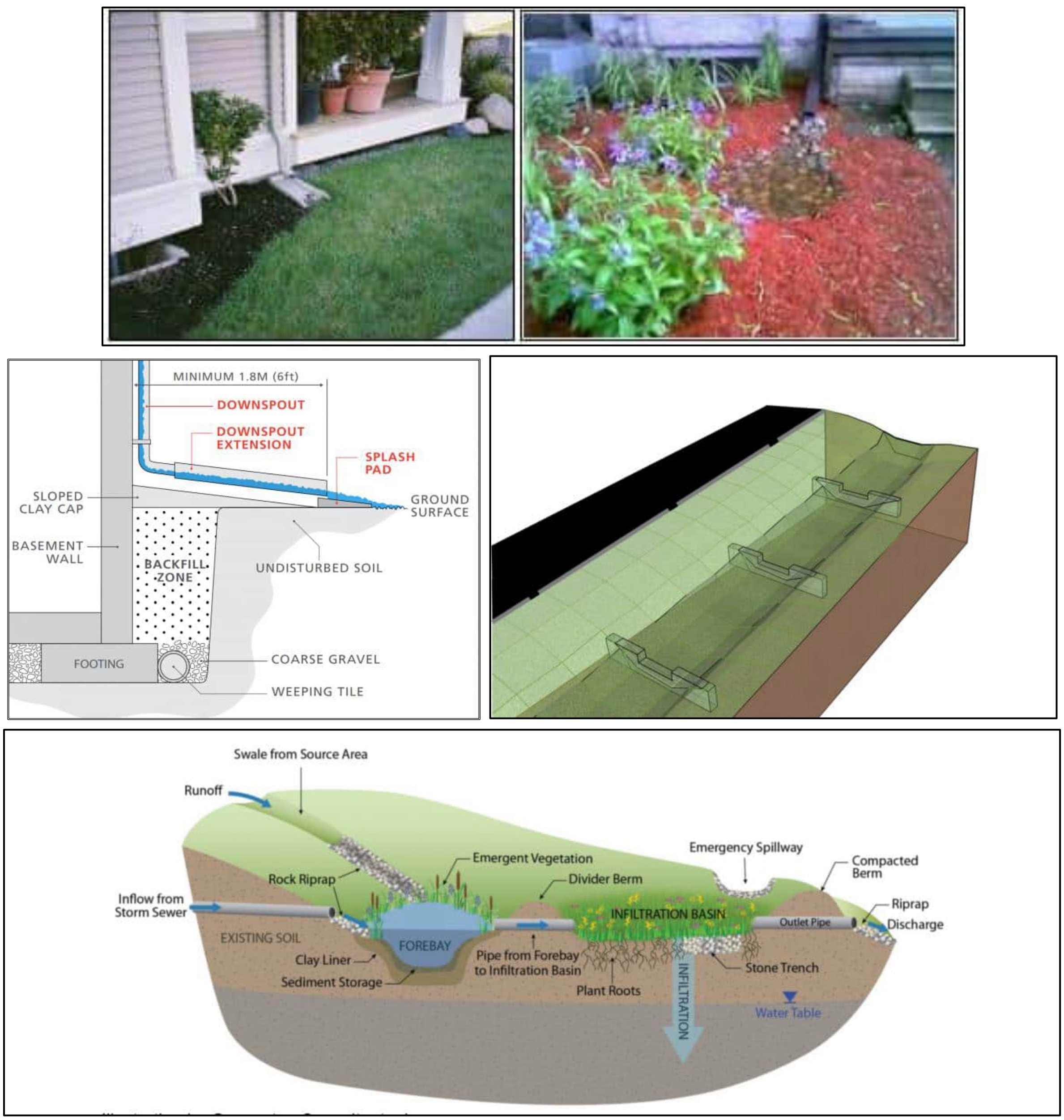
Alternative LID features, such as rainfall harvesting, green roofs, or soak away pits, may not be suitable for the site due to the inability of the municipality to maintain or mandate them when installed on private property. Additionally, LID features on roadways, including permeable pavement or bioswales, may also present a challenge if they go unmaintained and can in turn be detrimental to the overall submission. The soils in the area are not conducive to accepting stormwater runoff due to the high drawdown timing requirement and are thus likely to remain full at the next storm event, which will render them inefficient.

Lot Level - Downspout disconnection involves directing the runoff from roof leader downspouts to a pervious area, which drains away from the building. This gives an opportunity for the runoff to infiltrate before it reaches the typical curb and gutter system on the street. This also prevents the stormwater runoff from directly entering the storm sewer system or flowing across a “connected” impervious surface such as driveways.

Conveyance Level - Enhanced Grass Swales are designed as vegetated open channels that serve multiple functions in stormwater management. Traditionally, simple grass channels or ditches have been utilized for stormwater conveyance, especially for road drainage. However, enhanced grass swales go beyond the basic design by incorporating modified geometry and check dams to enhance their performance in terms of contaminant removal and runoff reduction. These design features improve the functionality of simple grass channels and roadside ditches, providing more effective treatment of storm sewer runoff.

End-of-pipe Level - To promote infiltration and enhance the stormwater management facility, an **infiltration basin** will be integrated into the wet cell. It is advisable to position the infiltration trench within the wet cell area to mitigate the risk of sedimentation and clogging. By locating the trench within the wet cell, the potential for sediment accumulation and blockage is minimized, allowing for better functioning of the infiltration basin. This strategic placement ensures that the stormwater runoff is efficiently managed and encourages the natural process of infiltration, thereby facilitating groundwater recharge and reducing the volume of runoff leaving the proposed development.

Figure 1 – Typical Downspout Disconnection, Enhanced Grass Swale and Infiltration Basin (LID Planning and Design Guide, CVC 2011)



It is important to acknowledge that the recommendations for Low Impact Developments (LIDs) are made based on the available information. However, it is recognized that the design and recommendations may need to be revaluated and potentially adjusted during the detailed design phase, considering the geotechnical information and the maintenance requirements imposed by the Town of Perth. A conceptual LID treatment train plan illustrating the proposed LID features is included in **Appendix F**.

7.0 WATER BALANCE

7.1 Purpose

The RVCA through their review comments have requested that a water balance be reviewed for the site to ensure that the site did not reduce the overall infiltration volumes given that this area is a sensitive groundwater aquifer. As such, the following provides a review of the conceptual water balance, complete with mitigation measures for the site which were reviewed and broken into the requirements for the developed portion of the land as well as the individual blocks to provide guidance to the designers when they proceed through their site plan control process.

7.2 Land Use

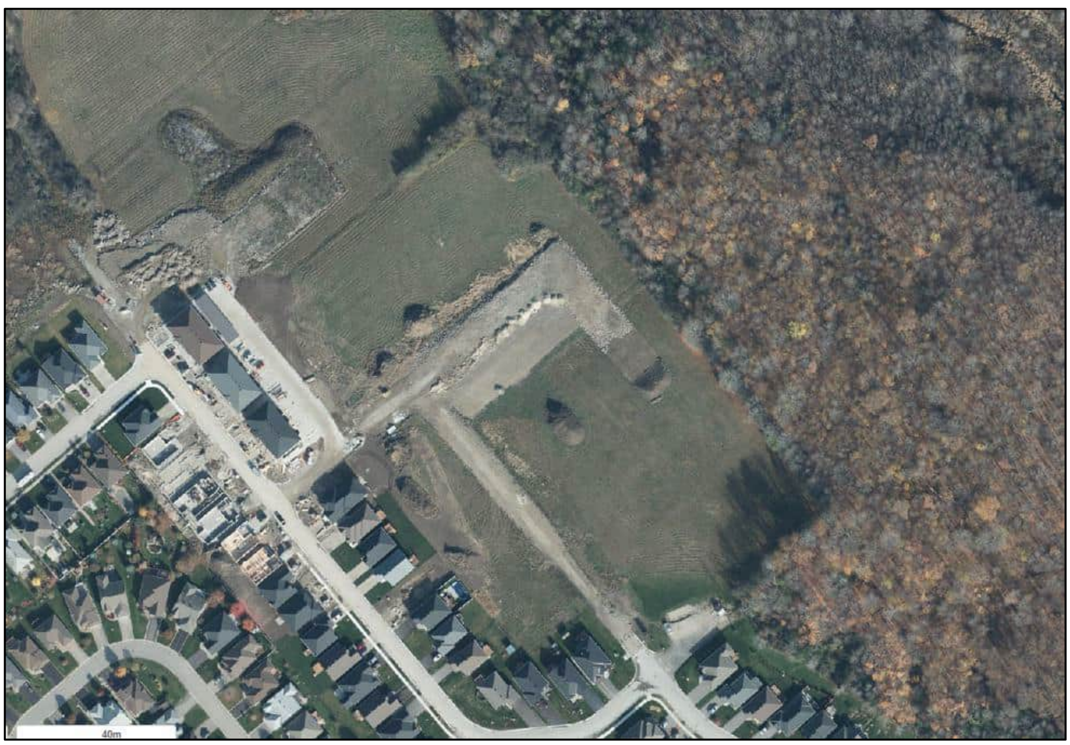


Figure 2 - Land Use

The current vacant land is predominantly a mixture of pasture sections (generally the western, southern and central portions of this phase) and treed areas (generally the northern and eastern extremities of this phase). Perthmore subdivision is directly adjacent to the Perth Long Swamp wetland which surrounds the site to the north, east and west. It is acknowledged that the Provincially Significant Wetlands are a significant natural heritage feature therefore, tree removal and other disturbances will be limited as much as possible. The entire undeveloped site is sloped toward the above-noted wetland. Elevations range from 134 m at the northeast corner of the site to 141 m at the highpoint of the property.

7.3 Soil Conditions

A detailed Geotechnical Report is not available at the conceptual design stage. Therefore, MP used the publicly available documents on AgMaps to review the soils for the site. The area is primarily comprised of Hydrological Soil Group B and C soils through the developed portion of land. The surrounding wetland is Hydrological Soils Group D. Based on the previous phase, McIntosh Perry has assumed that here is approximately 2' or 0.6m of soil overlaying bedrock. This relatively thin soils has been accounted for within the calculations to determine the soil moisture retention capacities of the soils. It is anticipated that during the detailed design stage, a geotechnical report will be completed at which time, these values can be updated if required.

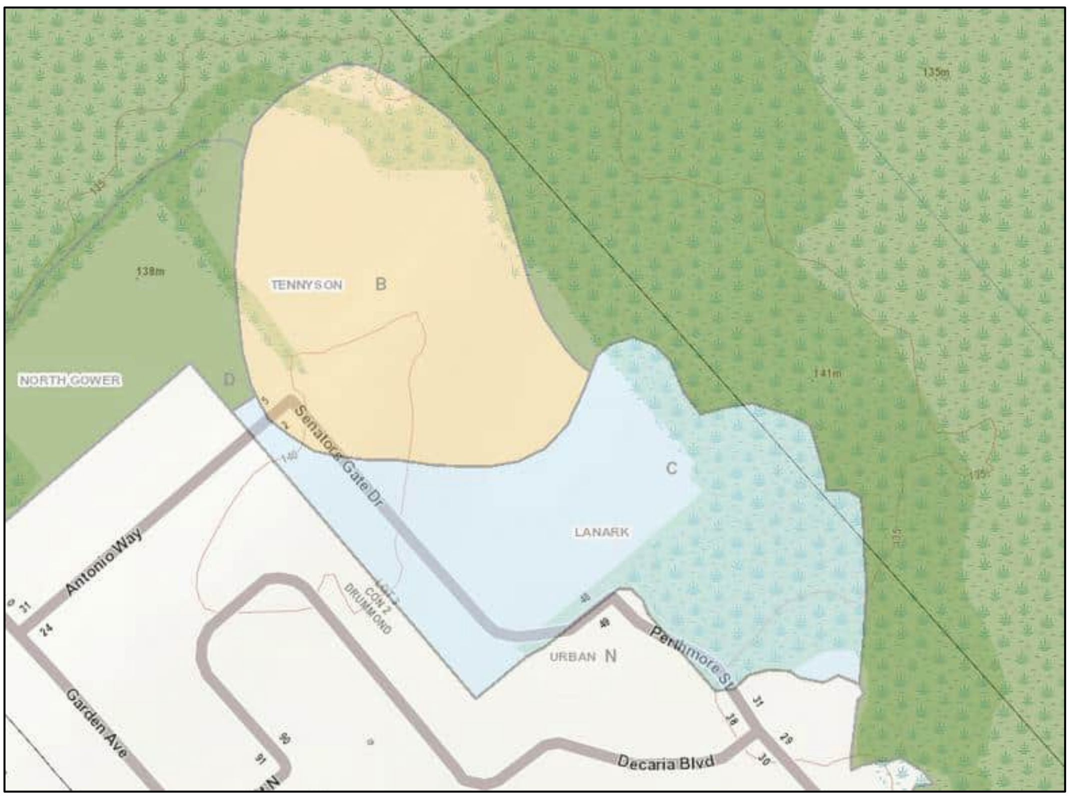


Figure 3 - AgMaps - Site Soils

7.4 Stormwater Management

As part of this assignment and to satisfy both RVCA and the Town, a servicing and stormwater management report has been prepared to ensure that the design criteria from both review agencies along with recommendations from the MNRF, MTO and MECP are adhered to. Site-specific stormwater management facilities will be located in the future high-density west block, which will be required to meet site-specific stormwater management criteria in order to be developed.

The stormwater management (SWM) strategy implemented for the Perthmore Subdivision Phase 6 adopts a treatment train approach, integrating a sequence of controls at various stages to effectively manage stormwater runoff. This comprehensive approach encompasses lot-level controls, conveyance controls, and end-of-pipe controls to address stormwater management requirements. Lot-level controls include measures such as downspout disconnection, which redirect roof runoff away from impervious surfaces and promote infiltration or reuse. Conveyance controls, such as enhanced grass swales, are incorporated to efficiently convey stormwater runoff while enhancing pollutant removal and runoff reduction capabilities. Lastly, end-of-pipe controls, such as infiltration basins, are implemented to facilitate the final treatment and infiltration of stormwater before it is discharged into the receiving environment. With the combination of these facilities, the mitigation measures that will be discussed below and the ultimate end of pipe facility, will ensure that runoff reaching the wetland is controlled to pre-development rates and meets an **enhanced** level of quality control (80% Total Suspended Solids (TSS) removal).

7.5 Water Balance Calculations

7.5.1 Data

Potential impacts to the existing wetland were reviewed through the use of standard water balance calculations. Data from Environment Canada for the Ottawa International Airport was used to calculate the runoff surplus and total precipitation for the site. Environment Canada data was limited to the precipitation and temperature data, while the remaining information was calculated using the Thornthwaite-Mather water balance methodology as described in the "Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance, C.W. Thornthwaite and J.R. Mather, 1957". Please see sample typical calculations within Appendix D. The pre- and post-development conditions were subdivided for the water balance as follows:

Soils:

- Sandy loam, noted to be HSG B; and
- Silt / clay loam, noted to be HSG C.

Pervious Land uses:

- Pasture overtopping sandy loam;
- Pasture overtopping silt/clay loam;
- Forest overtopping sandy loam; and
- Forest overtopping silt/clay loam.

Impervious Land Uses:

- Dwellings and asphalt.

The infiltration factors were chosen based on the following data:

Table 10 - Infiltration Factors from the "Tier 1 Water Budget and Water Quantity Stress Assessment" prepared by the Mississippi-Rideau Source Protection Region, August 2009

Description of Area / Development Site	Value of Infiltration Factor
Topography	
Flat Land (<1.5 slope range)	0.172
Rolling land (1.5 – 3% slope range)	0.120
Hilly land (>3% slope range)	0.073
Soil	
Low (clay, silt)	0.10
Low-Medium (till, sand-silt)	0.15
Medium (till, silty sand)	0.20
Medium-High (sands)	0.30
High (gravel, sands, organic deposits)	0.40
Variable (till)	0.20
Variable (fill)	0.40
Variable (sand)	0.35
Variable (bedrock)	
Precambrian Bedrock	0.20
Paleozoic Bedrock	0.05
Land Cover	
Low Infiltration – urban, aggregate	0.05
Medium Infiltration – agriculture, pasture, abandoned fields, wetland	0.10
High Infiltration – forest and plantation	0.20

For pre-development, the site has slopes generally under 1.5%, and as such was assigned a topographic infiltration factor of 0.172.

The soil classification was predominately sandy loam (infiltration rate of 0.2) for the HSG B soils and 0.15 for the HSG C soils.

The site is comprised of open vegetated areas which will results in a value of 0.10 being used and in forested areas, a land cover infiltration factor of 0.20 was used.

The soil classification for each area will not be changed for the pervious surfaces. This will be confirmed when the detailed grading design is advanced.

7.6 Sensitivity Analysis

Each of the land use and soil type was reviewed based on Table 10 of the Thornthwaite – Mather literature to obtain the applicable soil moisture retention of the underlying soils. The soil moisture retention used in our calculations is provided as "mm/m", therefore once the average on-site soil depth above the groundwater (is estimated to be 0.6 m) was applied, a corresponding site-specific soil moisture retention value was obtained for each category above. These soil moisture retention values are used to determine the soil moisture storage, given the accumulated water losses which are calculated based on the climatic data (temperature and precipitation) for the site. These tables are only noted in specific depths (25 mm and 50 mm intervals), therefore in some instances, the closest possible table was used. **Table 11** below illustrates an example at a soil moisture retention value of 75 mm. Located in **Appendix G**, calculations for 75 mm, 100 mm, 125 mm, 150 mm, 200 mm, 250 mm, 350 mm and 400 mm were completed as part of a bulk sensitivity analysis for the surplus data. Results of this analysis, as calculated for each soil moisture value noted above, indicate that changing moisture retention values by 25 mm to 50 mm yields approximately 1% change in water surplus. This would indicate that regardless of whether the soils had 150 mm or 200 mm of moisture retention, the difference in surplus will be minor.

Table 11 – Monthly Water Balance Example - 75mm - Climate Data per Environment Canada data for Ottawa International Airport (1981 - 2010)

Month	Temp	Heat Index	PET	P	ΔP = P - PET	WL	ST	ΔS	AET	D	S	RO	SMRO	TR	DT
January	-10.3	0	0	65	65		217	0	0	0	0	11	0	11	228
February	-8.1	0	0	54	54		271	0	0	0	0	5	0	5	276
March	-2.3	0	0	64	64		336	0	0	0	0	2	0	2	338
April	6.3	1.4	32	75	43		75	0	32	0	43	22	26	48	166
May	13.3	4.4	79	80	2		75	0	79	0	2	12	117	129	206
June	18.5	7.2	112	93	-19	-19	57	-18	111	1	0	6	59	65	122
July	21	8.8	133	92	-41	-60	33	-24	116	17	0	3	29	32	65
August	19.8	8.0	114	86	-29	-88	22	-11	97	18	0	2	15	17	39
September	15	5.3	73	90	17		39	17	73	0	0	1	7	8	47
October	8	2.0	34	86	52		75	36	34	0	17	9	4	13	105
November	1.5	0.2	5	82	77		75	0	5	0	77	43	2	45	197
December	-6.2	0	0	76	76		151	0	0	0	0	22	1	23	174
Total		37.4	580	944				0	545	35	138	138	260	398	

PET = Potential Evapotranspiration, P = Total Precipitation, ΔP = P-PET, WL = Accumulated Water Loss, ST= Storage, ΔS = Soil Moisture Storage, AET = Actual Evapotranspiration, D = Soil Moisture Deficit, S = Soil Moisture Surplus, RO = Water Runoff, SMRO = Snow Melt Runoff, TR = Total Runoff, DT = Total Moisture Detention

Note: Shaded cells taken from Thornwaite-Mather Tables. See sample calculation in Appendix D for cell by cell calculations. Total Surplus for example above is 398mm.

Monthly T from Environment Canada:

Heat Index (I) = 37.4, a: 1.06

Sample Calculations:

Calculated Potential Evapotranspiration (PET)

Thornthwaite Equation:

$$PET = 16\left(\frac{L}{12}\right)\left(\frac{N}{30}\right)\left(\frac{10Ta}{I}\right)^{\propto}$$

L = Average Daylight (hours)

N = Number of Days per Month

Ta = Average Temperature (°C)

I = Heat Index =

$$I = \sum_{i=1}^{12}\left(\frac{Tai}{5}\right)^{1.514}$$

$\alpha = (6.75\text{x } 10^{-7})\, I^3 - (7.71 \text{ x } 10^{-5})\, I^2 + (1.792 \text{ x } 10^{-2})\, I + 0.492$

Example April

Temperature (Ta) = 6.3°C

I = (Tai/5)^1.514 = (6.3/5)^1.514 = 1.4

Sum of all months I = 37.4

$\alpha = (6.75\text{x } 10^{-7})\, 37.4^3 - (7.71 \text{ x } 10^{-5})\, 37.4^2 + (1.792 \text{ x } 10^{-2})\, 37.4 + 0.49239 = 1.06$

L = 13.6 hours, N = 30 days

PET = 16 x (13.6/12) x (30/30) x ((10x6.3)/37.4)^1.06 = 32mm

Change between Precipitation and Potential Evapotranspiration (ΔP = P-PET)

Example April

P = 75mm

PET = 32mm

ΔP = P – APET = 75mm – 32mm = 43mm

Accumulated Water Loss

All Values where the ΔP are negative are brought forward and accumulated on a monthly basis

Example July

ΔP June = -19mm

ΔP July = -41mm

WL July = -19mm + -41mm = -60mm

Soil Moisture Storage

Starting Values Taken from Table 10 of Thornthwaite Mather's Water Balance 1957 for individual soil type.

For sample calculations below, assumed soil moisture storage maximum of 75mm. Start in first month with positive temperature (April), carry (75mm) to next month where ΔP is positive. When ΔP becomes negative, accumulated water loss (WL) is reviewed and the reduced soil moisture storage is inserted into the spreadsheet based on the Tables within the Thornthwaite Mather's Water Balance 1957. For the example, Table 25 is used for 75mm soil water retention. The values are then inserted into the ST table based on the corresponding WL for the given month.

WL July = -60mm

Table 25 is used and a ST of 33mm is obtained

Upon positive ΔP values, the ΔP and ST_{i-1} are added together for that months ST value until the maximum soil moisture storage is achieved.

ST September = ΔP September + ST_{i-1} (August) = 17mm + 22mm = 39mm

Upon achieving the maximum soil moisture storage, no additional storage is available until the temperature falls below -1°C, when snow is said to be able to be stored above the ground. At that time the P is added to the previous months ST (ST_{i-1}) until the temporary is above -1°C and snow melt occurs.

Change in Soil Moisture Storage

Change in Soil Moisture Storage = Soil Moisture Storage – Soil Moisture Storage of the previous month

($\Delta S = ST - ST_{i-1}$)

Example June

Storage (ST - May) = 75mm

ST June (Table 25, Thornthwaite Mather, 1957) = 57mm

ΔS= 57mm – 75mm = -18mm

Actual Evapotranspiration (AET)

Three Situations Exist:

1) No PET therefore, AET = 0 if, PET = 0;
2) WL > 0. AET = PET if, Soil Moisture Storage Capacity is positive; and
3) WL < 0. AET = Soil Moisture Storage Capacity + Total Precipitation ($AET = \Delta S + P_T$).

1) Example January

AET = 0 as PET = 0

2) Example April

WL = 0mm

ST = 75mm

PET = 32mm = AET

3) Example July

WL = -41 mm

ΔS = -18mm (June)

P (June) = 93mm

AET (June) = 18mm + 93mm = 111mm *Note disregard ΔS sign.

Monthly Soil Moisture Deficit or Surplus

Three Situations Exist:

1) Where Accumulated Potential Water Loss is lower than 0mm, a deficit exists;
2) Where Soil Moisture Capacity is above its maximum, a surplus exist; and
3) Where Soil Moisture Capacity is less than the maximum but there is no Accumulated Potential Water Loss, the runoff is being absorbed by the soil (soil is either wetting or drying).

1) Example Deficit (July):

WL = -41mm

ST (July) = 33mm

ΔS (July) = -24mm

PET = 133mm

AET = 116mm

Soil Moisture Deficit (July) = PET – AET = 133mm – 116mm = 17mm

2) Example Wetting (September)

WL = 0mm

ST (August) = 22mm

ΔP = 17mm

ST (September) = ΔP + ST (August) = 17mm + 22mm = 39mm, less than 75mm therefore wetting, no surplus, S = 0

3) Example Surplus (October):

WL = 0mm

S (September) = 39mm

ΔP = 52mm

Soil Moisture Surplus (October) = ΔP + S(September) = 39mm + 52mm = 91mm, as it is over 75mm, 75 is carried and the additional volume is a surplus of 91mm – 75mm = 16mm

---

Water Runoff

Thornthwaite Mather (1957) noted that the surplus water runoff values in no month can cause a runoff higher than 50% of the its total surplus volume, therefore, 50% is attributed to the month with the initial surplus, then carried forward at a 50% per month value until it is dissipated (i.e.: reaches 0mm).

For this example (rounded to the nearest mm), start at October;

S_{Oct} = 17mm,

RO_{Oct} = 17mm/2 = 9mm,

November

S_{Nov} = 77mm,

RO_{Nov} = (Remaining RO_{Oct} + S_{Nov})/2 = (9mm + 77mm)/2 = 43mm,

December

RO = (Remaining RO_{Nov} + S)/2 = (43mm + 0mm)/2 = 22mm.

This continues until 0mm is reached.

Snow Melt Runoff (SMRO)

Thornthwaite Mather (1957) noted that in areas with an elevation under 500m above sea level, that in the first month with temperatures above -1°C, only 10% of snow melt runoff occurs. A maximum of 50% melt will occur in each successive month until it is dissipated (i.e.: reaches 0mm).

For this example (rounded to the nearest mm), start at April (first positive average temperature, total snow fall is 260mm, note: 260mm = precipitation accumulated in months with negative temperatures (December through to March);

April

SMRO = 10% = 26mm, remaining 90% (234mm) brought forward to May;

May, 234mm x 50% = 117mm, carry remaining 117mm to June;

June, 117mm x 50% = 59mm.

This continues until 0mm is reached and all snow melt has been accounted for.

Total Runoff

Total runoff is the sum of the water runoff and snow runoff for each month.

TR (April) = RO_{April} + $SMRO_{April}$ = 22mm + 26mm = 48mm

7.6.1 Sensitivity Analysis Conclusion -For Soil Moisture Maximum Capacity

McIntosh Perry completed a sensitivity analysis on the soil moisture capacity and found that for soil depths above 100mm, the annual surplus volume in millimetres diminished at a rate of less than 1%/year per 25mm of available soil. Therefore, as the depths of soils have been averaged across the site and a conservative approach has been pushed forward, it is not expected that in concentrated areas where the soil is less than the indicated depth that the soils will function materially different.

7.7 Pre-Development, Post-Development and Post-Development with Mitigation

Under pre-development, post-development and post-development with mitigation, precipitation, drainage, and infiltration conditions were reviewed. In pre-development, one consolidated area was used, whereas in post-development and post-development with mitigation, the site was broken into each block (west, central, and east) as well as the remaining roadways, residential lots, SWM block and Block 70. The purpose of this breakdown is to provide each of those block’s guidance when it comes to the site plan control to achieve approval in order to meet the site-specific stormwater management criteria. If they were not separated from the “main” area, it would be difficult to break out their individual contributions for the future. The summary, however, combines all together to ensure that the site meets the requirements of pre-development as desired by the RVCA. The results have been summarized below:

Table 12 - Summary Water Balance Table

Characteristic	Pre-Development	Post-Development	Change (Pre – to Post)	Post-Development with Mitigation	Change (Pre- to Post- with Mitigation
Developed Lands to Perth Long Swamp Pre = Post Areas					
Input (Volumes)					
Precipitation (m^3/year)	115168	115168	0%	115168	0%
Output (Volumes)					
Total Infiltration (m^3/year)	23051	12320	-47%	23095	0%
Total Runoff (m^3/year)	23876	65413	174%	47360	98%

Table 12, above, illustrates that the pre-and post-development areas for the entire development remain relatively similar. The total infiltration is illustrated to indicate that in all instances, the development on-site (i.e.: when comparing post- to pre-development) results in a reduction in infiltration. To address the deficiency, infiltration-promoting measures will be required to ensure runoff is intercepted and permitted to recharge the groundwater aquifer.

Finally, the total runoff illustrated confirms that the wetland will see an increase in total volume as a result of the development. This will result in additional volume within the wetland temporarily until it is permitted to flow downstream. This information is critical for the natural sciences consultant to confirm that the vegetation communities are capable of withstanding the additional volume of runoff over the short term. The evaluation of the potential increase in runoff and its associated impacts on Perth Long Swamp is evaluated in **Section 8.0.** Please see **Appendix G** for the water balance tables broken out for each catchment.

7.8 Mitigation Measures

As a result of the lack of recharge when comparing post- to pre-development, the project will require infiltration trenches to ensure that the volume of runoff required enters the ground, providing groundwater recharge and continuing to ensure that the aquifer is maintained.

In order to design the trenches, the 5 mm event was reviewed. Environment Canada data as shown in **Table 13** below, indicates that there are 25.2 days with rain over 10 mm, 46.5 days with rain over 5 mm and 118.4 days of rain over 0.2 mm. Therefore, at a minimum there is:

- (46.5 – 25.2) days = 21.3 days x 5 mm = 107 mm; +
- (118.4 - 46.5) days = 71.9 days x 0.2 mm = 14 mm;
- Summing these volumes = 107 mm + 14 mm = 121 mm of minimum total volume that would be anticipated to be captured if the trenches are designed to accept the entire 5mm storm event.

Table 13 - Environment Canada - Days with Precipitation

1981 to 2010 Canadian Climate Normals station data

Days with Rainfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
>= 0.2 mm	4.4	3.9	6.7	10.9	13.4	13.2	11.9	11	12.3	13.7	11	6	118.4	A
>= 5 mm	1.6	1.2	2.1	4	4.9	5.8	5.4	4.8	5.1	5	4.2	2.3	46.5	A
>= 10 mm	0.87	0.57	1	2	2.7	2.9	3.1	2.8	3.2	2.7	2.1	1.2	25.2	A
>= 25 mm	0.13	0.07	0.10	0.33	0.47	0.73	0.77	0.67	0.60	0.47	0.43	0.13	4.9	A

As described above, the mitigation measures were reviewed for each catchment. The exact geometry and location within the catchment have been completed by the civil engineering team during the detailed design of the development. Based on the volume to be infiltrated, mitigation measures meet or exceed the required infiltration volume required to balance the site.

Table 14 - Mitigation Measure Sizing - Development Lands to Perth Long Swamp

Description	(Bk 70, SWM Bk, Residential Lots and Roadway)	West Block
Area of Asphalt (m^2)	26600	24010
Asphalt Runoff Coefficient	0.9	0.9
Volume of Runoff in 5 mm Event (m^3) to be infiltrated	120	108
Mitigation Required (m^3/yr)	2873	2593
Annual Volume to be infiltrated by designing for 5 mm Event (m^3)	2897	2615

Based on the analysis conducted, it is recommended to provide an infiltration storage volume of 120 cubic meters for the Phase 6 developments to meet the annual water balance infiltration targets. Additionally, a volume of 108 cubic meters should be allocated for the future west block to meet the annual water balance infiltration targets. To determine the rough sizing of the infiltration trench, typical depths of 0.5 meters and 0.75 meters were assumed. The resulting footprint area requirements are summarized in the following table, which helps estimate the necessary surface area for the implementation of the infiltration trench and ensure sufficient storage capacity for infiltration purposes. Detailed calculations are included in **Appendix G**.

Table 15 – Infiltration Trench Footprint Requirements

Description	Infiltration Target (m^3)	Assumed depth (m)	Footprint (m^2)
Phase 6 Developments	26600	0.50	600
		0.75	400
West Block	0.9	0.50	540
		0.75	360

7.8.1 Drawdown Of Infiltration Trenches

As detailed above, the trenches were sized to fully capture the 5 mm storm. The design criteria typical for a site draining to a wetland is that the trenches must be able to drawdown fully between 5 mm storm events. It is acknowledged that in larger events, the trenches will be overtopped and the grading on site will provide conveyance measures to direct the overtopped runoff towards the stormwater management facilities. With the assumed infiltration rates noted below, the drawdown values were reviewed to verify that the trenches were empty between 48-72 hrs as recommended by the TRCA.

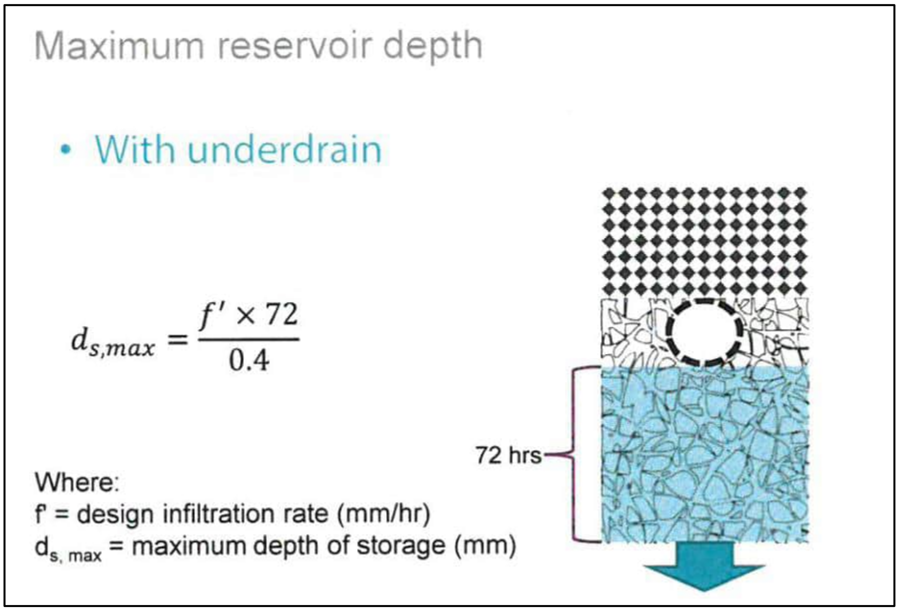


Figure 4 - Maximum Reservoir Depth (TRCA, 2018)

Table 16 - Drawdown Calculations

	Phase 6 Developments	West Block
Infiltration Rate (mm/hr)	25	25
Factor of Safety	4.5	4.5
Design Infiltration Rate (mm/hr) **assumed*	5.5	5.5
Maximum Depth of Storage – 72 hrs (mm)	990	990
Maximum Depth of Storage – 48 hrs (mm)	660	660
Depths of Trenches Provided On Site (mm)	500 / 750	500 / 750
Meets Infiltration Drawdown Criteria	Yes	Yes

As indicated above, the infiltration trench is anticipated to empty between 48 – 72 hrs and therefore, is assumed to meet the drawdown criteria and is anticipated to function as intended by being empty within 2 to 3 days of a 5 mm storm event.

8.0 ANALYSIS OF IMPACTS TO THE WETLAND

Drainage will be directed from the site to the underground storm sewer network prior to reaching the stormwater management pond and ultimately outlet towards the wetland. Riprap and other flow spreaders will be used at the pond outlet to disperse surface flows and dissipate the associated energy of the flows directed to the wetland. This will ensure that any concentrated flows are spread out to reduce the potential for downstream erosion. The discharge from this pond is expected to be reduced through infiltration and evaporation between the outlet of the stormwater management feature and the edge of the wetland.

To assess the water quantity impact of the uncontrolled post-development flows, the water depths in the wetlands were calculated for the pre-development and post-development conditions. To complete this analysis the runoff depth, from the VO6 model results, was multiplied by the tributary drainage area to obtain the runoff volume. Then this volume was divided by the surface area of the wetland to obtain the depth in the wetland. This is a conservative approach since it assumes "vertical walls" around the wetland were as the surface area of the wetland would increase and thus the water depths were lower than those shown in Table below.

Table 17 – Water Depths in Perth Long Swamp

Pre and Post Development Runoff from the site to Perth Long Swamp							
Return Period (yrs)	Pre-development Runoff Depth (mm)	Pre-development Runoff Volume (m^3)	Post-development Runoff Depth (mm)	Post-development Runoff Volume (m^3)	Pre-development Depth in Wetland (mm)	Post-development Depth in Wetland (mm)	Difference (mm)
2	7.35	897	17.23	2102	0.16	0.37	-0.21
5	13.28	1620	25.94	3165	0.28	0.56	-0.27
10	17.29	2110	31.45	3837	0.37	0.67	-0.30
25	23.63	2882	39.77	4851	0.51	0.85	-0.35
50	28.42	3467	45.85	5594	0.61	0.98	-0.37
100	34.22	4175	53.03	6470	0.73	1.14	-0.40

As shown in **Table 17**, the maximum increase in water depth in the wetlands is approximately 0.4 mm for the 100-year storm event. This increase in water elevation will have negligible impact on the wetlands or the downstream systems.

In conclusion, the overall area of the Perth Long Swamp wetland is immense when compared to the size of this site. Any additional volume, in excess of pre-development volume, once the pond and mitigation measures are in place will not make a measurable difference to the quality, function and operation of the wetland.

9.0 ENVIRONMENTAL COMPLIANCE APPROVAL

In compliance with Ontario's 2021 mandatory stormwater management (SWM) criteria for consolidated linear infrastructure, an environmental compliance approval will be necessary. As part of the approval process, a detailed application will be prepared and submitted during the detailed design phase. This application will include comprehensive information on the storm sewer infrastructure, the proposed design and function of the SWM facility, and other relevant details.

10.0 SEDIMENT EROSION CONTROL

10.1 Temporary Measures

Before construction begins, temporary silt fence, straw bales or rock flow check dams will need to be installed at all-natural runoff outlets from the property. It is crucial that these controls be maintained throughout construction and inspection of sediment and erosion control will be facilitated by the Contractor or Contract Administration staff throughout the construction period.

The Contractor, at their discretion or at the instruction of the Town of Perth, RVCA or the Contract Administrator shall increase the quantity of sediment and erosion controls on-site to ensure that the site is operating as intended and no additional sediment finds its way into the storm sewer network on site. The straw bales and silt fences shall be inspected weekly and after rainfall events. Care shall be taken to properly remove sediment from the fences and check dams as required.

Work through winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the situation. Should the Contractor's efforts fail at remediating the eroded areas, the Contractor shall contact the Conservation Authority to review the site conditions and determine the appropriate course of action.

As each lot is developed, proper sediment and erosion controls will need to be installed and maintained. Sediment controls shall consist of, at minimum, straw bales at the down gradient property line. Grass shall be established as soon as possible, and excess fill shall be removed or leveled promptly. All manholes, catch basins and other drainage structures shall be covered in geosock when installed.

10.2 Permanent Measures

Rip-rap will be placed at all locations that have the potential for concentrated flow. It is crucial that the Contractor ensure that the geotextile is keyed in properly to ensure runoff does not undermine the rip-rapped area. Additional rip-rap is to be placed at erosion prone locations as identified by the Contractor / Contract Administrator / Town of Perth or RVCA.

It is expected that the Contractor will promptly ensure that all disturbed areas receive topsoil and seed/sod and that grass be established as soon as possible. Any areas of excess fill shall be removed or levelled as soon as possible and must be located a sufficient distance from any watercourse to ensure that no sediment is washed out into the watercourse. As the vegetation growth within the site provides a key component to the control of sediment for the site, it must be properly maintained once established. Once the construction is complete, it will be up to the landowner to maintain the vegetation and ensure that the vegetation is not overgrown or impeded by foreign objects.

11.0 SUMMARY

- A new subdivision with 34 single family homes, 38 semi-detached homes and 14 apartment units will be constructed in Phase 6 of the Perthmore Subdivision.
- Proposed watermains ranging in diameter from 200mm to 300mm will be installed throughout the subdivision and will have multiple connection points to existing infrastructure.
- The proposed sanitary sewer will be 200 mm in diameter, will be installed throughout the subdivision and will gravity drain through the existing subdivision infrastructure though multiple connections.
- The proposed storm sewer, ranging in diameter from 250 mm to 900 mm, will be installed throughout the subdivision and will drain to a newly proposed stormwater management facility.
- Stormwater quantity and quality control will be provided by the proposed SWM facility. The facility will be designed as a wet pond to provide an enhanced level of water quality control (80% T.S.S. removal). A treatment train approach has been enacted using infiltration trenches, conveyance measures in rear yard swales and the end of pipe facility.
- Water balance criteria was reviewed, and mitigation measures will be required to meet the pre-development infiltration volumes. Infiltration trenches have been proposed, volume sizing has been completed with further design details such as placement to be confirmed with the detailed grading and drainage plan in detailed design.
- Through ensuring that the stormwater management and water balance criteria are not exceed in post-development from pre-development rates and volumes, and by locating the pond upstream of the wetland, no adverse impacts are anticipated to the Perth Long Swamp.
- Sediment and erosion protection measures will be installed as soon as ground conditions warrant and permit and shall remain in place until construction is complete, and vegetation is re-established.

12.0 RECOMMENDATIONS

Based on the information presented in this report, we recommend that the Town approve this Preliminary Servicing and Stormwater Management Report in support of the Draft Plan of Subdivision Application for Phase 6 of the Perthmore Subdivision.

Please feel free to contact the personnel below if you have any questions or concerns.

Regards,

McIntosh Perry Consulting Engineers Ltd.

Brent Cuming, P.Eng.
Project Engineer | Land Development
McIntosh Perry Consulting Engineers
T: 343.764.2012
E: b.cuming@mcintoshperry.com

Raja Subramaniam Raja Chockalingam, M.Eng, P.Eng.
Design Lead | Water Resources
McIntosh Perry Consulting Engineers
T: 249.494.2971
E: r.rajachockalingam@mcintoshperry.com

13.0 STATEMENT OF LIMITATIONS

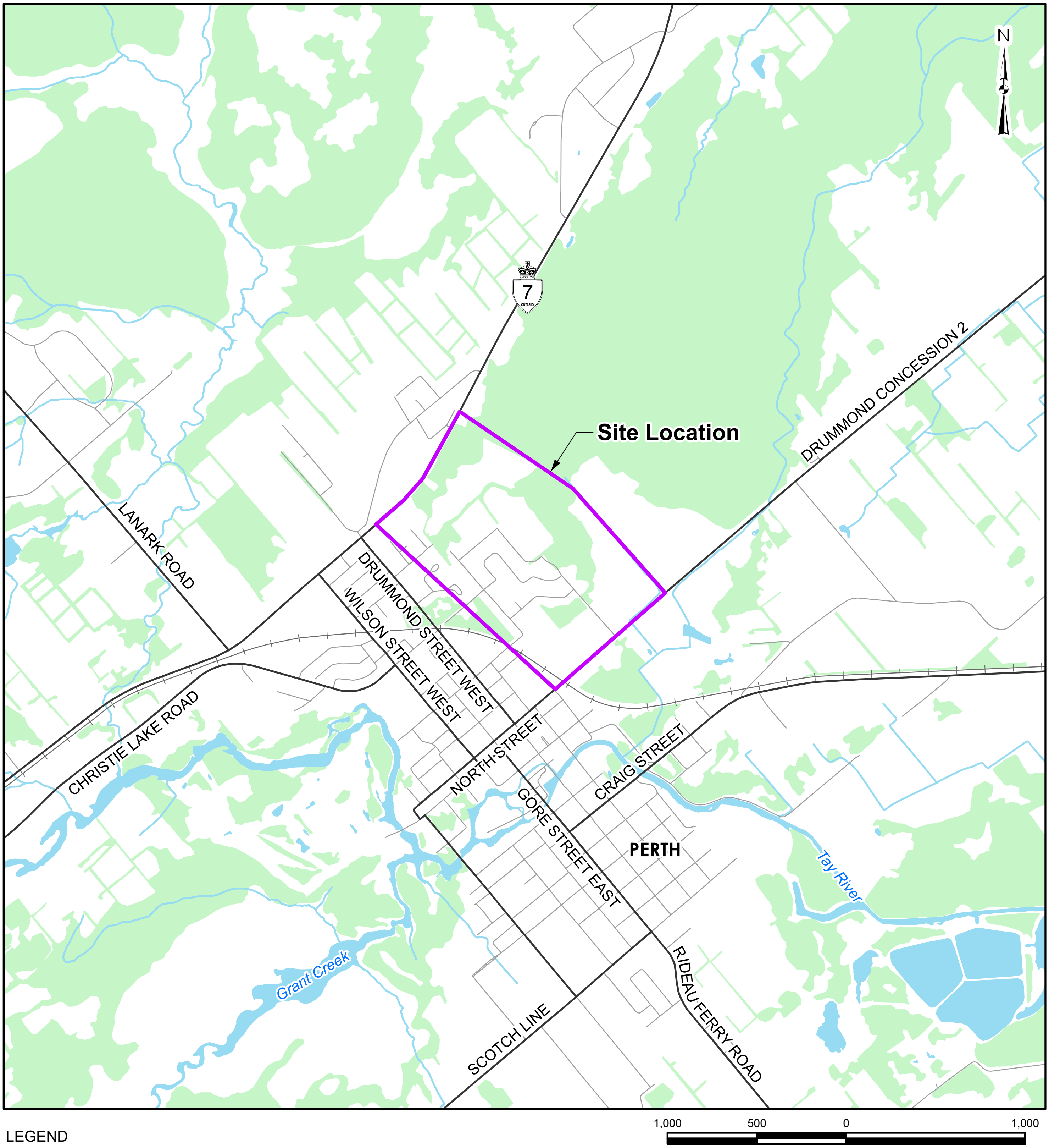
This report was produced for the exclusive use of Perthmore Developments Co. The purpose of the report is to assess the existing servicing infrastructure and to provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment, Conservation and Parks, Town of Perth and local approval agencies. McIntosh Perry reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by McIntosh Perry and site visits were performed, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. McIntosh Perry accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, McIntosh Perry should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

APPENDIX A
LOCATION PLAN

McINTOSH PERRY



LEGEND

- Approximate Site Boundary
- Local Road
- Major Road
- Railroad
- Watercourse
- Waterbody
- Wooded Area

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2020.

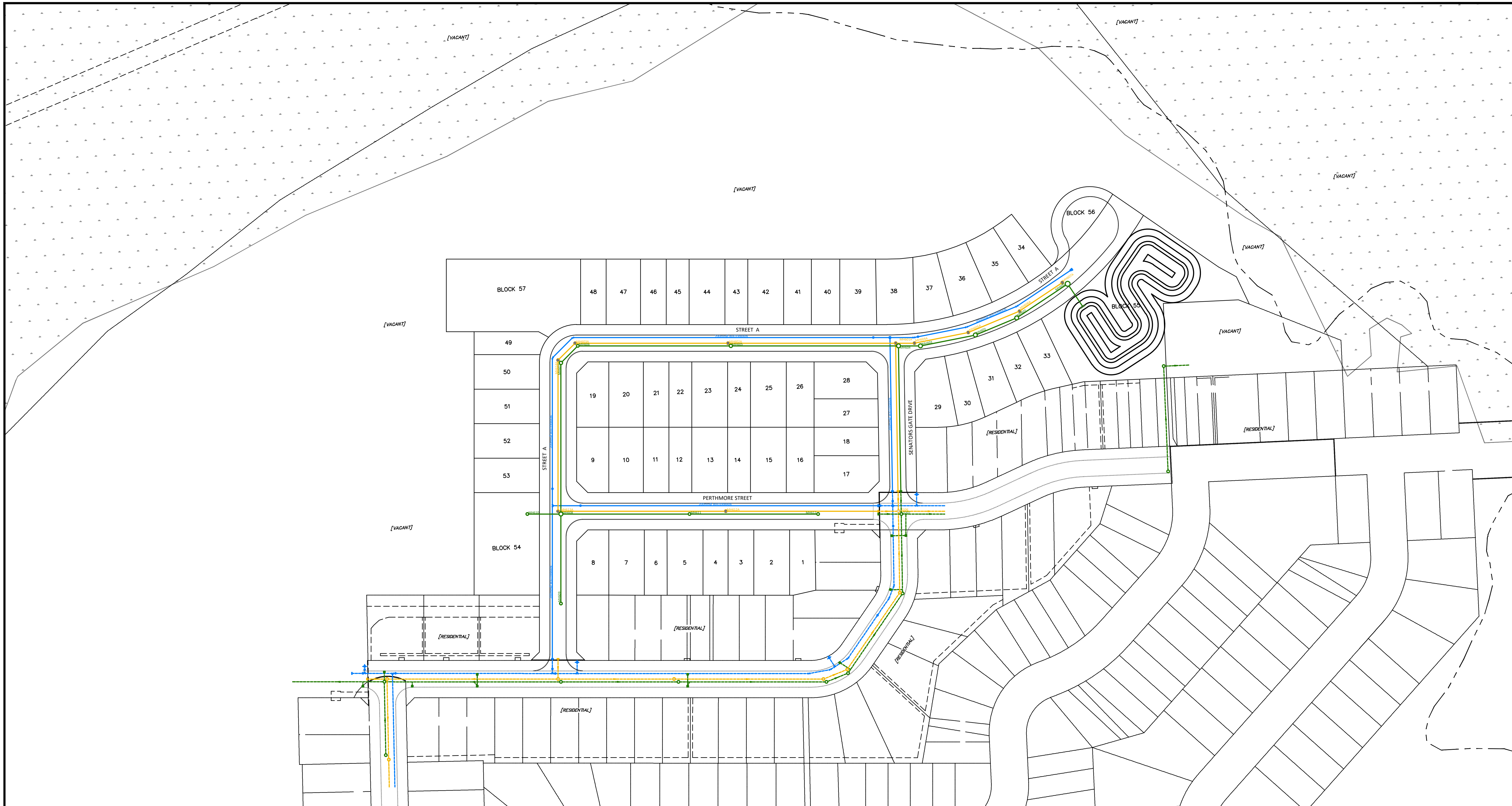
CLIENT:
PERTHMORE DEVELOPMENT CO.

PROJECT:
PERTHMORE SUBDIVISION PHASE 6

TITLE:
LOCATION PLAN

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:PP-13-9668-01		FIGURE:
Date	Dec., 21, 2020	1
GIS	EU	
Checked By	CH	



SCALE 1 : 2000

0 50 100 150 200 Metres

LEGEND

- - - -	EXISTING WATERMAIN
——	PROPOSED WATERMAIN
- - - -	EXISTING SANITARY SEWER
——	PROPOSED SANITARY SEWER
- - - -	EXISTING STORM SEWER
——	PROPOSED STORM SEWER

N

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

Project: PERTHMORE SUBDIVISION PHASE 6

Drawing Title: GENERAL PLAN OF SERVICES

Drawn by:	Checked By:
P.G.K.	B.S.C.
Scale: 1:2000	Project Number: PP-13-9668-01

No.	Revisions	Date
3	RE-ISSUED FOR DRAFT APPROVAL	JUNE 23, 2023
2	ISSUED FOR DRAFT PLAN APPROVAL	AUG. 03, 2022
1	ISSUED FOR DRAFT PLAN APPLICATION	DEC. 18, 2020

Drawing Number: 100

FILENAME: U:\Ottawa\01 Project - Proposals\2013 Jobs\OPP\PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03-Drawings\Production\PP-13-9668-01_Drawings.dwg
LAST SAVED: Friday, June 23, 2023 LAST SAVED BY: s.hall
LAST PLOTTED: Friday, June 23, 2023 CTB FILE USED: ---

APPENDIX B
WATERMAIN DESIGN

MCINTOSH PERRY

PP-13-9668-01 - Perthmore Subdivision Phase 6 - Water Demands 1

Peaking Factors:

Table 3-1: Peaking Factors

POPULATION	MINIMUM RATE FACTOR (MINIMUM HOUR)	MAXIMUM DAY FACTOR	PEAK RATE FACTOR (PEAK HOUR)
500 - 1,000	0.40	2.75	4.13
1,001 - 2,000	0.45	2.50	3.75
2,001 -3,000	0.45	2.25	3.38
3,001 - 10,000	0.50	2.00	3.00
10,001 - 25,000	0.60	1.90	2.85
25,001 - 50,000	0.65	1.80	2.70
50,001 - 75,000	0.65	1.75	2.62
75,001 - 150,000	0.70	1.65	2.48
greater than 150,000	0.80	1.50	2.25

Note: Domestic water demand peaking factors are per Section 3.4.2 of the Design Guidelines for Drinking-Water Systems 2008.

Population Density:

Unit Type	Persons Per Unit (ppu)
Single Family	3.4
Semi-detached	2.7
Townhouse	2.7
Apartment	1.8
Unknown	60/ha

Calculations:

Phase 6 - Consists of 34 single family, 38 Semi-detached units, 14 Apartment units

Population = 243.40 people

*Average Day Flow		Max. Day Flow		Peak Hourly Flow		
(L/s)	(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	
0.79	47.33	2.17	130.15	3.26	195.46	
0.79	**47.33**	**2.17**	**130.15**	**3.26**	**195.46**	**Total**

*Domestic flow was assumed to be 280L/(cap-day)

PP-13-9668-01 - Perthmore Subdivision Phase 6 - Water Demands 2

Peaking Factors:

Table 3-1: Peaking Factors

POPULATION	MINIMUM RATE FACTOR (MINIMUM HOUR)	MAXIMUM DAY FACTOR	PEAK RATE FACTOR (PEAK HOUR)
500 - 1,000	0.40	2.75	4.13
1,001 - 2,000	0.45	2.50	3.75
2,001 -3,000	0.45	2.25	3.38
3,001 - 10,000	0.50	2.00	3.00
10,001 - 25,000	0.60	1.90	2.85
25,001 - 50,000	0.65	1.80	2.70
50,001 - 75,000	0.65	1.75	2.62
75,001 - 150,000	0.70	1.65	2.48
greater than 150,000	0.80	1.50	2.25

Note: Domestic water demand peaking factors are per Section 3.4.2 of the Design Guidelines for Drinking-Water Systems 2008.

Population Density:

Unit Type	Persons Per Unit (ppu)
Single Family	3.4
Semi-detached	2.7
Townhouse	2.7
Apartment	1.8
Unknown	60/ha

Calculations:

Phase 6 - Consists of 34 single family, 38 Semi-detached units and 14 Apartment units

Future Development - Consists of 5.45 ha development area

Population = 570.40 people

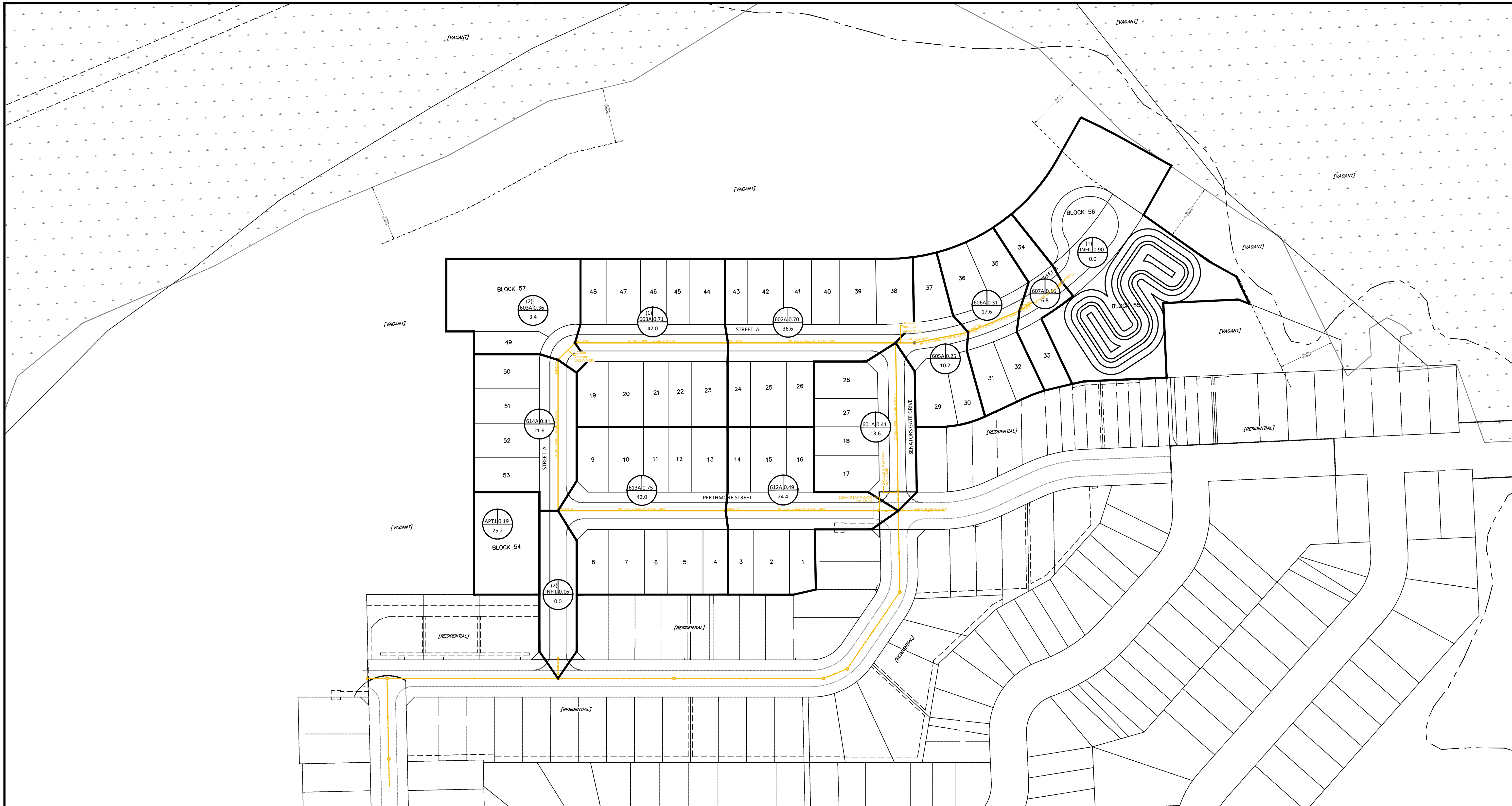
*Average Day Flow		Max. Day Flow		Peak Hourly Flow		
(L/s)	(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	
1.85	110.91	5.08	305.01	7.63	458.06	
1.85	**110.91**	**5.08**	**305.01**	**7.63**	**458.06**	**Total**

*Domestic flow was assumed to be 280L/(cap-day)

APPENDIX C

SANITARY SEWER DESIGN

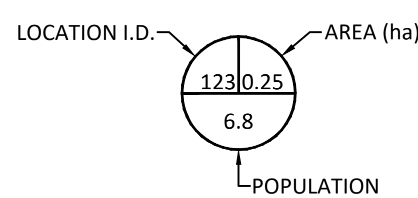
McINTOSH PERRY

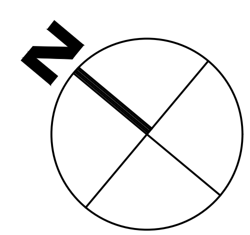


SCALE 1 : 2000

0 50 100 150 200 Metres

LEGEND





McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

Project: PERTHMORE SUBDIVISION PHASE 6

Drawing Title: SANITARY DRAINAGE AREA PLAN

Drawn by:	Checked By:
P.G.K.	B.S.C.
Scale: 1:2000	Project Number: PP-13-9668-01

No.	Revisions	Date
3	RE-ISSUED FOR DRAFT APPROVAL	JUNE 23, 2023
2	ISSUED FOR DRAFT PLAN APPROVAL	AUG. 03, 2022
1	ISSUED FOR DRAFT PLAN APPLICATION	DEC. 18, 2020

Drawing Number: 500

FILENAME: U:\Ottawa\01 Project - Proposals\2013 Jobs\0PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03-Drawings\Production\PP-13-9668-01_Drawings.dwg
LAST SAVED: Friday, June 23, 2023 LAST SAVED BY: s.hall
LAST PLOTTED: Friday, June 23, 2023 CTB FILE USED: ----

SANITARY SEWER DESIGN SHEET

McINTOSH PERRY

PROJECT: PERTHMORE SUBDIVISION PHASE 6
LOCATION: PERTH, ON
CLIENT: PERTHMORE DEVELOPMENT CO.

LOCATION: 1 STREET	2 AREA ID	3 FROM MH	4 TO MH	RESIDENTIAL: UNIT TYPES 5 SF	6 SD	7 TH	8 APT	9 AREA (ha)	POPULATION 10 IND	11 CUM	12 PEAK FACTOR	13 PEAK FLOW (L/s)	ICI AREAS: AREA (ha) INSTITUTIONAL 14 IND	15 CUM	COMMERCIAL 16 IND	17 CUM	INDUSTRIAL 18 IND	19 CUM	20 PEAK FLOW (L/s)	INFILTRATION ALLOWANCE: AREA (ha) 21 IND	22 CUM	23 FLOW (L/s)	FLOW: 24 DESIGN FLOW (L/s)	SEWER DATA: 25 CAPACITY (L/s)	26 LENGTH (m)	27 DIA (mm)	28 SLOPE (%)	29 VELOCITY (full) (m/s)	30 FLOW DEPTH (mm)	31 VELOCITY (actual) (m/s)	30 AVAILABLE CAPACITY L/s	31 AVAILABLE CAPACITY (%)
STREET A	603A(1)	603A	602A	6	8			0.71	42.0	42.0	4.00	0.54		0.00		0.00		0.00	0.00	0.71	0.71	0.23	0.78	27.59	82.10	200	0.65	0.851	24.7	0.378	26.81	97.18
	602A	602A	601A	6	6			0.70	36.6	78.6	4.00	1.02		0.00		0.00		0.00	0.00	0.70	1.41	0.47	1.48	21.64	90.00	200	0.40	0.667	37.5	0.387	20.16	93.14
STREET A	INFIL(1), 607A	607A	606A	2				1.06	6.8	6.8	4.00	0.09		0.00		0.00		0.00	0.00	1.06	1.06	0.35	0.44	27.59	27.61	200	0.65	0.851	18.9	0.317	27.15	98.41
	606A	606A	605A	2	4			0.31	17.6	24.4	4.00	0.32		0.00		0.00		0.00	0.00	0.31	1.37	0.45	0.77	27.59	29.81	200	0.65	0.851	24.6	0.376	26.82	97.21
	605A	605A	604A	3				0.25	10.2	34.6	4.00	0.45		0.00		0.00		0.00	0.00	0.25	1.62	0.53	0.98	27.59	29.40	200	0.65	0.851	27.6	0.405	26.60	96.44
		604A	601A						0.0	34.6	4.00	0.45		0.00		0.00		0.00	0.00	0.00	1.62	0.53	0.98	27.59	10.08	200	0.65	0.851	27.6	0.405	26.60	96.44
SENATORS GATE DRIVE	601A	601A	*CAP*	4				0.41	13.6	126.8	4.00	1.64		0.00		0.00		0.00	0.00	0.41	3.44	1.14	2.78	21.64	79.13	200	0.40	0.667	50.4	0.465	18.86	87.16
		CAP-1	*S106*					0.00	0.0	126.8	4.00	1.64		0.00		0.00		0.00	0.00	0.00	3.44	1.14	2.78	21.64	*11.00*	*200*	*0.40*	0.667	50.4	0.465	18.86	87.16
STREET A	603A(2)	603A	614A	1				0.36	3.4	3.4	4.00	0.04		0.00		0.00		0.00	0.00	0.36	0.36	0.12	0.16	27.59	12.90	200	0.65	0.851	11.9	0.234	27.42	99.41
	614A	614A	613A		8			0.41	21.6	25.0	4.00	0.32		0.00		0.00		0.00	0.00	0.41	0.77	0.25	0.58	27.59	81.00	200	0.65	0.851	21.5	0.345	27.01	97.90
PERTHMORE STREET	APT1, INFIL(2), 613A	613A	612A	6	8		14	1.10	67.2	92.2	4.00	1.20		0.00		0.00		0.00	0.00	1.10	1.87	0.62	1.81	21.64	90.00	200	0.40	0.667	41.2	0.410	19.83	91.63
	612A	612A	*CAP*	4	4			0.49	24.4	116.6	4.00	1.51		0.00		0.00		0.00	0.00	0.49	2.36	0.78	2.29	21.64	81.68	200	0.40	0.667	46.0	0.439	19.35	89.42
		CAP-2	*S106*					0.00	0.0	116.6	4.00	1.51		0.00		0.00		0.00	0.00	0.00	2.36	0.78	2.29	21.64	*11.00*	*200*	*0.40*	0.667	46.0	0.439	19.35	89.42

Design Parameters:

Residential			ICI Areas			Peak Factor
SF	3.4	p/p/u	INST	28,000	L/Ha/day	1.5
SD	2.7	p/p/u	COM	28,000	L/Ha/day	1.5
TH	2.7	p/p/u	IND	35,000	L/Ha/day	MOE Chart
APT	1.8	p/p/u				
Other	60	p/p/Ha				

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+P^0.5))
   where P = population in thousands

Designed: P.G.K.

Checked: B.S.C.

Project No.: PP-13-9668-01

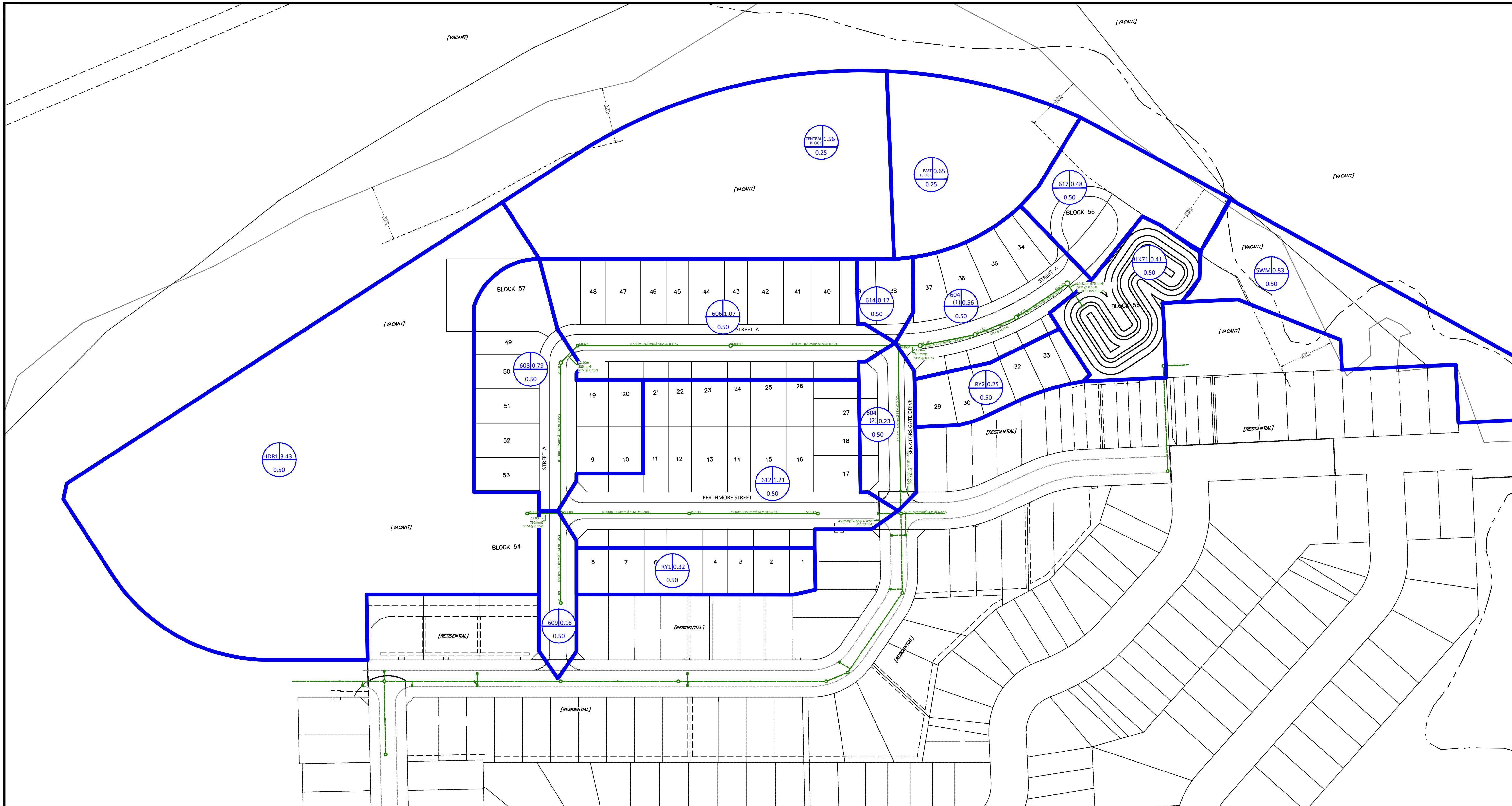
No.	Revision	Date
1.	ISSUED FOR DRAFT PLAN APPLICATION	DEC. 18, 2020
2.	ISSUED FOR DRAFT PLAN APPROVAL	AUG.3, 2022
3.	ISSUED FOR DRAFT PLAN APPROVAL	JUN. 23, 2023

Sheet No:
1 of 1

APPENDIX D

STORM SEWER DESIGN

McINTOSH PERRY



LEGEND

SCALE 1 : 2000

0 50 100 150 200 Metres

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

Project: PERTHMORE SUBDIVISION PHASE 6

Drawing Title: STORM DRAINAGE AREA PLAN

Drawn by:	Checked By:
P.G.K.	B.S.C.
Scale: 1:2000	Project Number: PP-13-9668-01

No.	Revisions	Date
3	RE-ISSUED FOR DRAFT APPROVAL	JUNE 23, 2023
2	ISSUED FOR DRAFT PLAN APPROVAL	AUG. 03, 2022
1	ISSUED FOR DRAFT PLAN APPLICATION	DEC. 18, 2020

Drawing Number: 501

FILENAME: \\mcintoshperry.local\share\Ottawa\01 Project - Proposals\2013 Jobs\PP\PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03-Drawings\Production\PP-13-9668-01_Drawings.dwg
LAST SAVED: Friday, June 23, 2023 LAST SAVED BY: j.hewson
LAST PLOTTED: Friday, June 23, 2023 CTB FILE USED: ---

STORM SEWER DESIGN SHEET

McINTOSH PERRY

PROJECT: PERTHMORE SUBDIVISION PHASE 6
LOCATION: PERTH, ON
CLIENT: PERTHMORE DEVELOPMENT CO.

LOCATION				CONTRIBUTING AREA (ha)								RATIONAL DESIGN FLOW											SEWER DATA								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
STREET	AREA ID	FROM MH	TO MH	C-VALUE 0.20	0.40	0.50	0.60	0.80	1.00	INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
	HDR2	610	608				3.28			1.97	1.97	20.00	0.30	20.30	58.41	67.89	97.42	319.56				319.56	449.81	18.00	750			0.15	0.986	130.26	28.96
STREET A	609	609	608			0.16				0.08	0.08	20.00	0.97	20.97	58.41	67.89	97.42	12.99				12.99	41.62	48.00	250			0.45	0.821	28.63	68.79
PERTHMORE STREET	612	612	611			1.21				0.61	0.61	20.00	1.42	21.42	58.41	67.89	97.42	98.24				98.24	133.02	69.00	450			0.20	0.810	34.78	26.15
		611	608							0.00	0.61	21.42	1.42	22.84	55.68	64.71	92.86	93.64				93.64	133.02	69.00	450			0.20	0.810	39.38	29.60
STREET A	608	608	607			0.94				0.47	3.12	22.84	1.28	24.12	53.23	61.88	88.79	462.17				462.17	579.98	81.00	825			0.15	1.051	117.81	20.31
		607	606							0.00	3.12	24.12	0.20	24.33	51.24	59.55	85.46	444.83				444.83	579.98	12.90	825			0.15	1.051	135.15	23.30
	606	606	605			1.11				0.56	3.68	24.33	1.30	25.63	50.93	59.20	84.95	520.80				520.80	579.98	82.10	825			0.15	1.051	59.18	10.20
		605	604							0.00	3.68	25.63	1.43	27.06	49.11	57.09	81.91	502.16				502.16	579.98	90.00	825			0.15	1.051	77.82	13.42
SENATORS GATE DRIVE	614, HDR1	BULKHEAD	604			0.07	2.34			1.44	1.44	20.00	0.33	20.33	58.41	67.89	97.42	233.66				233.66	339.63	18.00	675			0.15	0.919	105.98	31.20
STREET A	604(1)	604	603			0.68				0.34	5.46	27.06	0.17	27.22	47.29	54.96	78.87	717.35				717.35	905.48	11.80	975			0.15	1.175	188.13	20.78
		603	602							0.00	5.46	27.22	0.43	27.65	47.08	54.73	78.53	714.27				714.27	905.48	30.00	975			0.15	1.175	191.22	21.12
		602	601							0.00	5.46	27.65	0.34	27.99	46.58	54.14	77.68	706.57				706.57	905.48	24.00	975			0.15	1.175	198.92	21.97
		601	600							0.00	5.46	27.99	0.47	28.46	46.18	53.68	77.02	700.55				700.55	905.48	32.90	975			0.15	1.175	204.94	22.63
		600	POND							0.00	5.46	28.46	0.21	28.66	45.65	53.06	76.14	692.50				692.50	905.48	14.61	975			0.15	1.175	212.99	23.52
SENATORS GATE DRIVE	604(2)	604	*BULKHEAD*			0.23				0.12	0.12	20.00	1.13	21.13	58.41	67.89	97.42	18.67				18.67	188.11	77.63	450			0.40	1.146	169.44	90.07
		BULKHEAD	*D207*							0.00	0.12	21.13	0.18	21.31	56.21	65.33	93.75	17.97				17.97	188.11	*12.50*	*450*			*0.40*	1.146	170.14	90.45
PERTHMORE STREET		*BULKHEAD*	*D207*							0.00	0.00	20.00	0.18	20.18	58.41	67.89	97.42	0.00				0.00	188.11	*12.50*	*450*			*0.40*	1.146	188.11	100.00

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 27.1 * Tc^-0.699] 5 YEAR
[i = 31.5 * Tc^-0.699] 10 YEAR
[i = 45.2 * Tc^-0.699] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: P.G.K.
Checked: B.S.C.
Project No.: PP-13-9668-01

No.	Revision	Date
1.	ISSUED FOR DRAFT PLAN APPLICATION	DEC. 18, 2020
2.	ISSUED FOR DRAFT PLAN APPROVAL	AUG. 3, 2022
3.	ISSUED FOR DRAFT PLAN APPROVAL	JUN. 23, 2023

Sheet No: 1 of 1

\\mcintoshperry.local\share\Ottawa\01 Project - Proposals\2013 Jobs\0PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\02-Design Calculations\PP-13-9668-01_STM Design.xlsx

APPENDIX E

EXISTING CONDITIONS MEMO

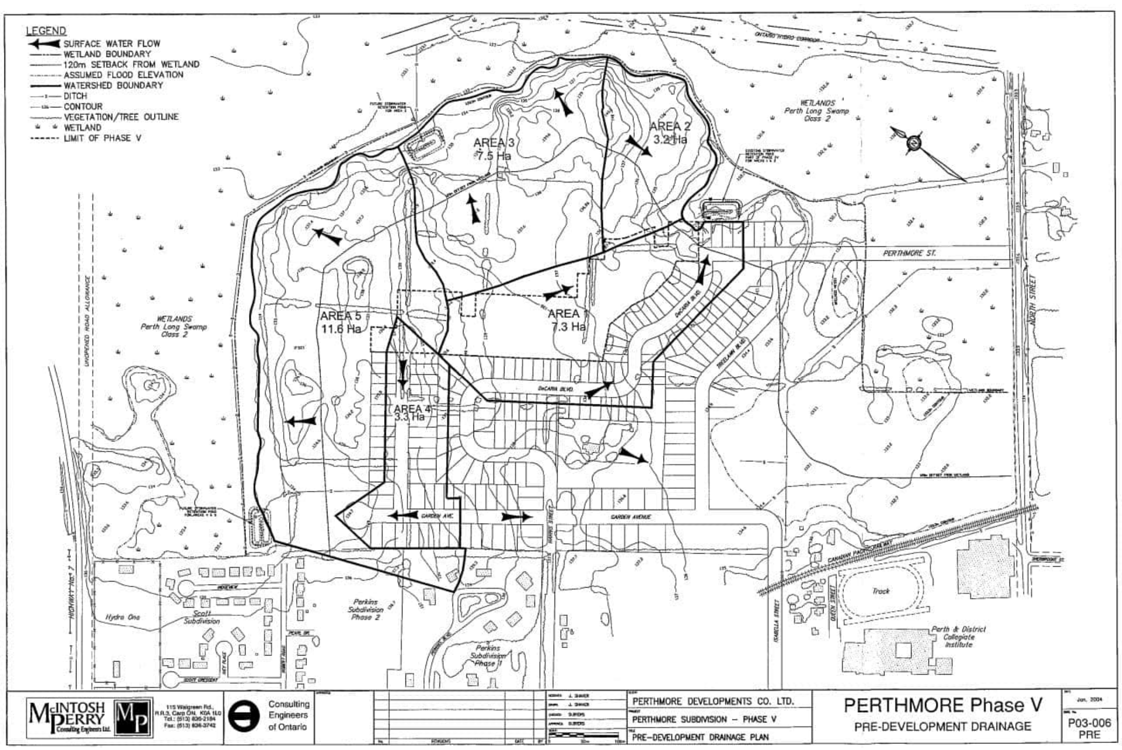
MEMORANDUM

To:	Ryan Kennedy, P. Eng., Practice Lead, Land Development
	Adam O'Connor, P.Eng., Assistant Vice President, Land Development
From:	John Price, P. Eng., Senior Water Resource Engineer
Cc:	Jason Sharp, P. Eng. Manager, Water Resources
Date:	December 2, 2020
Re:	Perthmore Subdivision

1.0 BACKGROUND

The Perthmore subdivision is located northwest of North Street in the Town of Perth. Various phases of the subdivision have been under development since the 1990s and the draft plan for a subsequent phase is now under consideration. The drainage and stormwater management infrastructure has also been constructed in phases over many years. The original pre-development flow values were first calculated in 1990s using the Rational Equation.

An existing stormwater management (SWM) pond is located on the northeast side of Perthmore Street as shown on the figure below. As part of development of this subsequent phase, this SWM facility will be reconstructed and expanded to address the water quality and quantity control requirements for the tributary drainage area. For the SWM design the pre-development flows, to be used as the target flows for the quantity control, were reassessed.



2.0 ANALYSIS

A Visual OTTHMO Version 5 (VO5) model was assembled for the analysis. As shown in the figure above, the pre-development tributary area to the SWM facility consists of Areas 1 and 2 and the total tributary pre-development drainage area is 10.5 ha. The VO5 hydrologic model requires various measured and calculated input parameters. The calculations of these input parameters area detailed below.

2.1 Parameters

2.1.1 General

Since the pre-development land use was rural the NASHYD command was employed in the VO5 model to calculate the runoff flows. NASHYD is used to simulate runoff flows with NASH instantaneous unit hydrograph. This hydrograph is made of a cascade of "n" linear reservoirs. The n (number of linear reservoirs) parameter was set at 3, in the model, and the rainfall losses were computed by the SCS CN procedure.

2.1.2 Time of Concentration/Time to Peak

The Time of Concentration (Tc), for the pre-development drainage basins, was calculated using the Airport Formula.

$$T_c = 3.26 * (1.1 - C) * L^{0.5} * S_W^{-0.33}$$

Where:

Tc = time of concentration in minutes
C = runoff coefficient
L = watershed length in metres
S_W = watershed slope in percentage

From the Tc value, the Time to Peak (Tp) value was calculated as 0.67 times Tc. The parameters employed in the calculation of Tc and Tp for the two drainage basins are show in Table 1.

Table 1 – Time to Peak

Catchment	Area	Flow Length	Fall	Slope	Tc[1]	Tp[2]
	ha	m	m	%	min	hrs
Area 1	7.3	435	7	1.61	58.1	0.65
Area 2	3.2	165	7	4.24	26.0	0.29

Notes: 1 – Airport Formula
2 – 0.67*Tc

2.1.3 SCS Curve Number

The Curve Number (CN) is the most important parameter in determining surface runoff when the SCS equation is used. Table 2 shows the parameters and the resulting CN value for Areas 1 and 2.

Table 2 – Curve Number

Catchment	Soil Type	Hydrologic	Land Use	Runoff	CN[3]	Ia
		Soil Group[1]	(0-5% Slope)	Coefficient[2]	(AMC II)	mm
Area 1	Sandy Loam	AB	Pasture	0.10	59	5
Area 2	Sandy Loam	AB	Pasture	0.10	59	5

Notes: 1 – MTO Drainage Management Manual – Design Chart 1.08
2 - MTO Drainage Management Manual – Design Chart 1.07
3 - MTO Drainage Management Manual – Design Chart 1.09 (Pasture, fair condition – average of A and B Hydrologic Soil Groups)

2.1.4 Rainfall

For the rainfall input to the VO5 model, the 12 hour SCS rainfall distribution, representing a high volume lower intensity storm, and a 4 hour Chicago rainfall distribution, representing a high intensity "thunder storm" type of rainfall event were used ion the analysis. The Intensity-Duration-Frequency (IDF) curve was obtained from the Ministry of Transportation (MTO) IDF Curve Lookup tool with the location centred over the property.

3.0 RESULTS

Employing the above noted parameters and the VO5 hydrologic model, Table 3 shows the calculated pre-development flow values for the 12 hour SCS and 4 hour Chicago rainfall hyetographs. It is recommended that these flow values be used for the water quantity control assessment of the reconstructed SWM facility. The redesign of the end of pipe facility will also include water quality control for the post-development tributary drainage area.

Table 3 – Calculated Flows

	12 hour SCS			4 hour Chicago		
Return Period	Area 1	Area 2	Total	Area 1	Area 2	Total
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.061	0.047	0.093	0.030	0.022	0.045
5	0.110	0.085	0.168	0.057	0.041	0.085
10	0.143	0.111	0.220	0.080	0.058	0.119
25	0.197	0.152	0.303	0.111	0.083	0.166
50	0.238	0.184	0.367	0.137	0.101	0.206
100	0.288	0.223	0.444	0.165	0.122	0.248

This memorandum is respectfully submitted by,
McIntosh Perry Consulting Engineers Ltd.

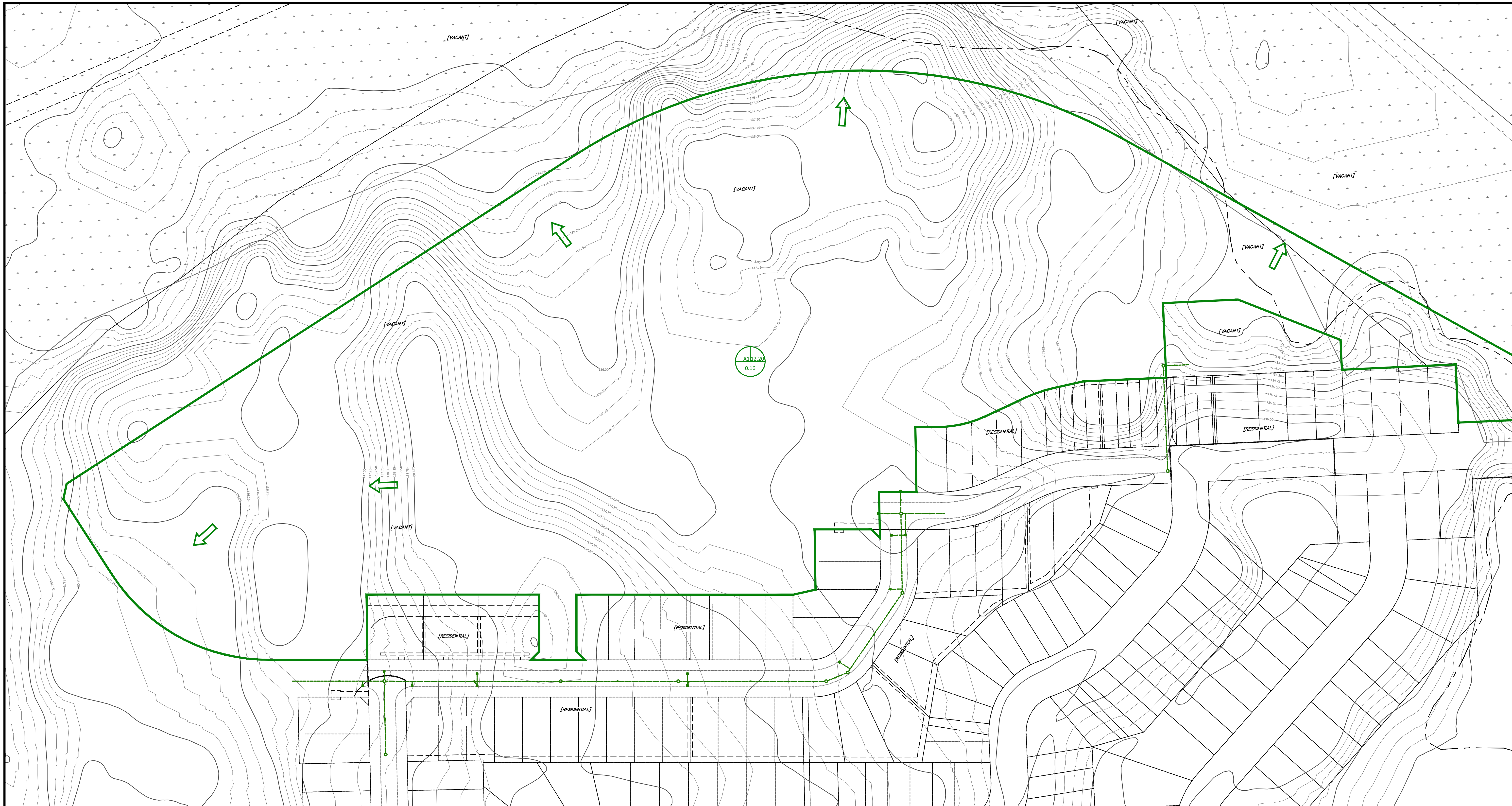
John Price

John Price, P. Eng.
Senior Water Resource Engineer
PH No. 613 714 5906
Email. J.Price@McIntoshPerry.com

APPENDIX F

STORMWATER MANAGEMENT DESIGN

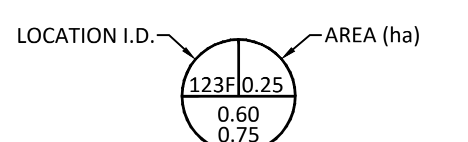
McINTOSH PERRY

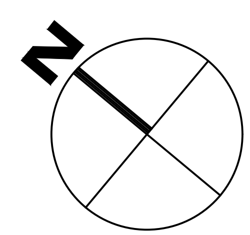


SCALE 1 : 2000

0 50 100 150 200 Metres

LEGEND





McINTOSH PERRY

115 Walgreen Road, RR3, Carp, ON K0A 1L0

Tel: 613-836-2184 Fax: 613-836-3742

www.mcintoshperry.com

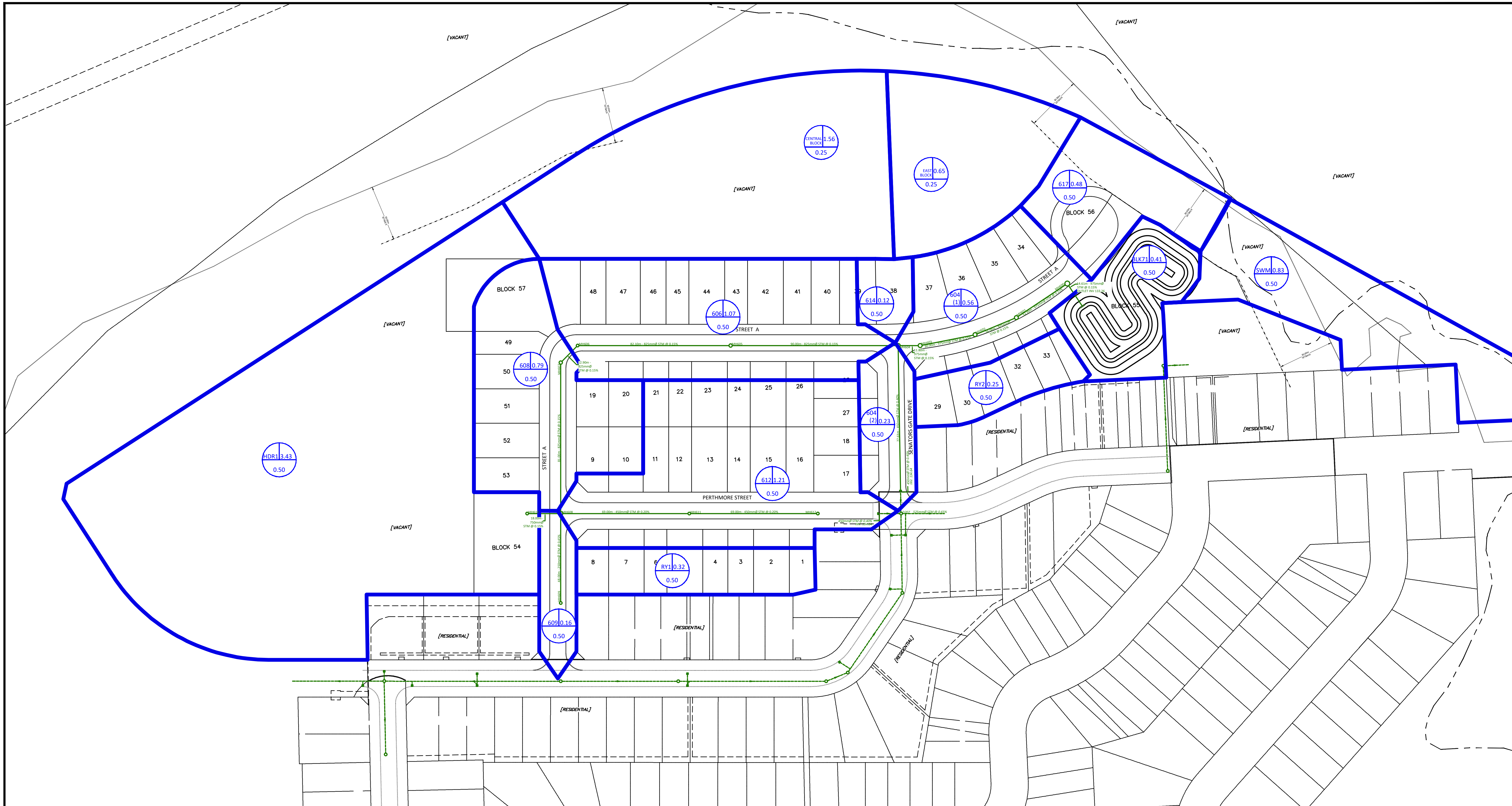
Client: PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

Project: PERTHMORE SUBDIVISION PHASE 6

Drawing Title: PRE-DEVELOPMENT DRAINAGE AREA PLAN

Drawn by:	Checked By:	No.	Revisions	Date	Drawing Number:
P.G.K.	B.S.C.	2	RE-ISSUED FOR DRAFT APPROVAL	JUNE 23, 2023	PRE
Scale: 1:2000	Project Number: PP-13-9668-01	1	ISSUED FOR DRAFT PLAN APPROVAL	AUG. 03, 2022	

FILENAME: U:\Ottawa\01 Project - Proposals\2013 Jobs\0PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03-Drawings\Production\PP-13-9668-01_Drawings.dwg
LAST SAVED: Thursday, June 22, 2023 LAST SAVED BY: s.hall
LAST PLOTTED: Friday, June 23, 2023 CTB FILE USED: ----



SCALE 1 : 2000

0 50 100 150 200 Metres

LEGEND

LOCATION I.D. — AREA (ha)

123F 0.25 0.60 0.75

AVERAGE COEFFICIENT
5-year
100-year

McINTOSH PERRY

115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Drawn by: P.G.K.	Checked By: B.S.C.
Scale: 1:2000	Project Number: PP-13-9668-01

Client: PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

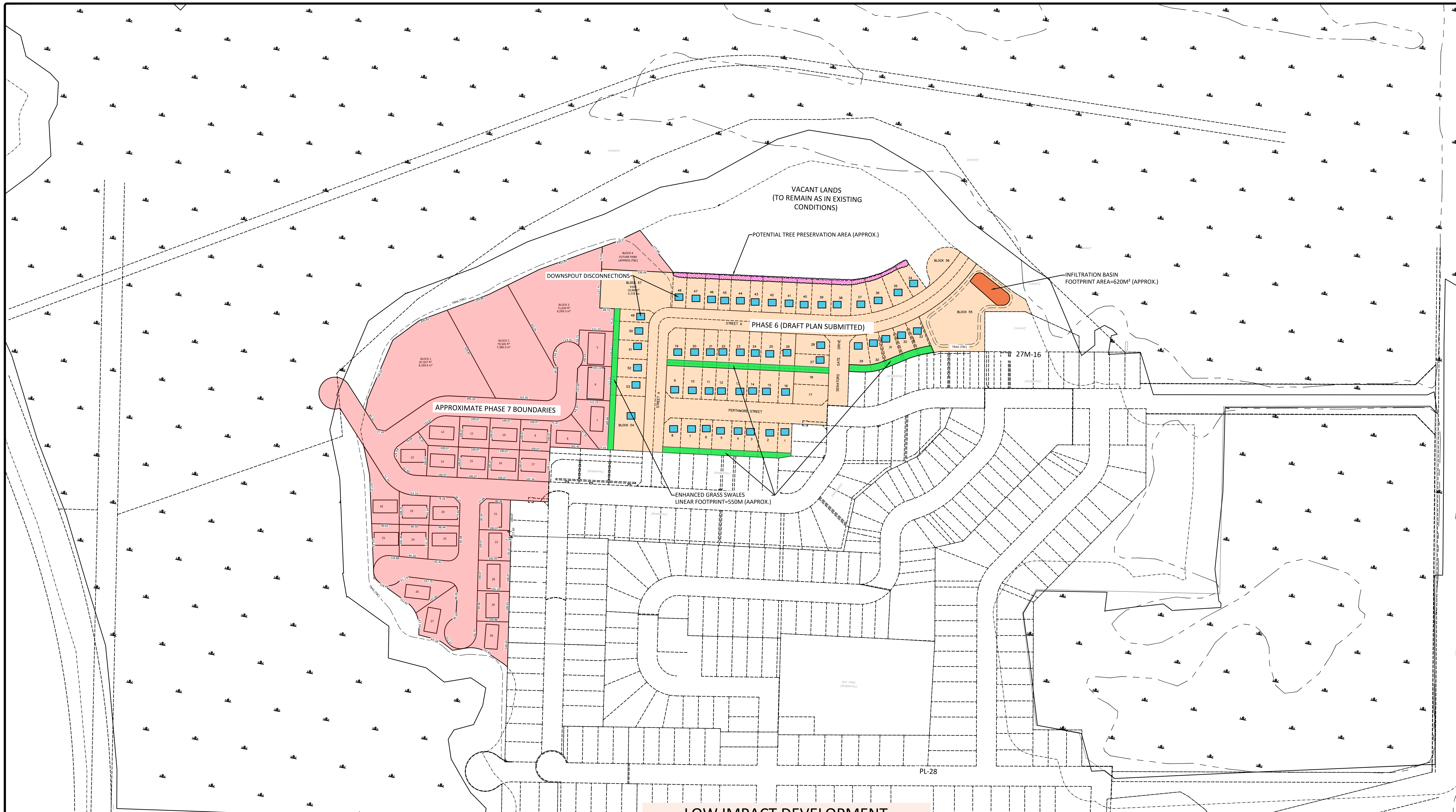
Project: PERTHMORE SUBDIVISION PHASE 6

Drawing Title: POST-DEVELOPMENT DRAINAGE AREA PLAN

No.	Revisions	Date
2	RE-ISSUED FOR DRAFT APPROVAL	JUNE 23, 2023
1	ISSUED FOR DRAFT PLAN APPROVAL	AUG. 03, 2022

Drawing Number: POST

FILENAME: \\mcintoshperry.local\share\Ottawa\01 Project - Proposals\2013 Jobs\0PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03-Drawings\Production\PP-13-9668-01_Drawings.dwg
LAST SAVED: Friday, June 23, 2023 LAST SAVED BY: j.hewson
LAST PLOTTED: Friday, June 23, 2023 CTB FILE USED: ----



LEGEND

- - - - -	EXISTING LEGAL FABRIC
- - - - -	WETLAND 30m SETBACK
— — —	FLOODPLAIN BOUNDARY
———	CONCEPTUAL LINEWORK
	MNRF PROVINCIALLY SIGNIFICANT WETLAND
- - - - -	CONCEPTUAL PATHWAY
(blue)	DOWNSPOUT DISCONNECTION (LOT LEVEL LID)
(green)	ENHANCED SWALE (CONVEYANCE LID)
(orange)	INFILTRATION BASIN (END-OF-PIPE LID)

DISCLAIMER:

BOUNDARIES SHOWN ON THIS SITE PLAN ARE COMPILED FROM EXISTING PLANS, FOR THE PURPOSES OF CREATING A CONCEPTUAL SUBDIVISION LAYOUT ONLY . MCINTOSH PERRY DOES NOT CERTIFY THAT THE BOUNDARIES OF THE PROPERTY SHOWN ON THIS PLAN ARE ACCURATE WITHIN THE MEANING OF THE SURVEYS ACT. PROPER LEGAL SURVEY RE-ESTABLISHMENT OF ANY BOUNDARY LOCATIONS OF PROPERTIES ON THIS PLAN MUST BE COMPLETED BY AN ONTARIO LAND SURVEYOR WORKING WITHIN THE SURVEYS ACT, SURVEYOR'S ACT, AND LAND TITLES OR REGISTRY ACT AND REGULATIONS MADE THEREUNDER.

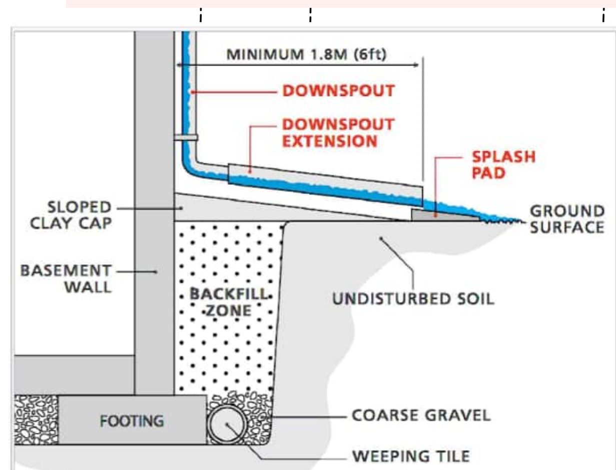
BUILDING ENVELOPES

LOTS 7-30 = 80' x 42'2"
LOTS 5 & 6 = 103'4"x 54'

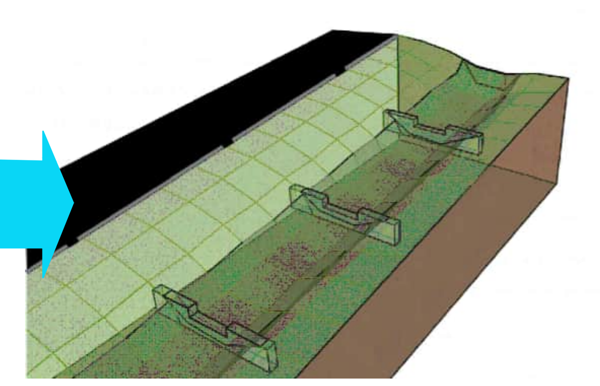
NOTE: LOT DIMENSIONS DISPLAYED IN FEET

LOW IMPACT DEVELOPMENT TREATMENT-TRAIN

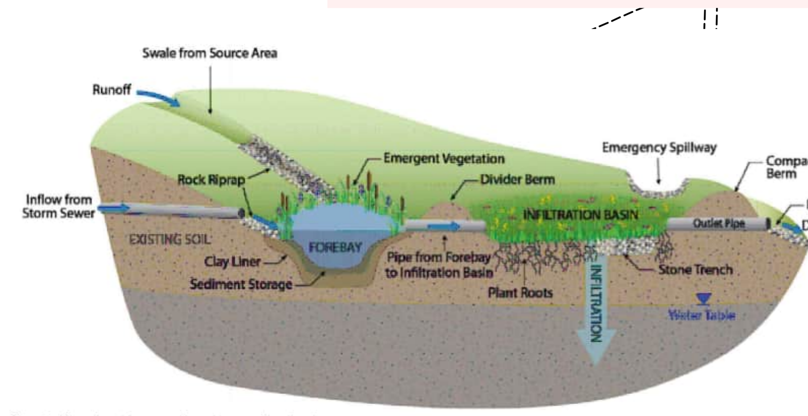
DOWNSPOUT DISCONNECTION



ENHANCED GRASS SWALES



INFILTRATION BASIN



SCALE	1 : 2000 (0, 50, 100, 150, 200 Metres)
NORTH:	
STAMP:	
No. / Revision/Issue / Date	FOR REVIEW ONLY — NOT FOR CONSTRUCTION
McINTOSH PERRY	3240 Drummond Conc. 5A, R.R. #7, Perth, ON K7H 3C9, Tel: 613-267-6524 Fax: 613-267-7992, www.mcintoshperry.com
Designed by:	RP
Drawn by:	
Checked By:	BC
Scale:	1:2000
Client:	PERTHMORE DEVLOPMENT CO. LTD
Project:	PERTHMORE ESTATES - PHASE 7
Drawing Title:	LOW IMPACT DEVELOPMENT CONCEPT PLAN
Date:	MAY.2023
Project Number:	PP-13-9668-03
Drawing Number:	CON2

Check and verify all dimensions before proceeding with the work

Do not scale drawings

CCO-13-9668-01 - PERTHMORE SUBDIVISION - PRE-DEVELOPMENT

Values

Land Use	Pasture	Pasture	Forest	Forest
Hydrologic Soil Group	B	C	B	C
Runoff Coefficients*	0.1	0.28	0.08	0.25
CN Values**	59	75	60	73
IA (mm)	5	5	10	10

* Design Chart 1.07 MTO Drainage Management Manual

** Design Chart 1.09 MTO Drainage Management Manual

Land Use

Drainage Area ID	Total Area (ha)	Pasture	Pasture	Forest	Forest	Weighted CN Value	Weighted C Value	Weighted IA Value
		B	C	B	C			
		Sub-Area (ha)	Sub-Area (ha)	Sub-Area (ha)	Sub-Area (ha)			
A1	12.2	5.45	1.76	1.56	3.2	64.0	0.16	6.9

Airport Formula

For use when the runoff coefficient is less than 0.4

$t_c = 3.26 * (1.1 - C) * L^{0.5} * S_w^{-0.33}$

Where

tc = time of concentration in minutes

C = runoff coefficient

L = watershed length in metres

S_w = watershed slope in %

Source: MTO Drainage Manual 1997 - Chapter 8, page 28

A1

C =	0.16		**T_C =**	54.6 min	**T_p =**	36.6 min	$T_p = 0.67\ T_c$
L =	435 m		**T_C =**	0.91 hours	**T_p =**	0.61 hours	
S_w =	1.61 %						

3240 Drummond Concession 5A, R.R.7 Perth, Ontario K7H 3C9 Tel.: 613.267.6524 Fax: 613.267.7992
info@mcintoshperry.com www.mcintoshperry.com

CCO-13-9668-01 - PERTHMORE SUBDIVISION - PRE-DEVELOPMENT RESULTS

	12 hour SCS	4 hour Chicago
Return Period	Area 1	Area 1
Yrs	m^3/s	m^3/s
2	0.114	0.053
5	0.211	0.105
10	0.278	0.149
25	0.383	0.210
50	0.463	0.262
100	0.560	0.317

CCO-13-9668-01 - PERTHMORE SUBDIVISION - POST-DEVELOPMENT

Values

Land Use	Pasture	Pasture	Forest	Forest
Hydrologic Soil Group	B	C	B	C
Runoff Coefficients*	0.1	0.28	0.08	0.25
CN Values**	59	75	60	73
IA (mm)	5	5	10	10

* Design Chart 1.07 MTO Drainage Management Manual

** Design Chart 1.09 MTO Drainage Management Manual

Land Use

Drainage Area ID	Total Area (ha)	Pasture	Pasture	Forest	Forest	Weighted CN Value	Weighted C Value	Weighted IA Value
		B	C	B	C			
		Sub-Area (ha)	Sub-Area (ha)	Sub-Area (ha)	Sub-Area (ha)			
Central Block	1.56	0	0	0.00	1.56	73.0	0.25	10.0
East Block	0.65	0	0	0.00	0.65	73.0	0.25	10.0

Airport Formula

For use when the runoff coefficient is less than 0.4

$$t_c = 3.26 * (1.1 - C) * L^{0.5} * S_w^{-0.33}$$

Where

tc = time of concentration in minutes

C = runoff coefficient

L = watershed length in metres

S_w = watershed slope in %

Source: MTO Drainage Manual 1997 - Chapter 8, page 28

Central Block:

C=	0.25	Tc=	19.7	min
L=	80.00	Tp=	0.22	hr
Sw=	2.00			

East Block:

C=	0.25	Tc=	12.6	min
L=	60.00	Tp=	0.14	hr
Sw=	5.00			

Sub-Catchment	Area	Total Imperviousness	Directly Connected	Pervious Area: CN	Pervious Area: Slope	Pervious Area: Flow Length	Pervious Area: Manning's n	Pervious Area: Ia	Impervious Area: Slope	Impervious Area: Flow Length (measured)	Impervious Area: Flow Length[3]	Impervious Area: Manning's n	Impervious Area: Depression Storage
	ha	%	%		%	m		mm	%	m			mm
West Block[6]	3.43	70.0	60.0	59.0	2.0	10.0	0.25	5.0	1.0	150.0	151.2	0.013	1.0
Central Block[6]	1.56	70.0	60.0	59.0	2.0	10.0	0.25	5.0	1.0	150.0	102.0	0.013	1.0
East Block[6]	0.65	70.0	60.0	75.0	2.0	10.0	0.25	5.0	1.0	100.0	65.8	0.013	1.0
Block 70	0.83	0.0	0.0	75.0	2.0	10.0	0.25	10.0	1.0	75.0	74.4	0.013	1.0
SWM Block[4,6]	0.41	0.0	0.0	75.0	2.0	10.0	0.25	5.0	1.0	50.0	52.3	0.013	1.0
Developed Portions[5,6]	5.32	50.0	35.0	59.0	2.0	10.0	0.25	5.0	1.0	350.0	188.3	0.013	1.0

Notes 1 -Airport Formula

2 - 0.67* Tc

3 - Flow Length = SquareRoot (Area/1.5) - (Area in square metres)

4 - Block 71

5 - 604(1) - 0.56ha, 604(2) - 0.23ha, 606 - 1.07ha, 608 - 0.79ha, 609 - 0.16ha, 612 - 1.21ha, 614 - 0.25ha, 617 - 0.48ha, RY1 - 0.32ha and RY2 - 0.25ha

6 - To Pond

Storage Requirements

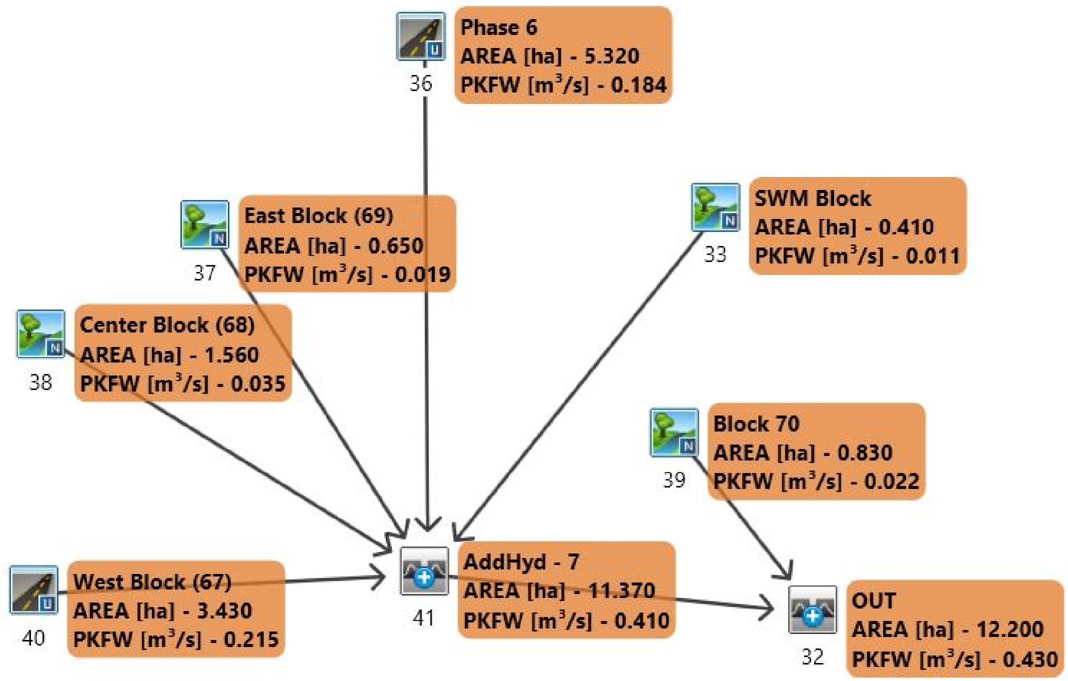
Facility Type:	Wet Pond		
Level of Protection:	Enhanced		
			%Imperviousness
Req'd Permanent Pool Storage Volume			46%
Vs =	85	m^3/ha	(Table 3.2, p. 3-10, SWMP Manual - 165m3/ha - 80m3/ha)
Vs =	966	m^3	
			Given the upstream individual storage requirements from Blocks 67, 68 and 69, the MECP SWMP Manual notes that the extended detention is increased to account for upstream storage)
Req'd Extended Detention Volume			MECP SWMP Manual - Section 3.3.2.
Ved =	80	m^3/ha	*It should be noted that*
Ved =	458	m^3	

CCO-13-9668-01 - PERTHMORE SUBDIVISION - POST-DEVELOPMENT - RESULTS - UNCONTROLLED

12 hour SCS							
Return Period	West Block	Central Block	East Block	Block 70	SWM Block	Developed Portions	Total
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.215	0.035	0.019	0.022	0.011	0.184	0.284
5	0.306	0.068	0.037	0.043	0.020	0.278	0.456
10	0.384	0.090	0.049	0.056	0.027	0.355	0.611
25	0.481	0.124	0.067	0.077	0.037	0.447	0.794
50	0.551	0.150	0.081	0.092	0.044	0.542	0.953
100	0.634	0.181	0.098	0.110	0.053	0.631	1.121

4 hour Chicago							
Return Period	West Block	Central Block	East Block	Block 70	SWM Block	Developed Portions	Total
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.228	0.012	0.006	0.007	0.004	0.153	0.198
5	0.315	0.027	0.014	0.017	0.008	0.223	0.311
10	0.374	0.041	0.022	0.026	0.012	0.292	0.417
25	0.461	0.059	0.033	0.038	0.018	0.368	0.546
50	0.523	0.076	0.042	0.048	0.023	0.423	0.646
100	0.587	0.094	0.051	0.059	0.028	0.481	0.751

Post-Development Uncontrolled - VO5 Model



CCO-13-9668-01 - PERTHMORE SUBDIVISION - POST-DEVELOPMENT - RESULTS - CONTROLLED

12 hour SCS								
Return Period	West Block[1]	Central Block	East Block	Block 70	SWM Block	Developed Portions	Outflow From Pond	Outflow From Site
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.029	0.035	6.250	0.022	0.011	0.184	0.084	0.087
5	0.042	0.068	6.250	0.043	0.020	0.278	0.191	0.198
10	0.050	0.090	6.250	0.056	0.027	0.355	0.264	0.279
25	0.063	0.124	6.250	0.077	0.037	0.447	0.336	0.356
50	0.072	0.150	6.250	0.092	0.044	0.542	0.386	0.411
100	0.083	0.181	6.250	0.110	0.053	0.631	0.436	0.467

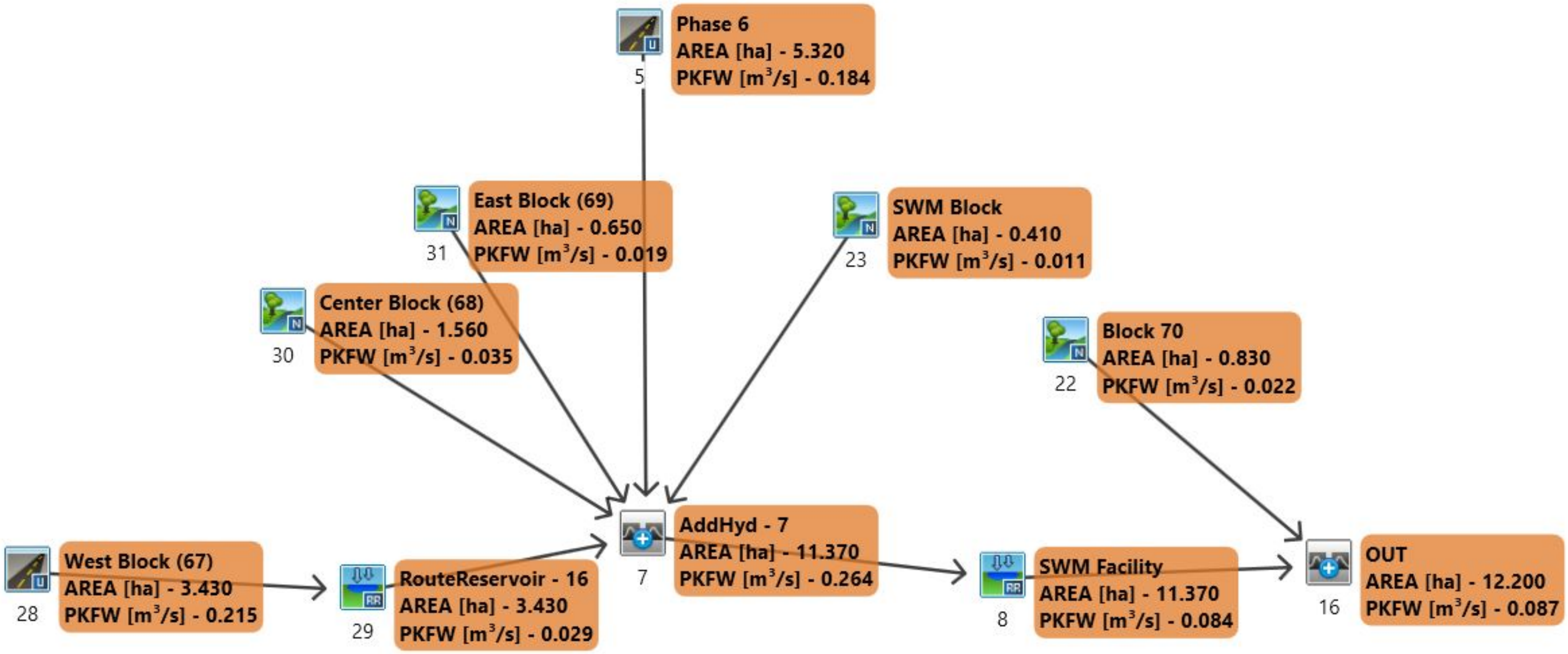
4 hour Chicago								
Return Period	West Block[1]	Central Block	East Block	Block 70	SWM Block	Developed Portions	Outflow From Pond	Outflow From Site
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.021	0.012	1.500	0.007	0.004	0.153	0.070	0.073
5	0.030	0.027	1.417	0.017	0.008	0.223	0.089	0.093
10	0.037	0.041	1.417	0.026	0.012	0.292	0.147	0.154
25	0.046	0.059	1.417	0.038	0.018	0.368	0.230	0.243
50	0.053	0.076	1.417	0.048	0.023	0.423	0.275	0.291
100	0.060	0.094	1.417	0.059	0.028	0.481	0.317	0.336

Notes

1. West Block to be restricted.

3240 Drummond Concession 5A, R.R.7 Perth, Ontario K7H 3C9 Tel.: 613.267.6524 Fax: 613.267.7992
info@mcintoshperry.com www.mcintoshperry.com

Post-Development Controlled - VO5 Model



CCO-13-9668-01 - PERTHMORE SUBDIVISION - POST-DEVELOPMENT - RESULTS - CONTROLLED

12 hour SCS				
	POST	PRE		
Return Period	Outflow From Site	Outflow from Site	Post to Pre	Post to Pre
Yrs	m^3/s	m^3/s	Δ	%
2	0.087	0.114	-0.027	23.7%
5	0.198	0.211	-0.013	6.2%
10	0.279	0.278	0.001	-0.4%
25	0.356	0.383	-0.027	7.0%
50	0.411	0.463	-0.052	11.2%
100	0.467	0.560	-0.093	16.6%

4 hour Chicago				
	POST	PRE		
Return Period	Outflow From Site	Outflow from Site	Post to Pre	Post to Pre
Yrs	m^3/s	m^3/s	Δ	Δ
2	0.073	0.053	0.020	-37.7%
5	0.093	0.105	-0.012	11.4%
10	0.154	0.149	0.005	-3.4%
25	0.240	0.210	0.030	-14.3%
50	0.290	0.262	0.028	-10.7%
100	0.330	0.317	0.013	-4.1%

3240 Drummond Concession 5A, R.R.7 Perth, Ontario K7H 3C9 Tel.: 613.267.6524 Fax: 613.267.7992
info@mcintoshperry.com www.mcintoshperry.com

CCO-13-9668-01 - PERTHMORE SUBDIVISION - STAGE / STORAGE / DISCHARGE TABLE

VO6 Route Reservoir Input - Rating Curve

Stage (m)	Discharge (m^3/s)	Storage (ha.m)	Storage (m^3)	
133.36	0	0.0000	0	
133.46	0.041	0.0120	120	
133.56	0.058	0.0253	253	
133.66	0.071	0.0399	399	25mm - 259 m³
133.76	0.083	0.0559	559	
133.86	0.092	0.0732	732	
133.96	0.250	0.0918	918	5year - 849 m³
134.06	0.320	0.1116	1116	
134.16	0.375	0.1321	1321	
134.26	0.422	0.1535	1535	
134.36	0.463	0.1758	1758	100year-1614 m³
134.46	0.651	0.1989	1989	
134.56	0.748	0.2228	2228	
134.66	0.828	0.2476	2476	
134.76	0.899	0.2733	2733	
134.86	0.964	0.2998	2998	
134.96	1.024	0.3263	3263	
135.06	1.080	0.3528	3528	

For Orifice Flow, C =	0.60
For Weir Flow, C =	1.84

	Orifice 1	Orifice 2	Orifice 3
Invert Elevation	133.36	133.86	134.36
Center of Crest Elevation			
Orifice Width/Weir Length	250 mm	475 mm	475 mm
Orifice Height			
Orifice Area (m^2)	0.049	0.177	0.177

Elevation	Orifice 1		Orifice 2		Orifice 3		Total
	H [m]	Q [l/s]	H [m]	Q [l/s]	H [m]	Q [l/s]	Q [l/s]
133.36	0.00	0					0
133.46	0.10	41					41
133.56	0.20	58					58
133.66	0.30	71					71
133.76	0.40	83					83
133.86	0.50	92					92
133.96	0.60	101	0.10	149			250
134.06	0.70	109	0.20	211			320
134.16	0.80	117	0.30	258			375
134.26	0.90	124	0.40	298			422
134.36	1.00	130	0.50	333			463
134.46	1.10	137	0.60	365	0.10	149	651
134.56	1.20	143	0.70	394	0.20	211	748
134.66	1.30	149	0.80	421	0.30	258	828
134.76	1.40	154	0.90	447	0.40	298	899
134.86	1.50	160	1.00	471	0.50	333	964
134.96	1.60	165	1.10	494	0.60	365	1024
135.06	1.70	170	1.20	516	0.70	394	1080

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.

*2. Orifice Equation: $Q = cA(2gh)^{1/2}$ (m^3/s *1000 = l/s)*

*3. Weir Equation: $Q = CLH^{3/2}$ (m^3/s *1000 = l/s)*

4. These Computations Do Not Account for Submergence Effects

5. H for orifice equations is depth of water above the centroide of the orifice.

6. H for weir equations is depth of water above the weir crest.

Reference: Urban Hydrology, Hydraulics and Stormwater Quality: engineering application and computer modeling / A. Akan, Robert J. Houghtalen, 2003.

CCO-13-9668-01 - PERTHMORE SUBDIVISION - EXTENDED DETENSION AND DRAWDOWN

Table E-3

As per the Section 4.6.2 (Wet Ponds) of the MECP Stormwater Management Planning and Design Manual, March 2003, a detention time of 24 hours should be targeted in all instances. The detention time can be easily solved if the relationship between pond surface area and pond depth is approximated using a linear regression equation as follows:

A1 **Drawdown Time Equation ---->**

$$t = \frac{0.66\, C_2\, h^{1.5} + 2\, C_3\, h^{0.5}}{2.75\, A_o}$$

Equation 4.11 (MECP SWM Planning Design Manual, 2003)

where,

t =	Drawdown time in seconds
C_2 =	Slope coefficient from the area-depth linear regression
C_3 =	Intercept from the area-depth linear regression
h =	Maximum water elevation above the orifice (m)
A_o =	Cross-sectional area of the orifice (m^2)

The relationship between A and h using Linear Regression (i.e., $A = C_2 h + C_3$)

Orifice Details:

Orifice Diameter =	75 mm	150 mm
Orifice Invert Elevation =	133.36 m	133.86 m

Active Storage Pond Details:

Active Storage Elevation (m)	Max Water Elevation Above Orifice (m)	Surface area of the Pond (m^2)	
133.36	0.00	1,374.00	Permanent Pool Level
133.46	0.10	1,452.00	
133.76	0.40	1,691.00	Extended Detention
133.86	0.50	1,772.00	150mm orifice
133.96	0.60	1,852.00	25mm event

Drawdown Time Results (During Construction):	Extended Detention	25mm Event	
Orifices	75 mm	75 mm	150 mm
Slope (C_2) =	793	793	800
Intercept (C_3) =	1,373	1,373	1,372
Maximum Water Elevation Above Orifice (h) =	0.40 m	0.40 m	0.20 m
Therefore, A =	1,691	1,691	1,532
Cross-sectional area of the orifice (A_o) =	0.004 m2	0.004 m2	0.018 m2
Drawdown time	153,899 s	153,899 s	26,224 s
Drawdown Time	**43 hrs**	**43 hrs**	**8 hrs**
		51 hrs	

CCO-13-9668-01 - PERTHMORE SUBDIVISION - STORMWATER MANAGEMENT POND FOREBAY AND PERMANENT POOL STORAGE VOLUME

Cell 1		
Elevation (m)	Total Storage (m^3)	
131.76	0	
131.86	9	
131.96	20	
132.06	32	
132.16	47	
132.26	64	
132.36	82	
132.46	103	
132.56	127	
132.66	153	
132.76	181	*Top of forebay*

Cell 2	
Elevation (m)	Total Storage (m^3)
131.26	0
131.36	6
131.46	14
131.56	23
131.66	34
131.76	46
131.86	60
131.96	76
132.06	93
132.16	113
132.26	134
132.36	158
132.46	183
132.56	211
132.66	241
132.76	274
132.86	353
132.96	441
133.06	535
133.16	638
133.26	747
133.36	867

Combined		
Elevation (m)	Total Storage (m^3)	
131.26	0	
131.36	6	
131.46	14	
131.56	23	
131.66	34	
131.76	46	
131.86	60	
131.96	76	
132.06	93	
132.16	113	
132.26	134	
132.36	158	
132.46	183	
132.56	211	
132.66	241	
132.76	454	
132.86	534	
132.96	621	
133.06	716	
133.16	818	
133.26	928	
133.36	1048	*Top of Permanent Pool*

1. Forebay Storage Volumes

A conservative estimate for forebay volume is equal to or greater than ten (10) years of sediment accumulation.
The conservative estimate for minimum forebay volume based on ten (10) times the sediment accumulation is 143 m3.
The total forebay volume is 181 m3.
Therefore, the forebay volume meets the conservative minimum requirements for total volume.

2. Permanent Pool Storage Volumes

Total Permanent Pool Volume Required = 966 m^3
Total Permanent Pool Volume Provided = 1048 m^3
Therefore, the permanent pool volume provided is greater than the required volume.

q

3. Settling Length

Distance = $\dfrac{rQ_p}{V_s}$ Equation 4.5 : Settling Length, MECP SMPDM, March 2003

Length-to-Width Ratio --->	$r =$	2	(recommended)
Peak Flow Rate --->	$Q_p =$	0.18 m^3/s	(quality storm outflow --- 25mm storm event)
Settling Velocity --->	$V_s =$	0.0003 m/s	(recommended)

Distance = 35 m **Settling Length (based on settling particles of approx. 0.15mm diameter)**

4. Dispersion Length

Distance = $\dfrac{(8Q)}{dV_f}$ Equation 4.6 : Dispersion Length, MECP SMPDM March 2003

Inlet Flow Rate --->	$Q =$	0.44 m^3/s	(5 year Post)
Depth of Permanent Pool --->	$d =$	1.00 m	(in Forebay)
Settling Velocity --->	$V_f =$	0.5 m/s	(recommended)

Distance = 7 m **Length of dispersion (based on pipe full flow capacity)**

The forebay should be 35 m long to settle particles and for pipe full flow dispersion.
The forebay length provided in the proposed pond design is 40 m long for particle settlement and dispersion.
Therefore, the forebay length meets the minimum requirements for particle settlement and dispersion

5. Forebay Width

Width = $\frac{\text{Dist.}}{8}$ Equation 4.7 : Minimum Forebay Bottom Width

Width = $\frac{35}{8}$ = 4 m

The forebay deep zone should be at least 4 m wide.
The forebay deep zone width provided in the proposed pond design is 4 m wide.
Therefore, the forebay deep zone provided meets the minimum requirements for bottom width.

6. Forebay Surface Area Sh

In all instances the forebay surface area should not exceed one-third (33.3 %) of the total permanent pool area:

Forebay surface area = 344 m^2
Permanent Pool surface area = 1374 m^2
The forebay surface area is 25.0% of the pond surface area
Therefore, the pond surface area meets the MECP requirements.

7. Forebay Volume

In all instances the forebay volume should not exceed 20% of the total permanent pool volume:

Forebay volume = 181 m^3
Total Permanent Pool Volume = 1048 m^3
The forebay volume is ---> 17% of the total permanent pool volume
Therefore, the pond volume meets the MECP requirements.

CCO-13-9668-01 - PERTHMORE SUBDIVISION - STORMWATER MANAGEMENT POND CLEANOUT FREQUENCY

Catchment Imperviousness	Annual Loading (kg/ha)	Wet Density (kg/m^3)	Annual Loading (m^3/ha)
35%	770	1,230	0.6
55%	2,300	1,230	1.9
70%	3,495	1,230	2.8
85%	4,680	1,230	3.8

Requirements		Pond 1	Units
Catchment Imperviousness	=	50%	
Sediment Loading Per 1-Year	=	1.6	m^3/ha
Total Area to Pond	=	11.4	ha
Yearly Sediment to Pond	=	17.9	m^3
Initial Removal Efficiency	=	80%	
Yearly Accumulation in Pond	=	14.3	m^3
Required Quality Volume	=	*140*	m^3/ha
Required Permanent Pool Volume [(140 - 80 Extended Detention) x Total Area]	=	682	m^3
Permanent Pool Volume Provided	**=**	**1,048**	**m^3**
Required Quality Volume @ 5% less Efficient	=	*133*	m^3/ha
Required Permanent Pool Volume @ 5% less Efficient [(133 - 80 Extended Detention) x Total Area]	=	603	m^3
Total Sediment Accumlation Allowed Before Removal Required (Provided - Max Allowed 5% Reduction)	=	446	m^3
Total Approximate Number of Years Before Sediment Removal is Required	**=**	**32**	**years**

See Extended Detention and Permanent Pool Volumes

CCO-13-9668-01 - PERTHMORE SUBDIVISION - STORMWATER MANAGEMENT POND EMERGENCY SPILLWAY

Outlet Control Device - Outlet Control Structure

For Orifice Flow, C =	0.60
For Weir Flow, C =	1.70

	Emergency Weir
Invert Elevation	134.76
Weir Length	7.50 m

Elevation	Weir		Total
	H [m]	Q [l/s]	Q [l/s]
134.76	x	x	0
134.86	0.10	403	403
134.96	0.20	1140	1140
135.06	0.30	2095	2095

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.

*2. Orifice Equation: $Q = cA(2gh)^{1/2}$ (m^3/s *1000 = l/s)*

*3. Weir Equation: $Q = CLH^{3/2}$ (m^3/s *1000 = l/s)*

4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.

Reference: Urban Hydrology, Hydraulics and Stormwater Quality: engineering application and computer modeling

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

      V    V   I    SSSSS  U    U    A     L              (v 6.2.2011)
      V    V   I    SS     U    U   A A    L
       V  V    I     SS    U    U  AAAAA   L
       V  V    I      SS   U    U  A    A  L
        VV     I    SSSSS  UUUUU  A    A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
```



```
                   ***** D E T A I L E D   O U T P U T *****


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

  Output  filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\e71a1c02-8110-411f-84d6-8608f2
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\e71a1c02-8110-411f-84d6-8608f2


DATE: 06-15-2023                          TIME: 02:15:48

USER:


COMMENTS: ____________________________________________________________


-------------------------------------------------------------------------------------
-----------------------
  ************************************************
  ** SIMULATION : 002yr 12hr 15min SCS          **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                  |              ata\Local\Temp\
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\82441fcb
| Ptotal= 43.20 mm |    Comments: created from IDF Group New IDFGroup - 2
```

```
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    0.00 |  3.25    1.73 |  6.50    7.78 |  9.75    1.51
                 0.25    1.08 |  3.50    1.73 |  6.75    3.46 | 10.00    1.51
                 0.50    1.08 |  3.75    1.73 |  7.00    3.46 | 10.25    0.86
                 0.75    1.08 |  4.00    1.73 |  7.25    2.59 | 10.50    0.86
                 1.00    1.08 |  4.25    2.59 |  7.50    2.59 | 10.75    0.86
                 1.25    1.08 |  4.50    2.59 |  7.75    2.59 | 11.00    0.86
                 1.50    1.08 |  4.75    3.46 |  8.00    2.59 | 11.25    0.86
                 1.75    1.08 |  5.00    3.46 |  8.25    1.51 | 11.50    0.86
                 2.00    1.08 |  5.25    5.18 |  8.50    1.51 | 11.75    0.86
                 2.25    1.30 |  5.50    5.18 |  8.75    1.51 | 12.00    0.86
                 2.50    1.30 |  5.75   20.74 |  9.00    1.51 |
                 2.75    1.30 |  6.00   57.02 |  9.25    1.51 |
                 3.00    1.30 |  6.25    7.78 |  9.50    1.51 |

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

--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.81          2.81
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     193.56         10.00
    Mannings n          =       0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
                0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
                0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
                0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
                0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
                0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
                1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
                1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
                1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
                1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
```

```
                1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
                1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
                1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
                1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
                1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
                1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
                1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
                1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
                2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
                2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
                2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
                2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
                2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
                2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
                2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
                2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
                2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
                2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
                2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
                2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
                3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
                3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Max.Eff.Inten.(mm/hr)=      57.02        18.93
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.75 (ii)    9.19 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.22         0.12
                                                         *TOTALS*
     PEAK FLOW      (cms)=        0.30         0.10         0.406 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33          6.25
     RUNOFF VOLUME    (mm)=      42.20         8.84         20.52
     TOTAL RAINFALL   (mm)=      43.20        43.20         43.20
     RUNOFF COEFFICIENT   =       0.98         0.20          0.47

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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

```
                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
                0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
                0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
                0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
                0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
                0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
                1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
                1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
                1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
                1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
                1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
                1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
                1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
                1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
                1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
                1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
                1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
                1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
                2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
                2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
                2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
                2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
                2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
                2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
                2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
                2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
                2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
                2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
                2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
                2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
                3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
                3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

    Unit Hyd Qpeak  (cms)=   0.167

    PEAK FLOW      (cms)=   0.022 (i)
    TIME TO PEAK    (hrs)=   6.333
    RUNOFF VOLUME    (mm)=   9.330
    TOTAL RAINFALL   (mm)=  43.200
    RUNOFF COEFFICIENT   =   0.216

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                     ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                 0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                 0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                 0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                 0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                 0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
                 0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
                 0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
                 0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
                 0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
                 0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
                 1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
                 1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
                 1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
                 1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
                 1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
                 1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
                 1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
                 1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
                 1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
                 1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
                 1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
                 1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
                 2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
                 2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
                 2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
                 2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
                 2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
                 2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
                 2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
                 2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
                 2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
                 2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
                 2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
                 2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
                 3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
                 3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.011 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=   9.333
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.216

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                                     ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                 0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                 0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                 0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                 0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                 0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
                 0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
                 0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
                 0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
                 0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
                 0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
                 1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
                 1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
                 1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
                 1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
                 1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
                 1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
                 1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
                 1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
                 1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
                 1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
                 1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
                 1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
                 2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
                 2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
                 2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
                 2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
                 2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
                 2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
                 2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
                 2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
                 2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
                 2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
                 2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
                 2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
                 3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
                 3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.035 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=   8.657
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.200

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                                     ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                 0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                 0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                 0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                 0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                 0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
                 0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
                 0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
                 0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
                 0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
                 0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
                 1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
                 1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
                 1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
                 1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
                 1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
                 1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
                 1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
                 1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
                 1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
                 1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
                 1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
                 1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
                 2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
                 2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
                 2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
                 2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
                 2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
                 2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
                 2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
                 2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
                 2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
                 2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
                 2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
                 2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
                 3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
                 3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.019 (i)
     TIME TO PEAK    (hrs)=   6.250
     RUNOFF VOLUME    (mm)=   8.604
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.199

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

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


                                     ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                 0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                 0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                 0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                 0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                 0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
```

```
               0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
               0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
               0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
               0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
               0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
               1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
               1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
               1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
               1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
               1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
               1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
               1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
               1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
               1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
               1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
               1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
               1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
               2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
               2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
               2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
               2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
               2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
               2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
               2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
               2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
               2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
               2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
               2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
               2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
               3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
               3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Max.Eff.Inten.(mm/hr)=      47.95        13.86
                over (min)       20.00        40.00
     Storage Coeff.  (min)=      19.95 (ii)   39.10 (ii)
     Unit Hyd. Tpeak (min)=      20.00        40.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.04          0.184 (iii)
     TIME TO PEAK    (hrs)=       6.42         6.83          6.42
     RUNOFF VOLUME    (mm)=      42.20         8.84         20.51
     TOTAL RAINFALL   (mm)=      43.20        43.20         43.20
     RUNOFF COEFFICIENT   =       0.98         0.20          0.47


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
```

```
--------------------
| CALIB              |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71          1.71
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     151.22         40.00
     Mannings n          =      0.013         0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                   0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                   0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                   0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                   0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                   0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                   0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
                   0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
                   0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
                   0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
                   0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
                   0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
                   1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
                   1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
                   1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
                   1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
                   1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
                   1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
                   1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
                   1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
                   1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
                   1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
                   1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
                   1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
                   2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
                   2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
                   2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
                   2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
                   2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
                   2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
                   2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
                   2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
                   2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
                   2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
                   2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
```

```
               2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
               3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
               3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Max.Eff.Inten.(mm/hr)=      57.02        17.16
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.10 (ii)   18.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.24         0.06
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.04          0.215 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.42          6.25
     RUNOFF VOLUME    (mm)=      42.20         8.84         20.52
     TOTAL RAINFALL   (mm)=      43.20        43.20         43.20
     RUNOFF COEFFICIENT   =       0.98         0.20          0.47

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.0900     0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430     0.215      6.25      20.52
   OUTFLOW: ID= 1 (  0029)      3.430     0.029      7.08      20.42

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.41
                  TIME SHIFT OF PEAK FLOW         (min)= 50.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0384

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.011     6.33     9.33
      + ID2= 2 (  0029):     3.43   0.029     7.08    20.42
        ===================================================
        ID = 3 (  0007):     3.84   0.034     6.42    19.23
```

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.034     6.42    19.23
      + ID2= 2 (  0030):     1.56   0.035     6.33     8.66
        ===================================================
        ID = 1 (  0007):     5.40   0.068     6.33    16.18

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.40   0.068     6.33    16.18
      + ID2= 2 (  0031):     0.65   0.019     6.25     8.60
        ===================================================
        ID = 3 (  0007):     6.05   0.086     6.33    15.37

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     6.05   0.086     6.33    15.37
      + ID2= 2 (  0005):     5.32   0.184     6.42    20.51
        ===================================================
        ID = 1 (  0007):    11.37   0.264     6.42    17.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.4220     0.1535
                          0.0410     0.0120    |   0.4630     0.1758
                          0.0580     0.0253    |   0.6510     0.1989
                          0.0710     0.0399    |   0.7480     0.2228
                          0.0830     0.0559    |   0.8280     0.2476
                          0.0920     0.0732    |   0.8990     0.2733
                          0.2500     0.0918    |   0.9640     0.2998
                          0.3200     0.1116    |   1.0240     0.3263
                          0.3750     0.1321    |   1.0800     0.3528
```

```
                         AREA     QPEAK     TPEAK       R.V.
                         (ha)     (cms)     (hrs)       (mm)
INFLOW : ID= 2 (  0007)     11.370      0.264      6.42      17.77
OUTFLOW: ID= 1 (  0008)     11.370      0.084      7.50      17.77

          PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.99
          TIME SHIFT OF PEAK FLOW         (min)= 65.00
          MAXIMUM  STORAGE   USED       (ha.m.)=  0.0588

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.022     6.33     9.33
      + ID2= 2 (  0008):    11.37   0.084     7.50    17.77
        ==================================================
        ID = 3 (  0016):    12.20   0.087     7.33    17.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.30	6.250	57.02	9.33	1.51
0.167	0.00	3.250	1.30	6.333	7.78	9.42	1.51
0.250	0.00	3.333	1.73	6.417	7.78	9.50	1.51
0.333	1.08	3.417	1.73	6.500	7.78	9.58	1.51
0.417	1.08	3.500	1.73	6.583	7.78	9.67	1.51
0.500	1.08	3.583	1.73	6.667	7.78	9.75	1.51
0.583	1.08	3.667	1.73	6.750	7.78	9.83	1.51
0.667	1.08	3.750	1.73	6.833	3.46	9.92	1.51
0.750	1.08	3.833	1.73	6.917	3.46	10.00	1.51
0.833	1.08	3.917	1.73	7.000	3.46	10.08	1.51
0.917	1.08	4.000	1.73	7.083	3.46	10.17	1.51
1.000	1.08	4.083	1.73	7.167	3.46	10.25	1.51
1.083	1.08	4.167	1.73	7.250	3.46	10.33	0.86
1.167	1.08	4.250	1.73	7.333	2.59	10.42	0.86
1.250	1.08	4.333	2.59	7.417	2.59	10.50	0.86
1.333	1.08	4.417	2.59	7.500	2.59	10.58	0.86
1.417	1.08	4.500	2.59	7.583	2.59	10.67	0.86
1.500	1.08	4.583	2.59	7.667	2.59	10.75	0.86
1.583	1.08	4.667	2.59	7.750	2.59	10.83	0.86
1.667	1.08	4.750	2.59	7.833	2.59	10.92	0.86
1.750	1.08	4.833	3.46	7.917	2.59	11.00	0.86
1.833	1.08	4.917	3.46	8.000	2.59	11.08	0.86
1.917	1.08	5.000	3.46	8.083	2.59	11.17	0.86
2.000	1.08	5.083	3.46	8.167	2.59	11.25	0.86
2.083	1.08	5.167	3.46	8.250	2.59	11.33	0.86
2.167	1.08	5.250	3.46	8.333	1.51	11.42	0.86
2.250	1.08	5.333	5.18	8.417	1.51	11.50	0.86
2.333	1.30	5.417	5.18	8.500	1.51	11.58	0.86
2.417	1.30	5.500	5.18	8.583	1.51	11.67	0.86
2.500	1.30	5.583	5.18	8.667	1.51	11.75	0.86
2.583	1.30	5.667	5.18	8.750	1.51	11.83	0.86
2.667	1.30	5.750	5.18	8.833	1.51	11.92	0.86
2.750	1.30	5.833	20.74	8.917	1.51	12.00	0.86
2.833	1.30	5.917	20.74	9.000	1.51	12.08	0.86
2.917	1.30	6.000	20.74	9.083	1.51	12.17	0.86
3.000	1.30	6.083	57.02	9.167	1.51	12.25	0.86
3.083	1.30	6.167	57.02	9.250	1.51		

```
     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.114 (i)
     TIME TO PEAK    (hrs)=   6.833
     RUNOFF VOLUME    (mm)=   7.354
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.170

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.30	6.250	57.02	9.33	1.51
0.167	0.00	3.250	1.30	6.333	7.78	9.42	1.51
0.250	0.00	3.333	1.73	6.417	7.78	9.50	1.51
0.333	1.08	3.417	1.73	6.500	7.78	9.58	1.51
0.417	1.08	3.500	1.73	6.583	7.78	9.67	1.51
0.500	1.08	3.583	1.73	6.667	7.78	9.75	1.51
0.583	1.08	3.667	1.73	6.750	7.78	9.83	1.51
0.667	1.08	3.750	1.73	6.833	3.46	9.92	1.51
0.750	1.08	3.833	1.73	6.917	3.46	10.00	1.51
0.833	1.08	3.917	1.73	7.000	3.46	10.08	1.51
0.917	1.08	4.000	1.73	7.083	3.46	10.17	1.51
1.000	1.08	4.083	1.73	7.167	3.46	10.25	1.51
1.083	1.08	4.167	1.73	7.250	3.46	10.33	0.86
1.167	1.08	4.250	1.73	7.333	2.59	10.42	0.86
1.250	1.08	4.333	2.59	7.417	2.59	10.50	0.86
1.333	1.08	4.417	2.59	7.500	2.59	10.58	0.86
1.417	1.08	4.500	2.59	7.583	2.59	10.67	0.86
1.500	1.08	4.583	2.59	7.667	2.59	10.75	0.86
1.583	1.08	4.667	2.59	7.750	2.59	10.83	0.86
1.667	1.08	4.750	2.59	7.833	2.59	10.92	0.86
1.750	1.08	4.833	3.46	7.917	2.59	11.00	0.86
1.833	1.08	4.917	3.46	8.000	2.59	11.08	0.86
1.917	1.08	5.000	3.46	8.083	2.59	11.17	0.86
2.000	1.08	5.083	3.46	8.167	2.59	11.25	0.86
2.083	1.08	5.167	3.46	8.250	2.59	11.33	0.86
2.167	1.08	5.250	3.46	8.333	1.51	11.42	0.86
2.250	1.08	5.333	5.18	8.417	1.51	11.50	0.86
2.333	1.30	5.417	5.18	8.500	1.51	11.58	0.86
2.417	1.30	5.500	5.18	8.583	1.51	11.67	0.86
2.500	1.30	5.583	5.18	8.667	1.51	11.75	0.86
2.583	1.30	5.667	5.18	8.750	1.51	11.83	0.86
2.667	1.30	5.750	5.18	8.833	1.51	11.92	0.86
2.750	1.30	5.833	20.74	8.917	1.51	12.00	0.86
2.833	1.30	5.917	20.74	9.000	1.51	12.08	0.86
2.917	1.30	6.000	20.74	9.083	1.51	12.17	0.86
3.000	1.30	6.083	57.02	9.167	1.51	12.25	0.86
3.083	1.30	6.167	57.02	9.250	1.51		

```
     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.022 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=   9.330
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.216

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.30	6.250	57.02	9.33	1.51
0.167	0.00	3.250	1.30	6.333	7.78	9.42	1.51
0.250	0.00	3.333	1.73	6.417	7.78	9.50	1.51
0.333	1.08	3.417	1.73	6.500	7.78	9.58	1.51
0.417	1.08	3.500	1.73	6.583	7.78	9.67	1.51
0.500	1.08	3.583	1.73	6.667	7.78	9.75	1.51
0.583	1.08	3.667	1.73	6.750	7.78	9.83	1.51
0.667	1.08	3.750	1.73	6.833	3.46	9.92	1.51
0.750	1.08	3.833	1.73	6.917	3.46	10.00	1.51
0.833	1.08	3.917	1.73	7.000	3.46	10.08	1.51
0.917	1.08	4.000	1.73	7.083	3.46	10.17	1.51
1.000	1.08	4.083	1.73	7.167	3.46	10.25	1.51
1.083	1.08	4.167	1.73	7.250	3.46	10.33	0.86
1.167	1.08	4.250	1.73	7.333	2.59	10.42	0.86
1.250	1.08	4.333	2.59	7.417	2.59	10.50	0.86
1.333	1.08	4.417	2.59	7.500	2.59	10.58	0.86
1.417	1.08	4.500	2.59	7.583	2.59	10.67	0.86
1.500	1.08	4.583	2.59	7.667	2.59	10.75	0.86
1.583	1.08	4.667	2.59	7.750	2.59	10.83	0.86
1.667	1.08	4.750	2.59	7.833	2.59	10.92	0.86
1.750	1.08	4.833	3.46	7.917	2.59	11.00	0.86
1.833	1.08	4.917	3.46	8.000	2.59	11.08	0.86
1.917	1.08	5.000	3.46	8.083	2.59	11.17	0.86
2.000	1.08	5.083	3.46	8.167	2.59	11.25	0.86
2.083	1.08	5.167	3.46	8.250	2.59	11.33	0.86
2.167	1.08	5.250	3.46	8.333	1.51	11.42	0.86
2.250	1.08	5.333	5.18	8.417	1.51	11.50	0.86
2.333	1.30	5.417	5.18	8.500	1.51	11.58	0.86
2.417	1.30	5.500	5.18	8.583	1.51	11.67	0.86
2.500	1.30	5.583	5.18	8.667	1.51	11.75	0.86
2.583	1.30	5.667	5.18	8.750	1.51	11.83	0.86
2.667	1.30	5.750	5.18	8.833	1.51	11.92	0.86
2.750	1.30	5.833	20.74	8.917	1.51	12.00	0.86
2.833	1.30	5.917	20.74	9.000	1.51	12.08	0.86
2.917	1.30	6.000	20.74	9.083	1.51	12.17	0.86
3.000	1.30	6.083	57.02	9.167	1.51	12.25	0.86
3.083	1.30	6.167	57.02	9.250	1.51		

```
     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.011 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=   9.333
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.216

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
```

```
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.30	6.250	57.02	9.33	1.51
0.167	0.00	3.250	1.30	6.333	7.78	9.42	1.51
0.250	0.00	3.333	1.73	6.417	7.78	9.50	1.51
0.333	1.08	3.417	1.73	6.500	7.78	9.58	1.51
0.417	1.08	3.500	1.73	6.583	7.78	9.67	1.51
0.500	1.08	3.583	1.73	6.667	7.78	9.75	1.51
0.583	1.08	3.667	1.73	6.750	7.78	9.83	1.51
0.667	1.08	3.750	1.73	6.833	3.46	9.92	1.51
0.750	1.08	3.833	1.73	6.917	3.46	10.00	1.51
0.833	1.08	3.917	1.73	7.000	3.46	10.08	1.51
0.917	1.08	4.000	1.73	7.083	3.46	10.17	1.51
1.000	1.08	4.083	1.73	7.167	3.46	10.25	1.51
1.083	1.08	4.167	1.73	7.250	3.46	10.33	0.86
1.167	1.08	4.250	1.73	7.333	2.59	10.42	0.86
1.250	1.08	4.333	2.59	7.417	2.59	10.50	0.86
1.333	1.08	4.417	2.59	7.500	2.59	10.58	0.86
1.417	1.08	4.500	2.59	7.583	2.59	10.67	0.86
1.500	1.08	4.583	2.59	7.667	2.59	10.75	0.86
1.583	1.08	4.667	2.59	7.750	2.59	10.83	0.86
1.667	1.08	4.750	2.59	7.833	2.59	10.92	0.86
1.750	1.08	4.833	3.46	7.917	2.59	11.00	0.86
1.833	1.08	4.917	3.46	8.000	2.59	11.08	0.86
1.917	1.08	5.000	3.46	8.083	2.59	11.17	0.86
2.000	1.08	5.083	3.46	8.167	2.59	11.25	0.86
2.083	1.08	5.167	3.46	8.250	2.59	11.33	0.86
2.167	1.08	5.250	3.46	8.333	1.51	11.42	0.86
2.250	1.08	5.333	5.18	8.417	1.51	11.50	0.86
2.333	1.30	5.417	5.18	8.500	1.51	11.58	0.86
2.417	1.30	5.500	5.18	8.583	1.51	11.67	0.86
2.500	1.30	5.583	5.18	8.667	1.51	11.75	0.86
2.583	1.30	5.667	5.18	8.750	1.51	11.83	0.86
2.667	1.30	5.750	5.18	8.833	1.51	11.92	0.86
2.750	1.30	5.833	20.74	8.917	1.51	12.00	0.86
2.833	1.30	5.917	20.74	9.000	1.51	12.08	0.86
2.917	1.30	6.000	20.74	9.083	1.51	12.17	0.86
3.000	1.30	6.083	57.02	9.167	1.51	12.25	0.86
3.083	1.30	6.167	57.02	9.250	1.51		

```
     Max.Eff.Inten.(mm/hr)=      47.95        13.86
                over (min)       20.00        40.00
     Storage Coeff.  (min)=      19.95 (ii)   39.10 (ii)
     Unit Hyd. Tpeak (min)=      20.00        40.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.04        0.184 (iii)
     TIME TO PEAK    (hrs)=       6.42         6.83         6.42
     RUNOFF VOLUME    (mm)=      42.20         8.84        20.51
     TOTAL RAINFALL   (mm)=      43.20        43.20        43.20
     RUNOFF COEFFICIENT   =       0.98         0.20         0.47

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.30	6.250	57.02	9.33	1.51
0.167	0.00	3.250	1.30	6.333	7.78	9.42	1.51
0.250	0.00	3.333	1.73	6.417	7.78	9.50	1.51
0.333	1.08	3.417	1.73	6.500	7.78	9.58	1.51
0.417	1.08	3.500	1.73	6.583	7.78	9.67	1.51
0.500	1.08	3.583	1.73	6.667	7.78	9.75	1.51
0.583	1.08	3.667	1.73	6.750	7.78	9.83	1.51
0.667	1.08	3.750	1.73	6.833	3.46	9.92	1.51
0.750	1.08	3.833	1.73	6.917	3.46	10.00	1.51
0.833	1.08	3.917	1.73	7.000	3.46	10.08	1.51
0.917	1.08	4.000	1.73	7.083	3.46	10.17	1.51
1.000	1.08	4.083	1.73	7.167	3.46	10.25	1.51
1.083	1.08	4.167	1.73	7.250	3.46	10.33	0.86
1.167	1.08	4.250	1.73	7.333	2.59	10.42	0.86
1.250	1.08	4.333	2.59	7.417	2.59	10.50	0.86
1.333	1.08	4.417	2.59	7.500	2.59	10.58	0.86
1.417	1.08	4.500	2.59	7.583	2.59	10.67	0.86
1.500	1.08	4.583	2.59	7.667	2.59	10.75	0.86
1.583	1.08	4.667	2.59	7.750	2.59	10.83	0.86
1.667	1.08	4.750	2.59	7.833	2.59	10.92	0.86
1.750	1.08	4.833	3.46	7.917	2.59	11.00	0.86
1.833	1.08	4.917	3.46	8.000	2.59	11.08	0.86
1.917	1.08	5.000	3.46	8.083	2.59	11.17	0.86
2.000	1.08	5.083	3.46	8.167	2.59	11.25	0.86
2.083	1.08	5.167	3.46	8.250	2.59	11.33	0.86
2.167	1.08	5.250	3.46	8.333	1.51	11.42	0.86
2.250	1.08	5.333	5.18	8.417	1.51	11.50	0.86
2.333	1.30	5.417	5.18	8.500	1.51	11.58	0.86
2.417	1.30	5.500	5.18	8.583	1.51	11.67	0.86
2.500	1.30	5.583	5.18	8.667	1.51	11.75	0.86
2.583	1.30	5.667	5.18	8.750	1.51	11.83	0.86
2.667	1.30	5.750	5.18	8.833	1.51	11.92	0.86
2.750	1.30	5.833	20.74	8.917	1.51	12.00	0.86
2.833	1.30	5.917	20.74	9.000	1.51	12.08	0.86
2.917	1.30	6.000	20.74	9.083	1.51	12.17	0.86
3.000	1.30	6.083	57.02	9.167	1.51	12.25	0.86
3.083	1.30	6.167	57.02	9.250	1.51		

```
     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.019 (i)
     TIME TO PEAK    (hrs)=   6.250
     RUNOFF VOLUME    (mm)=   8.604
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.199

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.30	6.250	57.02	9.33	1.51
0.167	0.00	3.250	1.30	6.333	7.78	9.42	1.51
0.250	0.00	3.333	1.73	6.417	7.78	9.50	1.51
0.333	1.08	3.417	1.73	6.500	7.78	9.58	1.51
0.417	1.08	3.500	1.73	6.583	7.78	9.67	1.51
0.500	1.08	3.583	1.73	6.667	7.78	9.75	1.51
0.583	1.08	3.667	1.73	6.750	7.78	9.83	1.51
0.667	1.08	3.750	1.73	6.833	3.46	9.92	1.51
0.750	1.08	3.833	1.73	6.917	3.46	10.00	1.51
0.833	1.08	3.917	1.73	7.000	3.46	10.08	1.51
0.917	1.08	4.000	1.73	7.083	3.46	10.17	1.51
1.000	1.08	4.083	1.73	7.167	3.46	10.25	1.51
1.083	1.08	4.167	1.73	7.250	3.46	10.33	0.86
1.167	1.08	4.250	1.73	7.333	2.59	10.42	0.86
1.250	1.08	4.333	2.59	7.417	2.59	10.50	0.86
1.333	1.08	4.417	2.59	7.500	2.59	10.58	0.86
1.417	1.08	4.500	2.59	7.583	2.59	10.67	0.86
1.500	1.08	4.583	2.59	7.667	2.59	10.75	0.86
1.583	1.08	4.667	2.59	7.750	2.59	10.83	0.86
1.667	1.08	4.750	2.59	7.833	2.59	10.92	0.86
1.750	1.08	4.833	3.46	7.917	2.59	11.00	0.86
1.833	1.08	4.917	3.46	8.000	2.59	11.08	0.86
1.917	1.08	5.000	3.46	8.083	2.59	11.17	0.86
2.000	1.08	5.083	3.46	8.167	2.59	11.25	0.86
2.083	1.08	5.167	3.46	8.250	2.59	11.33	0.86
2.167	1.08	5.250	3.46	8.333	1.51	11.42	0.86
2.250	1.08	5.333	5.18	8.417	1.51	11.50	0.86
2.333	1.30	5.417	5.18	8.500	1.51	11.58	0.86
2.417	1.30	5.500	5.18	8.583	1.51	11.67	0.86
2.500	1.30	5.583	5.18	8.667	1.51	11.75	0.86
2.583	1.30	5.667	5.18	8.750	1.51	11.83	0.86
2.667	1.30	5.750	5.18	8.833	1.51	11.92	0.86
2.750	1.30	5.833	20.74	8.917	1.51	12.00	0.86
2.833	1.30	5.917	20.74	9.000	1.51	12.08	0.86
2.917	1.30	6.000	20.74	9.083	1.51	12.17	0.86
3.000	1.30	6.083	57.02	9.167	1.51	12.25	0.86
3.083	1.30	6.167	57.02	9.250	1.51		

```
     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.035 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=   8.657
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.200

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250
```

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

                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.00 | 3.167    1.30 | 6.250   57.02 |   9.33    1.51
              0.167    0.00 | 3.250    1.30 | 6.333    7.78 |   9.42    1.51
              0.250    0.00 | 3.333    1.73 | 6.417    7.78 |   9.50    1.51
              0.333    1.08 | 3.417    1.73 | 6.500    7.78 |   9.58    1.51
              0.417    1.08 | 3.500    1.73 | 6.583    7.78 |   9.67    1.51
              0.500    1.08 | 3.583    1.73 | 6.667    7.78 |   9.75    1.51
              0.583    1.08 | 3.667    1.73 | 6.750    7.78 |   9.83    1.51
              0.667    1.08 | 3.750    1.73 | 6.833    3.46 |   9.92    1.51
              0.750    1.08 | 3.833    1.73 | 6.917    3.46 |  10.00    1.51
              0.833    1.08 | 3.917    1.73 | 7.000    3.46 |  10.08    1.51
              0.917    1.08 | 4.000    1.73 | 7.083    3.46 |  10.17    1.51
              1.000    1.08 | 4.083    1.73 | 7.167    3.46 |  10.25    1.51
              1.083    1.08 | 4.167    1.73 | 7.250    3.46 |  10.33    0.86
              1.167    1.08 | 4.250    1.73 | 7.333    2.59 |  10.42    0.86
              1.250    1.08 | 4.333    2.59 | 7.417    2.59 |  10.50    0.86
              1.333    1.08 | 4.417    2.59 | 7.500    2.59 |  10.58    0.86
              1.417    1.08 | 4.500    2.59 | 7.583    2.59 |  10.67    0.86
              1.500    1.08 | 4.583    2.59 | 7.667    2.59 |  10.75    0.86
              1.583    1.08 | 4.667    2.59 | 7.750    2.59 |  10.83    0.86
              1.667    1.08 | 4.750    2.59 | 7.833    2.59 |  10.92    0.86
              1.750    1.08 | 4.833    3.46 | 7.917    2.59 |  11.00    0.86
              1.833    1.08 | 4.917    3.46 | 8.000    2.59 |  11.08    0.86
              1.917    1.08 | 5.000    3.46 | 8.083    2.59 |  11.17    0.86
              2.000    1.08 | 5.083    3.46 | 8.167    2.59 |  11.25    0.86
              2.083    1.08 | 5.167    3.46 | 8.250    2.59 |  11.33    0.86
              2.167    1.08 | 5.250    3.46 | 8.333    1.51 |  11.42    0.86
              2.250    1.08 | 5.333    5.18 | 8.417    1.51 |  11.50    0.86
              2.333    1.30 | 5.417    5.18 | 8.500    1.51 |  11.58    0.86
              2.417    1.30 | 5.500    5.18 | 8.583    1.51 |  11.67    0.86
              2.500    1.30 | 5.583    5.18 | 8.667    1.51 |  11.75    0.86
              2.583    1.30 | 5.667    5.18 | 8.750    1.51 |  11.83    0.86
              2.667    1.30 | 5.750    5.18 | 8.833    1.51 |  11.92    0.86
              2.750    1.30 | 5.833   20.74 | 8.917    1.51 |  12.00    0.86
              2.833    1.30 | 5.917   20.74 | 9.000    1.51 |  12.08    0.86
              2.917    1.30 | 6.000   20.74 | 9.083    1.51 |  12.17    0.86
              3.000    1.30 | 6.083   57.02 | 9.167    1.51 |  12.25    0.86
              3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Max.Eff.Inten.(mm/hr)=      57.02        17.16
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.10 (ii)   18.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.24         0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.04          0.215 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.42           6.25
```

```
     RUNOFF VOLUME    (mm)=      42.20         8.84         20.52
     TOTAL RAINFALL   (mm)=      43.20        43.20         43.20
     RUNOFF COEFFICIENT   =       0.98         0.20          0.47

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|  1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.011     6.33     9.33
      + ID2= 2 (  0036):     5.32   0.184     6.42    20.51
        ===================================================
        ID = 3 (  0041):     5.73   0.193     6.42    19.71

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

--------------------
| ADD HYD  (  0041)|
|  3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.193     6.42    19.71
      + ID2= 2 (  0037):     0.65   0.019     6.25     8.60
        ===================================================
        ID = 1 (  0041):     6.38   0.206     6.42    18.58

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

--------------------
| ADD HYD  (  0041)|
|  1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     6.38   0.206     6.42    18.58
      + ID2= 2 (  0038):     1.56   0.035     6.33     8.66
        ===================================================
        ID = 3 (  0041):     7.94   0.239     6.42    16.63

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

--------------------
| ADD HYD  (  0041)|
```

```
|  3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     7.94   0.239     6.42    16.63
      + ID2= 2 (  0040):     3.43   0.215     6.25    20.52
        ===================================================
        ID = 1 (  0041):    11.37   0.410     6.25    17.80

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

--------------------
| ADD HYD  (  0032)|
|  1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.022     6.33     9.33
      + ID2= 2 (  0041):    11.37   0.410     6.25    17.80
        ===================================================
        ID = 3 (  0032):    12.20   0.430     6.25    17.23

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

       V    V   I    SSSSS  U   U    A     L              (v 6.2.2011)
       V    V   I    SS     U   U   A A    L
        V  V    I     SS    U   U  AAAAA   L
        V  V    I      SS   U   U  A   A   L
         VV     I    SSSSS  UUUUU  A   A   LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
```



```
                    *****  D E T A I L E D   O U T P U T *****


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

  Output  filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\b7e8d506-c5f4-4dd3-a1a5-9c15a5
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\b7e8d506-c5f4-4dd3-a1a5-9c15a5
```

```
DATE: 06-15-2023                           TIME: 02:15:48

USER:


COMMENTS: ____________________________________________________________


----------------------------------------------------------------------------------
-----------------------
  ************************************************
  ** SIMULATION : 005yr 12hr 15min SCS          **
  ************************************************


--------------------
|   READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                 |              ata\Local\Temp\
|                 |              073789e9-0d0b-43a3-ada4-078b0c00e084\e8698180
| Ptotal= 57.60 mm |    Comments: created from IDF Group New IDFGroup - 2
--------------------
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.00    0.00 |  3.25    2.30 |   6.50   10.37 |   9.75    2.02
                  0.25    1.44 |  3.50    2.30 |   6.75    4.61 |  10.00    2.02
                  0.50    1.44 |  3.75    2.30 |   7.00    4.61 |  10.25    1.15
                  0.75    1.44 |  4.00    2.30 |   7.25    3.46 |  10.50    1.15
                  1.00    1.44 |  4.25    3.46 |   7.50    3.46 |  10.75    1.15
                  1.25    1.44 |  4.50    3.46 |   7.75    3.46 |  11.00    1.15
                  1.50    1.44 |  4.75    4.61 |   8.00    3.46 |  11.25    1.15
                  1.75    1.44 |  5.00    4.61 |   8.25    2.02 |  11.50    1.15
                  2.00    1.44 |  5.25    6.91 |   8.50    2.02 |  11.75    1.15
                  2.25    1.73 |  5.50    6.91 |   8.75    2.02 |  12.00    1.15
                  2.50    1.73 |  5.75   27.65 |   9.00    2.02 |
                  2.75    1.73 |  6.00   76.03 |   9.25    2.02 |
                  3.00    1.73 |  6.25   10.37 |   9.50    2.02 |

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

--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.81          2.81
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     193.56         10.00
     Mannings n          =      0.013         0.250
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.73	6.250	76.03	9.33	2.02
0.167	0.00	3.250	1.73	6.333	10.37	9.42	2.02
0.250	0.00	3.333	2.30	6.417	10.37	9.50	2.02
0.333	1.44	3.417	2.30	6.500	10.37	9.58	2.02
0.417	1.44	3.500	2.30	6.583	10.37	9.67	2.02
0.500	1.44	3.583	2.30	6.667	10.37	9.75	2.02
0.583	1.44	3.667	2.30	6.750	10.37	9.83	2.02
0.667	1.44	3.750	2.30	6.833	4.61	9.92	2.02
0.750	1.44	3.833	2.30	6.917	4.61	10.00	2.02
0.833	1.44	3.917	2.30	7.000	4.61	10.08	2.02
0.917	1.44	4.000	2.30	7.083	4.61	10.17	2.02
1.000	1.44	4.083	2.30	7.167	4.61	10.25	2.02
1.083	1.44	4.167	2.30	7.250	4.61	10.33	1.15
1.167	1.44	4.250	2.30	7.333	3.46	10.42	1.15
1.250	1.44	4.333	3.46	7.417	3.46	10.50	1.15
1.333	1.44	4.417	3.46	7.500	3.46	10.58	1.15
1.417	1.44	4.500	3.46	7.583	3.46	10.67	1.15
1.500	1.44	4.583	3.46	7.667	3.46	10.75	1.15
1.583	1.44	4.667	3.46	7.750	3.46	10.83	1.15
1.667	1.44	4.750	3.46	7.833	3.46	10.92	1.15
1.750	1.44	4.833	4.61	7.917	3.46	11.00	1.15
1.833	1.44	4.917	4.61	8.000	3.46	11.08	1.15
1.917	1.44	5.000	4.61	8.083	3.46	11.17	1.15
2.000	1.44	5.083	4.61	8.167	3.46	11.25	1.15
2.083	1.44	5.167	4.61	8.250	3.46	11.33	1.15
2.167	1.44	5.250	4.61	8.333	2.02	11.42	1.15
2.250	1.44	5.333	6.91	8.417	2.02	11.50	1.15
2.333	1.73	5.417	6.91	8.500	2.02	11.58	1.15
2.417	1.73	5.500	6.91	8.583	2.02	11.67	1.15
2.500	1.73	5.583	6.91	8.667	2.02	11.75	1.15
2.583	1.73	5.667	6.91	8.750	2.02	11.83	1.15
2.667	1.73	5.750	6.91	8.833	2.02	11.92	1.15
2.750	1.73	5.833	27.65	8.917	2.02	12.00	1.15
2.833	1.73	5.917	27.65	9.000	2.02	12.08	1.15
2.917	1.73	6.000	27.65	9.083	2.02	12.17	1.15
3.000	1.73	6.083	76.03	9.167	2.02	12.25	1.15
3.083	1.73	6.167	76.03	9.250	2.02		

```
Max.Eff.Inten.(mm/hr)=      76.03        32.55
           over (min)        5.00        10.00
Storage Coeff.  (min)=       4.24 (ii)    8.19 (ii)
Unit Hyd. Tpeak (min)=       5.00        10.00
Unit Hyd. peak  (cms)=       0.24         0.13
                                                     *TOTALS*
PEAK FLOW       (cms)=       0.41         0.19         0.595 (iii)
TIME TO PEAK    (hrs)=       6.25         6.25          6.25
RUNOFF VOLUME    (mm)=      56.60        15.25         29.72
TOTAL RAINFALL   (mm)=      57.60        57.60         57.60
RUNOFF COEFFICIENT  =       0.98         0.26          0.52
```

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

```
(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
     CN* =  59.0    Ia = Dep. Storage  (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
     THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.73	6.250	76.03	9.33	2.02
0.167	0.00	3.250	1.73	6.333	10.37	9.42	2.02
0.250	0.00	3.333	2.30	6.417	10.37	9.50	2.02
0.333	1.44	3.417	2.30	6.500	10.37	9.58	2.02
0.417	1.44	3.500	2.30	6.583	10.37	9.67	2.02
0.500	1.44	3.583	2.30	6.667	10.37	9.75	2.02
0.583	1.44	3.667	2.30	6.750	10.37	9.83	2.02
0.667	1.44	3.750	2.30	6.833	4.61	9.92	2.02
0.750	1.44	3.833	2.30	6.917	4.61	10.00	2.02
0.833	1.44	3.917	2.30	7.000	4.61	10.08	2.02
0.917	1.44	4.000	2.30	7.083	4.61	10.17	2.02
1.000	1.44	4.083	2.30	7.167	4.61	10.25	2.02
1.083	1.44	4.167	2.30	7.250	4.61	10.33	1.15
1.167	1.44	4.250	2.30	7.333	3.46	10.42	1.15
1.250	1.44	4.333	3.46	7.417	3.46	10.50	1.15
1.333	1.44	4.417	3.46	7.500	3.46	10.58	1.15
1.417	1.44	4.500	3.46	7.583	3.46	10.67	1.15
1.500	1.44	4.583	3.46	7.667	3.46	10.75	1.15
1.583	1.44	4.667	3.46	7.750	3.46	10.83	1.15
1.667	1.44	4.750	3.46	7.833	3.46	10.92	1.15
1.750	1.44	4.833	4.61	7.917	3.46	11.00	1.15
1.833	1.44	4.917	4.61	8.000	3.46	11.08	1.15
1.917	1.44	5.000	4.61	8.083	3.46	11.17	1.15
2.000	1.44	5.083	4.61	8.167	3.46	11.25	1.15
2.083	1.44	5.167	4.61	8.250	3.46	11.33	1.15
2.167	1.44	5.250	4.61	8.333	2.02	11.42	1.15
2.250	1.44	5.333	6.91	8.417	2.02	11.50	1.15
2.333	1.73	5.417	6.91	8.500	2.02	11.58	1.15
2.417	1.73	5.500	6.91	8.583	2.02	11.67	1.15
2.500	1.73	5.583	6.91	8.667	2.02	11.75	1.15
2.583	1.73	5.667	6.91	8.750	2.02	11.83	1.15
2.667	1.73	5.750	6.91	8.833	2.02	11.92	1.15
2.750	1.73	5.833	27.65	8.917	2.02	12.00	1.15
2.833	1.73	5.917	27.65	9.000	2.02	12.08	1.15
2.917	1.73	6.000	27.65	9.083	2.02	12.17	1.15
3.000	1.73	6.083	76.03	9.167	2.02	12.25	1.15
3.083	1.73	6.167	76.03	9.250	2.02		

```
Unit Hyd Qpeak  (cms)=   0.167

PEAK FLOW       (cms)=   0.043 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  17.090
TOTAL RAINFALL   (mm)=  57.600
RUNOFF COEFFICIENT  =    0.297

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

```
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.73	6.250	76.03	9.33	2.02
0.167	0.00	3.250	1.73	6.333	10.37	9.42	2.02
0.250	0.00	3.333	2.30	6.417	10.37	9.50	2.02
0.333	1.44	3.417	2.30	6.500	10.37	9.58	2.02
0.417	1.44	3.500	2.30	6.583	10.37	9.67	2.02
0.500	1.44	3.583	2.30	6.667	10.37	9.75	2.02
0.583	1.44	3.667	2.30	6.750	10.37	9.83	2.02
0.667	1.44	3.750	2.30	6.833	4.61	9.92	2.02
0.750	1.44	3.833	2.30	6.917	4.61	10.00	2.02
0.833	1.44	3.917	2.30	7.000	4.61	10.08	2.02
0.917	1.44	4.000	2.30	7.083	4.61	10.17	2.02
1.000	1.44	4.083	2.30	7.167	4.61	10.25	2.02
1.083	1.44	4.167	2.30	7.250	4.61	10.33	1.15
1.167	1.44	4.250	2.30	7.333	3.46	10.42	1.15
1.250	1.44	4.333	3.46	7.417	3.46	10.50	1.15
1.333	1.44	4.417	3.46	7.500	3.46	10.58	1.15
1.417	1.44	4.500	3.46	7.583	3.46	10.67	1.15
1.500	1.44	4.583	3.46	7.667	3.46	10.75	1.15
1.583	1.44	4.667	3.46	7.750	3.46	10.83	1.15
1.667	1.44	4.750	3.46	7.833	3.46	10.92	1.15
1.750	1.44	4.833	4.61	7.917	3.46	11.00	1.15
1.833	1.44	4.917	4.61	8.000	3.46	11.08	1.15
1.917	1.44	5.000	4.61	8.083	3.46	11.17	1.15
2.000	1.44	5.083	4.61	8.167	3.46	11.25	1.15
2.083	1.44	5.167	4.61	8.250	3.46	11.33	1.15
2.167	1.44	5.250	4.61	8.333	2.02	11.42	1.15
2.250	1.44	5.333	6.91	8.417	2.02	11.50	1.15
2.333	1.73	5.417	6.91	8.500	2.02	11.58	1.15
2.417	1.73	5.500	6.91	8.583	2.02	11.67	1.15
2.500	1.73	5.583	6.91	8.667	2.02	11.75	1.15
2.583	1.73	5.667	6.91	8.750	2.02	11.83	1.15
2.667	1.73	5.750	6.91	8.833	2.02	11.92	1.15
2.750	1.73	5.833	27.65	8.917	2.02	12.00	1.15
2.833	1.73	5.917	27.65	9.000	2.02	12.08	1.15
2.917	1.73	6.000	27.65	9.083	2.02	12.17	1.15
3.000	1.73	6.083	76.03	9.167	2.02	12.25	1.15
3.083	1.73	6.167	76.03	9.250	2.02		

```
Unit Hyd Qpeak  (cms)=   0.078

PEAK FLOW       (cms)=   0.020 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  17.097
TOTAL RAINFALL   (mm)=  57.600
RUNOFF COEFFICIENT  =    0.297

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

```
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.73	6.250	76.03	9.33	2.02
0.167	0.00	3.250	1.73	6.333	10.37	9.42	2.02
0.250	0.00	3.333	2.30	6.417	10.37	9.50	2.02
0.333	1.44	3.417	2.30	6.500	10.37	9.58	2.02
0.417	1.44	3.500	2.30	6.583	10.37	9.67	2.02
0.500	1.44	3.583	2.30	6.667	10.37	9.75	2.02
0.583	1.44	3.667	2.30	6.750	10.37	9.83	2.02
0.667	1.44	3.750	2.30	6.833	4.61	9.92	2.02
0.750	1.44	3.833	2.30	6.917	4.61	10.00	2.02

```
               0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
               0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
               1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
               1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
               1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
               1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
               1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
               1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
               1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
               1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
               1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
               1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
               1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
               1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
               2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
               2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
               2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
               2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
               2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
               2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
               2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
               2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
               2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
               2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
               2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
               2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
               3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
               3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.068 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  15.986
     TOTAL RAINFALL   (mm)=  57.600
     RUNOFF COEFFICIENT   =   0.278

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    1.73 | 6.250   76.03 |   9.33    2.02
               0.167    0.00 | 3.250    1.73 | 6.333   10.37 |   9.42    2.02
               0.250    0.00 | 3.333    2.30 | 6.417   10.37 |   9.50    2.02
               0.333    1.44 | 3.417    2.30 | 6.500   10.37 |   9.58    2.02
               0.417    1.44 | 3.500    2.30 | 6.583   10.37 |   9.67    2.02
               0.500    1.44 | 3.583    2.30 | 6.667   10.37 |   9.75    2.02
               0.583    1.44 | 3.667    2.30 | 6.750   10.37 |   9.83    2.02
               0.667    1.44 | 3.750    2.30 | 6.833    4.61 |   9.92    2.02
               0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
               0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
               0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
               1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
               1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
               1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
               1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
               1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
               1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
               1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
               1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
               1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
               1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
               1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
               1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
               2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
               2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
               2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
               2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
               2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
               2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
               2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
               2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
               2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
               2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
               2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
               2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
               3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
               3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.037 (i)
     TIME TO PEAK    (hrs)=   6.250
     RUNOFF VOLUME    (mm)=  15.887
     TOTAL RAINFALL   (mm)=  57.600
     RUNOFF COEFFICIENT   =   0.276

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

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


                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    1.73 | 6.250   76.03 |   9.33    2.02
               0.167    0.00 | 3.250    1.73 | 6.333   10.37 |   9.42    2.02
               0.250    0.00 | 3.333    2.30 | 6.417   10.37 |   9.50    2.02
               0.333    1.44 | 3.417    2.30 | 6.500   10.37 |   9.58    2.02
               0.417    1.44 | 3.500    2.30 | 6.583   10.37 |   9.67    2.02
               0.500    1.44 | 3.583    2.30 | 6.667   10.37 |   9.75    2.02
               0.583    1.44 | 3.667    2.30 | 6.750   10.37 |   9.83    2.02
               0.667    1.44 | 3.750    2.30 | 6.833    4.61 |   9.92    2.02
               0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
               0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
               0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
               1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
               1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
               1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
               1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
               1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
               1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
               1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
               1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
               1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
               1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
               1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
               1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
               2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
               2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
               2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
               2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
               2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
               2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
               2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
               2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
               2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
               2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
               2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
               2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
               3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
               3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Max.Eff.Inten.(mm/hr)=      63.94        29.81
               over (min)        20.00        35.00
     Storage Coeff.  (min)=      17.78 (ii)   31.88 (ii)
     Unit Hyd. Tpeak (min)=      20.00        35.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.08          0.278 (iii)
     TIME TO PEAK    (hrs)=       6.42         6.75           6.42
     RUNOFF VOLUME    (mm)=      56.60        15.25          29.72
     TOTAL RAINFALL   (mm)=      57.60        57.60          57.60
     RUNOFF COEFFICIENT   =       0.98         0.26           0.52


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    1.73 | 6.250   76.03 |   9.33    2.02
               0.167    0.00 | 3.250    1.73 | 6.333   10.37 |   9.42    2.02
               0.250    0.00 | 3.333    2.30 | 6.417   10.37 |   9.50    2.02
               0.333    1.44 | 3.417    2.30 | 6.500   10.37 |   9.58    2.02
               0.417    1.44 | 3.500    2.30 | 6.583   10.37 |   9.67    2.02
               0.500    1.44 | 3.583    2.30 | 6.667   10.37 |   9.75    2.02
               0.583    1.44 | 3.667    2.30 | 6.750   10.37 |   9.83    2.02
               0.667    1.44 | 3.750    2.30 | 6.833    4.61 |   9.92    2.02
               0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
               0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
               0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
               1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
               1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
```

```
              1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
              1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
              1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
              1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
              1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
              1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
              1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
              1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
              1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
              1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
              2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
              2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
              2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
              2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
              2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
              2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
              2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
              2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
              2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
              2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
              2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
              2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
              3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
              3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Max.Eff.Inten.(mm/hr)=      76.03        29.81
              over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.65 (ii)   15.11 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.25         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.08          0.306 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.42           6.25
     RUNOFF VOLUME    (mm)=      56.60        15.25          29.72
     TOTAL RAINFALL   (mm)=      57.60        57.60          57.60
     RUNOFF COEFFICIENT   =       0.98         0.26           0.52

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200
```

```
                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.306      6.25      29.72
   OUTFLOW: ID= 1 (  0029)      3.430      0.042      7.08      29.62

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.71
                TIME SHIFT OF PEAK FLOW         (min)= 50.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0559

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

--------------------
| ADD HYD  (  0007)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):      0.41   0.020     6.33    17.10
      + ID2= 2 (  0029):      3.43   0.042     7.08    29.62
        ================================================
        ID = 3 (  0007):      3.84   0.053     6.42    28.28

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

--------------------
| ADD HYD  (  0007)|
|  3 +  2 =  1     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):      3.84   0.053     6.42    28.28
      + ID2= 2 (  0030):      1.56   0.068     6.33    15.99
        ================================================
        ID = 1 (  0007):      5.40   0.121     6.33    24.73

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

--------------------
| ADD HYD  (  0007)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):      5.40   0.121     6.33    24.73
      + ID2= 2 (  0031):      0.65   0.037     6.25    15.89
        ================================================
        ID = 3 (  0007):      6.05   0.154     6.33    23.78

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

--------------------
| ADD HYD  (  0007)|
|  3 +  2 =  1     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
        ID1= 3 (  0007):      6.05   0.154     6.33    23.78
      + ID2= 2 (  0005):      5.32   0.278     6.42    29.72
        ================================================
        ID = 1 (  0007):     11.37   0.419     6.42    26.56

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220     0.1535
                          0.0410     0.0120   |   0.4630     0.1758
                          0.0580     0.0253   |   0.6510     0.1989
                          0.0710     0.0399   |   0.7480     0.2228
                          0.0830     0.0559   |   0.8280     0.2476
                          0.0920     0.0732   |   0.8990     0.2733
                          0.2500     0.0918   |   0.9640     0.2998
                          0.3200     0.1116   |   1.0240     0.3263
                          0.3750     0.1321   |   1.0800     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.370      0.419      6.42      26.56
   OUTFLOW: ID= 1 (  0008)     11.370      0.191      7.08      26.55

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.56
                TIME SHIFT OF PEAK FLOW         (min)= 40.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0849

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

--------------------
| ADD HYD  (  0016)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):      0.83   0.043     6.33    17.09
      + ID2= 2 (  0008):     11.37   0.191     7.08    26.55
        ================================================
        ID = 3 (  0016):     12.20   0.198     7.00    25.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

```
                        ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    0.00 | 3.167    1.73 | 6.250   76.03 |  9.33    2.02
         0.167    0.00 | 3.250    1.73 | 6.333   10.37 |  9.42    2.02
         0.250    0.00 | 3.333    2.30 | 6.417   10.37 |  9.50    2.02
         0.333    1.44 | 3.417    2.30 | 6.500   10.37 |  9.58    2.02
         0.417    1.44 | 3.500    2.30 | 6.583   10.37 |  9.67    2.02
         0.500    1.44 | 3.583    2.30 | 6.667   10.37 |  9.75    2.02
         0.583    1.44 | 3.667    2.30 | 6.750   10.37 |  9.83    2.02
         0.667    1.44 | 3.750    2.30 | 6.833    4.61 |  9.92    2.02
         0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
         0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
         0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
         1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
         1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
         1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
         1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
         1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
         1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
         1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
         1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
         1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
         1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
         1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
         1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
         2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
         2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
         2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
         2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
         2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
         2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
         2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
         2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
         2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
         2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
         2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
         2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
         3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
         3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.211 (i)
     TIME TO PEAK    (hrs)=   6.833
     RUNOFF VOLUME    (mm)=  13.279
     TOTAL RAINFALL   (mm)=  57.600
     RUNOFF COEFFICIENT   =   0.231

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

```
------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                                   ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    1.73 | 6.250   76.03 |   9.33    2.02
               0.167    0.00 | 3.250    1.73 | 6.333   10.37 |   9.42    2.02
               0.250    0.00 | 3.333    2.30 | 6.417   10.37 |   9.50    2.02
               0.333    1.44 | 3.417    2.30 | 6.500   10.37 |   9.58    2.02
               0.417    1.44 | 3.500    2.30 | 6.583   10.37 |   9.67    2.02
               0.500    1.44 | 3.583    2.30 | 6.667   10.37 |   9.75    2.02
               0.583    1.44 | 3.667    2.30 | 6.750   10.37 |   9.83    2.02
               0.667    1.44 | 3.750    2.30 | 6.833    4.61 |   9.92    2.02
               0.750    1.44 | 3.833    2.30 | 6.917    4.61 |  10.00    2.02
               0.833    1.44 | 3.917    2.30 | 7.000    4.61 |  10.08    2.02
               0.917    1.44 | 4.000    2.30 | 7.083    4.61 |  10.17    2.02
               1.000    1.44 | 4.083    2.30 | 7.167    4.61 |  10.25    2.02
               1.083    1.44 | 4.167    2.30 | 7.250    4.61 |  10.33    1.15
               1.167    1.44 | 4.250    2.30 | 7.333    3.46 |  10.42    1.15
               1.250    1.44 | 4.333    3.46 | 7.417    3.46 |  10.50    1.15
               1.333    1.44 | 4.417    3.46 | 7.500    3.46 |  10.58    1.15
               1.417    1.44 | 4.500    3.46 | 7.583    3.46 |  10.67    1.15
               1.500    1.44 | 4.583    3.46 | 7.667    3.46 |  10.75    1.15
               1.583    1.44 | 4.667    3.46 | 7.750    3.46 |  10.83    1.15
               1.667    1.44 | 4.750    3.46 | 7.833    3.46 |  10.92    1.15
               1.750    1.44 | 4.833    4.61 | 7.917    3.46 |  11.00    1.15
               1.833    1.44 | 4.917    4.61 | 8.000    3.46 |  11.08    1.15
               1.917    1.44 | 5.000    4.61 | 8.083    3.46 |  11.17    1.15
               2.000    1.44 | 5.083    4.61 | 8.167    3.46 |  11.25    1.15
               2.083    1.44 | 5.167    4.61 | 8.250    3.46 |  11.33    1.15
               2.167    1.44 | 5.250    4.61 | 8.333    2.02 |  11.42    1.15
               2.250    1.44 | 5.333    6.91 | 8.417    2.02 |  11.50    1.15
               2.333    1.73 | 5.417    6.91 | 8.500    2.02 |  11.58    1.15
               2.417    1.73 | 5.500    6.91 | 8.583    2.02 |  11.67    1.15
               2.500    1.73 | 5.583    6.91 | 8.667    2.02 |  11.75    1.15
               2.583    1.73 | 5.667    6.91 | 8.750    2.02 |  11.83    1.15
               2.667    1.73 | 5.750    6.91 | 8.833    2.02 |  11.92    1.15
               2.750    1.73 | 5.833   27.65 | 8.917    2.02 |  12.00    1.15
               2.833    1.73 | 5.917   27.65 | 9.000    2.02 |  12.08    1.15
               2.917    1.73 | 6.000   27.65 | 9.083    2.02 |  12.17    1.15
               3.000    1.73 | 6.083   76.03 | 9.167    2.02 |  12.25    1.15
               3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Unit Hyd Qpeak  (cms)=   0.167
```

```
     PEAK FLOW       (cms)=   0.043 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  17.090
     TOTAL RAINFALL   (mm)=  57.600
     RUNOFF COEFFICIENT   =   0.297

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                   ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    1.73 | 6.250   76.03 |   9.33    2.02
               0.167    0.00 | 3.250    1.73 | 6.333   10.37 |   9.42    2.02
               0.250    0.00 | 3.333    2.30 | 6.417   10.37 |   9.50    2.02
               0.333    1.44 | 3.417    2.30 | 6.500   10.37 |   9.58    2.02
               0.417    1.44 | 3.500    2.30 | 6.583   10.37 |   9.67    2.02
               0.500    1.44 | 3.583    2.30 | 6.667   10.37 |   9.75    2.02
               0.583    1.44 | 3.667    2.30 | 6.750   10.37 |   9.83    2.02
               0.667    1.44 | 3.750    2.30 | 6.833    4.61 |   9.92    2.02
               0.750    1.44 | 3.833    2.30 | 6.917    4.61 |  10.00    2.02
               0.833    1.44 | 3.917    2.30 | 7.000    4.61 |  10.08    2.02
               0.917    1.44 | 4.000    2.30 | 7.083    4.61 |  10.17    2.02
               1.000    1.44 | 4.083    2.30 | 7.167    4.61 |  10.25    2.02
               1.083    1.44 | 4.167    2.30 | 7.250    4.61 |  10.33    1.15
               1.167    1.44 | 4.250    2.30 | 7.333    3.46 |  10.42    1.15
               1.250    1.44 | 4.333    3.46 | 7.417    3.46 |  10.50    1.15
               1.333    1.44 | 4.417    3.46 | 7.500    3.46 |  10.58    1.15
               1.417    1.44 | 4.500    3.46 | 7.583    3.46 |  10.67    1.15
               1.500    1.44 | 4.583    3.46 | 7.667    3.46 |  10.75    1.15
               1.583    1.44 | 4.667    3.46 | 7.750    3.46 |  10.83    1.15
               1.667    1.44 | 4.750    3.46 | 7.833    3.46 |  10.92    1.15
               1.750    1.44 | 4.833    4.61 | 7.917    3.46 |  11.00    1.15
               1.833    1.44 | 4.917    4.61 | 8.000    3.46 |  11.08    1.15
               1.917    1.44 | 5.000    4.61 | 8.083    3.46 |  11.17    1.15
               2.000    1.44 | 5.083    4.61 | 8.167    3.46 |  11.25    1.15
               2.083    1.44 | 5.167    4.61 | 8.250    3.46 |  11.33    1.15
               2.167    1.44 | 5.250    4.61 | 8.333    2.02 |  11.42    1.15
               2.250    1.44 | 5.333    6.91 | 8.417    2.02 |  11.50    1.15
               2.333    1.73 | 5.417    6.91 | 8.500    2.02 |  11.58    1.15
               2.417    1.73 | 5.500    6.91 | 8.583    2.02 |  11.67    1.15
               2.500    1.73 | 5.583    6.91 | 8.667    2.02 |  11.75    1.15
```

```
               2.583    1.73 | 5.667    6.91 | 8.750    2.02 |  11.83    1.15
               2.667    1.73 | 5.750    6.91 | 8.833    2.02 |  11.92    1.15
               2.750    1.73 | 5.833   27.65 | 8.917    2.02 |  12.00    1.15
               2.833    1.73 | 5.917   27.65 | 9.000    2.02 |  12.08    1.15
               2.917    1.73 | 6.000   27.65 | 9.083    2.02 |  12.17    1.15
               3.000    1.73 | 6.083   76.03 | 9.167    2.02 |  12.25    1.15
               3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.020 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  17.097
     TOTAL RAINFALL   (mm)=  57.600
     RUNOFF COEFFICIENT   =   0.297

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

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


                                   ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    1.73 | 6.250   76.03 |   9.33    2.02
               0.167    0.00 | 3.250    1.73 | 6.333   10.37 |   9.42    2.02
               0.250    0.00 | 3.333    2.30 | 6.417   10.37 |   9.50    2.02
               0.333    1.44 | 3.417    2.30 | 6.500   10.37 |   9.58    2.02
               0.417    1.44 | 3.500    2.30 | 6.583   10.37 |   9.67    2.02
               0.500    1.44 | 3.583    2.30 | 6.667   10.37 |   9.75    2.02
               0.583    1.44 | 3.667    2.30 | 6.750   10.37 |   9.83    2.02
               0.667    1.44 | 3.750    2.30 | 6.833    4.61 |   9.92    2.02
               0.750    1.44 | 3.833    2.30 | 6.917    4.61 |  10.00    2.02
               0.833    1.44 | 3.917    2.30 | 7.000    4.61 |  10.08    2.02
               0.917    1.44 | 4.000    2.30 | 7.083    4.61 |  10.17    2.02
               1.000    1.44 | 4.083    2.30 | 7.167    4.61 |  10.25    2.02
               1.083    1.44 | 4.167    2.30 | 7.250    4.61 |  10.33    1.15
               1.167    1.44 | 4.250    2.30 | 7.333    3.46 |  10.42    1.15
               1.250    1.44 | 4.333    3.46 | 7.417    3.46 |  10.50    1.15
```

```
               1.333    1.44 | 4.417    3.46 | 7.500    3.46 |  10.58    1.15
               1.417    1.44 | 4.500    3.46 | 7.583    3.46 |  10.67    1.15
               1.500    1.44 | 4.583    3.46 | 7.667    3.46 |  10.75    1.15
               1.583    1.44 | 4.667    3.46 | 7.750    3.46 |  10.83    1.15
               1.667    1.44 | 4.750    3.46 | 7.833    3.46 |  10.92    1.15
               1.750    1.44 | 4.833    4.61 | 7.917    3.46 |  11.00    1.15
               1.833    1.44 | 4.917    4.61 | 8.000    3.46 |  11.08    1.15
               1.917    1.44 | 5.000    4.61 | 8.083    3.46 |  11.17    1.15
               2.000    1.44 | 5.083    4.61 | 8.167    3.46 |  11.25    1.15
               2.083    1.44 | 5.167    4.61 | 8.250    3.46 |  11.33    1.15
               2.167    1.44 | 5.250    4.61 | 8.333    2.02 |  11.42    1.15
               2.250    1.44 | 5.333    6.91 | 8.417    2.02 |  11.50    1.15
               2.333    1.73 | 5.417    6.91 | 8.500    2.02 |  11.58    1.15
               2.417    1.73 | 5.500    6.91 | 8.583    2.02 |  11.67    1.15
               2.500    1.73 | 5.583    6.91 | 8.667    2.02 |  11.75    1.15
               2.583    1.73 | 5.667    6.91 | 8.750    2.02 |  11.83    1.15
               2.667    1.73 | 5.750    6.91 | 8.833    2.02 |  11.92    1.15
               2.750    1.73 | 5.833   27.65 | 8.917    2.02 |  12.00    1.15
               2.833    1.73 | 5.917   27.65 | 9.000    2.02 |  12.08    1.15
               2.917    1.73 | 6.000   27.65 | 9.083    2.02 |  12.17    1.15
               3.000    1.73 | 6.083   76.03 | 9.167    2.02 |  12.25    1.15
               3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Max.Eff.Inten.(mm/hr)=      63.94        29.81
                over (min)       20.00        35.00
     Storage Coeff.  (min)=      17.78 (ii)   31.88 (ii)
     Unit Hyd. Tpeak (min)=      20.00        35.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.08         0.278 (iii)
     TIME TO PEAK    (hrs)=       6.42         6.75          6.42
     RUNOFF VOLUME    (mm)=      56.60        15.25         29.72
     TOTAL RAINFALL   (mm)=      57.60        57.60         57.60
     RUNOFF COEFFICIENT   =       0.98         0.26          0.52


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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

```
                 ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    0.00 | 3.167    1.73 | 6.250   76.03 |  9.33    2.02
   0.167    0.00 | 3.250    1.73 | 6.333   10.37 |  9.42    2.02
   0.250    0.00 | 3.333    2.30 | 6.417   10.37 |  9.50    2.02
   0.333    1.44 | 3.417    2.30 | 6.500   10.37 |  9.58    2.02
   0.417    1.44 | 3.500    2.30 | 6.583   10.37 |  9.67    2.02
   0.500    1.44 | 3.583    2.30 | 6.667   10.37 |  9.75    2.02
   0.583    1.44 | 3.667    2.30 | 6.750   10.37 |  9.83    2.02
   0.667    1.44 | 3.750    2.30 | 6.833    4.61 |  9.92    2.02
   0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
   0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
   0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
   1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
   1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
   1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
   1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
   1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
   1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
   1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
   1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
   1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
   1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
   1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
   1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
   2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
   2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
   2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
   2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
   2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
   2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
   2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
   2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
   2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
   2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
   2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
   2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
   3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
   3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

Unit Hyd Qpeak  (cms)=   0.177

PEAK FLOW      (cms)=   0.037 (i)
TIME TO PEAK   (hrs)=   6.250
RUNOFF VOLUME   (mm)=  15.887
TOTAL RAINFALL  (mm)=  57.600
RUNOFF COEFFICIENT  =   0.276

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

-------------------------------------------------------------------------------
```

```
--------------------
| CALIB             |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

                 ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    0.00 | 3.167    1.73 | 6.250   76.03 |  9.33    2.02
   0.167    0.00 | 3.250    1.73 | 6.333   10.37 |  9.42    2.02
   0.250    0.00 | 3.333    2.30 | 6.417   10.37 |  9.50    2.02
   0.333    1.44 | 3.417    2.30 | 6.500   10.37 |  9.58    2.02
   0.417    1.44 | 3.500    2.30 | 6.583   10.37 |  9.67    2.02
   0.500    1.44 | 3.583    2.30 | 6.667   10.37 |  9.75    2.02
   0.583    1.44 | 3.667    2.30 | 6.750   10.37 |  9.83    2.02
   0.667    1.44 | 3.750    2.30 | 6.833    4.61 |  9.92    2.02
   0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
   0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
   0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
   1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
   1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
   1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
   1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
   1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
   1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
   1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
   1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
   1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
   1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
   1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
   1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
   2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
   2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
   2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
   2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
   2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
   2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
   2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
   2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
   2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
   2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
   2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
   2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
   3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
   3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

Unit Hyd Qpeak  (cms)=   0.271
```

```
PEAK FLOW      (cms)=   0.068 (i)
TIME TO PEAK   (hrs)=   6.333
RUNOFF VOLUME   (mm)=  15.986
TOTAL RAINFALL  (mm)=  57.600
RUNOFF COEFFICIENT  =   0.278

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

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                        IMPERVIOUS   PERVIOUS (i)
    Surface Area    (ha)=      1.71        1.71
    Dep. Storage    (mm)=      1.00        5.00
    Average Slope    (%)=      1.00        2.00
    Length           (m)=    151.22       40.00
    Mannings n          =     0.013       0.250

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

                 ---- TRANSFORMED HYETOGRAPH ----
    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
   0.083    0.00 | 3.167    1.73 | 6.250   76.03 |  9.33    2.02
   0.167    0.00 | 3.250    1.73 | 6.333   10.37 |  9.42    2.02
   0.250    0.00 | 3.333    2.30 | 6.417   10.37 |  9.50    2.02
   0.333    1.44 | 3.417    2.30 | 6.500   10.37 |  9.58    2.02
   0.417    1.44 | 3.500    2.30 | 6.583   10.37 |  9.67    2.02
   0.500    1.44 | 3.583    2.30 | 6.667   10.37 |  9.75    2.02
   0.583    1.44 | 3.667    2.30 | 6.750   10.37 |  9.83    2.02
   0.667    1.44 | 3.750    2.30 | 6.833    4.61 |  9.92    2.02
   0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
   0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
   0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
   1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
   1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
   1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
   1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
   1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
   1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
   1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
   1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
   1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
   1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
   1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
   1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
   2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
   2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
```

```
   2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
   2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
   2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
   2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
   2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
   2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
   2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
   2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
   2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
   2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
   3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
   3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

    Max.Eff.Inten.(mm/hr)=      76.03        29.81
               over (min)       5.00        20.00
    Storage Coeff.  (min)=       3.65 (ii)   15.11 (ii)
    Unit Hyd. Tpeak (min)=       5.00        20.00
    Unit Hyd. peak  (cms)=       0.25         0.07
                                                         *TOTALS*
    PEAK FLOW       (cms)=       0.25         0.08         0.306 (iii)
    TIME TO PEAK    (hrs)=       6.25         6.42          6.25
    RUNOFF VOLUME    (mm)=      56.60        15.25         29.72
    TOTAL RAINFALL   (mm)=      57.60        57.60         57.60
    RUNOFF COEFFICIENT   =       0.98         0.26          0.52

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.020     6.33    17.10
      + ID2= 2 (  0036):     5.32   0.278     6.42    29.72
        ==================================================
        ID = 3 (  0041):     5.73   0.297     6.42    28.81

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.297     6.42    28.81
```

```
     + ID2= 2 (  0037):     0.65   0.037     6.25    15.89
       ==================================================
       ID = 1 (  0041):     6.38   0.320     6.42    27.50

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0041):     6.38   0.320     6.42    27.50
     + ID2= 2 (  0038):     1.56   0.068     6.33    15.99
       ==================================================
       ID = 3 (  0041):     7.94   0.384     6.42    25.23

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0041):     7.94   0.384     6.42    25.23
     + ID2= 2 (  0040):     3.43   0.306     6.25    29.72
       ==================================================
       ID = 1 (  0041):    11.37   0.627     6.25    26.59

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0039):     0.83   0.043     6.33    17.09
     + ID2= 2 (  0041):    11.37   0.627     6.25    26.59
       ==================================================
       ID = 3 (  0032):    12.20   0.666     6.25    25.94

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

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2011)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```


```
                    *****  D E T A I L E D   O U T P U T *****


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

  Output  filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\dc0b50a8-bc98-4087-bb05-526673
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\dc0b50a8-bc98-4087-bb05-526673


DATE: 06-15-2023                              TIME: 02:15:49

USER:


COMMENTS: ____________________________________________________________


--------------------------------------------------------------------------------
-----------------------
  ************************************************
  ** SIMULATION : 010yr 12hr 15min SCS          **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                  |              ata\Local\Temp\
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\ed4b58ae
| Ptotal= 66.00 mm |    Comments: created from IDF Group New IDFGroup - 2
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    0.00 |  3.25    2.64 |  6.50   11.88 |  9.75    2.31
                 0.25    1.65 |  3.50    2.64 |  6.75    5.28 | 10.00    2.31
                 0.50    1.65 |  3.75    2.64 |  7.00    5.28 | 10.25    1.32
                 0.75    1.65 |  4.00    2.64 |  7.25    3.96 | 10.50    1.32
                 1.00    1.65 |  4.25    3.96 |  7.50    3.96 | 10.75    1.32
                 1.25    1.65 |  4.50    3.96 |  7.75    3.96 | 11.00    1.32
                 1.50    1.65 |  4.75    5.28 |  8.00    3.96 | 11.25    1.32
                 1.75    1.65 |  5.00    5.28 |  8.25    2.31 | 11.50    1.32
                 2.00    1.65 |  5.25    7.92 |  8.50    2.31 | 11.75    1.32
                 2.25    1.98 |  5.50    7.92 |  8.75    2.31 | 12.00    1.32
                 2.50    1.98 |  5.75   31.68 |  9.00    2.31 |
                 2.75    1.98 |  6.00   87.12 |  9.25    2.31 |
                 3.00    1.98 |  6.25   11.88 |  9.50    2.31 |

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

--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.81          2.81
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     193.56         10.00
    Mannings n          =      0.013         0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
               0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
               0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
               0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
               0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
               0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
               0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
               0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
               0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
               0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
               0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
               1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
               1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
               1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
               1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
               1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
               1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
               1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
               1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
               1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
               1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
               1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
               1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
               2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
               2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
               2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
               2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
               2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
               2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
               2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
               2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
               2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
               2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
               2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
               2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
               3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
               3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

     Max.Eff.Inten.(mm/hr)=      87.12        41.61
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.01 (ii)    7.76 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.47         0.25         0.715 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.25          6.25
     RUNOFF VOLUME    (mm)=      65.00        19.52         35.44
     TOTAL RAINFALL   (mm)=      66.00        66.00         66.00
     RUNOFF COEFFICIENT   =       0.98         0.30          0.54

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
               0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
               0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
               0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
               0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
               0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.583	1.65	3.667	2.64	6.750	11.88	9.83	2.31
0.667	1.65	3.750	2.64	6.833	5.28	9.92	2.31
0.750	1.65	3.833	2.64	6.917	5.28	10.00	2.31
0.833	1.65	3.917	2.64	7.000	5.28	10.08	2.31
0.917	1.65	4.000	2.64	7.083	5.28	10.17	2.31
1.000	1.65	4.083	2.64	7.167	5.28	10.25	2.31
1.083	1.65	4.167	2.64	7.250	5.28	10.33	1.32
1.167	1.65	4.250	2.64	7.333	3.96	10.42	1.32
1.250	1.65	4.333	3.96	7.417	3.96	10.50	1.32
1.333	1.65	4.417	3.96	7.500	3.96	10.58	1.32
1.417	1.65	4.500	3.96	7.583	3.96	10.67	1.32
1.500	1.65	4.583	3.96	7.667	3.96	10.75	1.32
1.583	1.65	4.667	3.96	7.750	3.96	10.83	1.32
1.667	1.65	4.750	3.96	7.833	3.96	10.92	1.32
1.750	1.65	4.833	5.28	7.917	3.96	11.00	1.32
1.833	1.65	4.917	5.28	8.000	3.96	11.08	1.32
1.917	1.65	5.000	5.28	8.083	3.96	11.17	1.32
2.000	1.65	5.083	5.28	8.167	3.96	11.25	1.32
2.083	1.65	5.167	5.28	8.250	3.96	11.33	1.32
2.167	1.65	5.250	5.28	8.333	2.31	11.42	1.32
2.250	1.65	5.333	7.92	8.417	2.31	11.50	1.32
2.333	1.98	5.417	7.92	8.500	2.31	11.58	1.32
2.417	1.98	5.500	7.92	8.583	2.31	11.67	1.32
2.500	1.98	5.583	7.92	8.667	2.31	11.75	1.32
2.583	1.98	5.667	7.92	8.750	2.31	11.83	1.32
2.667	1.98	5.750	7.92	8.833	2.31	11.92	1.32
2.750	1.98	5.833	31.68	8.917	2.31	12.00	1.32
2.833	1.98	5.917	31.68	9.000	2.31	12.08	1.32
2.917	1.98	6.000	31.68	9.083	2.31	12.17	1.32
3.000	1.98	6.083	87.12	9.167	2.31	12.25	1.32
3.083	1.98	6.167	87.12	9.250	2.31		

```
Unit Hyd Qpeak  (cms)=   0.167

PEAK FLOW       (cms)=   0.056 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  22.242
TOTAL RAINFALL   (mm)=  66.000
RUNOFF COEFFICIENT   =   0.337

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

```
------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.98	6.250	87.12	9.33	2.31
0.167	0.00	3.250	1.98	6.333	11.88	9.42	2.31
0.250	0.00	3.333	2.64	6.417	11.88	9.50	2.31
0.333	1.65	3.417	2.64	6.500	11.88	9.58	2.31
0.417	1.65	3.500	2.64	6.583	11.88	9.67	2.31
0.500	1.65	3.583	2.64	6.667	11.88	9.75	2.31
0.583	1.65	3.667	2.64	6.750	11.88	9.83	2.31
0.667	1.65	3.750	2.64	6.833	5.28	9.92	2.31
0.750	1.65	3.833	2.64	6.917	5.28	10.00	2.31
0.833	1.65	3.917	2.64	7.000	5.28	10.08	2.31
0.917	1.65	4.000	2.64	7.083	5.28	10.17	2.31
1.000	1.65	4.083	2.64	7.167	5.28	10.25	2.31
1.083	1.65	4.167	2.64	7.250	5.28	10.33	1.32
1.167	1.65	4.250	2.64	7.333	3.96	10.42	1.32
1.250	1.65	4.333	3.96	7.417	3.96	10.50	1.32
1.333	1.65	4.417	3.96	7.500	3.96	10.58	1.32
1.417	1.65	4.500	3.96	7.583	3.96	10.67	1.32
1.500	1.65	4.583	3.96	7.667	3.96	10.75	1.32
1.583	1.65	4.667	3.96	7.750	3.96	10.83	1.32
1.667	1.65	4.750	3.96	7.833	3.96	10.92	1.32
1.750	1.65	4.833	5.28	7.917	3.96	11.00	1.32
1.833	1.65	4.917	5.28	8.000	3.96	11.08	1.32
1.917	1.65	5.000	5.28	8.083	3.96	11.17	1.32
2.000	1.65	5.083	5.28	8.167	3.96	11.25	1.32
2.083	1.65	5.167	5.28	8.250	3.96	11.33	1.32
2.167	1.65	5.250	5.28	8.333	2.31	11.42	1.32
2.250	1.65	5.333	7.92	8.417	2.31	11.50	1.32
2.333	1.98	5.417	7.92	8.500	2.31	11.58	1.32
2.417	1.98	5.500	7.92	8.583	2.31	11.67	1.32
2.500	1.98	5.583	7.92	8.667	2.31	11.75	1.32
2.583	1.98	5.667	7.92	8.750	2.31	11.83	1.32
2.667	1.98	5.750	7.92	8.833	2.31	11.92	1.32
2.750	1.98	5.833	31.68	8.917	2.31	12.00	1.32
2.833	1.98	5.917	31.68	9.000	2.31	12.08	1.32
2.917	1.98	6.000	31.68	9.083	2.31	12.17	1.32
3.000	1.98	6.083	87.12	9.167	2.31	12.25	1.32
3.083	1.98	6.167	87.12	9.250	2.31		

```
Unit Hyd Qpeak  (cms)=   0.078

PEAK FLOW       (cms)=   0.027 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  22.250
TOTAL RAINFALL   (mm)=  66.000
RUNOFF COEFFICIENT   =   0.337

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

------------------------------------------------------------------------------
```

```
--------------------
| CALIB             |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.98	6.250	87.12	9.33	2.31
0.167	0.00	3.250	1.98	6.333	11.88	9.42	2.31
0.250	0.00	3.333	2.64	6.417	11.88	9.50	2.31
0.333	1.65	3.417	2.64	6.500	11.88	9.58	2.31
0.417	1.65	3.500	2.64	6.583	11.88	9.67	2.31
0.500	1.65	3.583	2.64	6.667	11.88	9.75	2.31
0.583	1.65	3.667	2.64	6.750	11.88	9.83	2.31
0.667	1.65	3.750	2.64	6.833	5.28	9.92	2.31
0.750	1.65	3.833	2.64	6.917	5.28	10.00	2.31
0.833	1.65	3.917	2.64	7.000	5.28	10.08	2.31
0.917	1.65	4.000	2.64	7.083	5.28	10.17	2.31
1.000	1.65	4.083	2.64	7.167	5.28	10.25	2.31
1.083	1.65	4.167	2.64	7.250	5.28	10.33	1.32
1.167	1.65	4.250	2.64	7.333	3.96	10.42	1.32
1.250	1.65	4.333	3.96	7.417	3.96	10.50	1.32
1.333	1.65	4.417	3.96	7.500	3.96	10.58	1.32
1.417	1.65	4.500	3.96	7.583	3.96	10.67	1.32
1.500	1.65	4.583	3.96	7.667	3.96	10.75	1.32
1.583	1.65	4.667	3.96	7.750	3.96	10.83	1.32
1.667	1.65	4.750	3.96	7.833	3.96	10.92	1.32
1.750	1.65	4.833	5.28	7.917	3.96	11.00	1.32
1.833	1.65	4.917	5.28	8.000	3.96	11.08	1.32
1.917	1.65	5.000	5.28	8.083	3.96	11.17	1.32
2.000	1.65	5.083	5.28	8.167	3.96	11.25	1.32
2.083	1.65	5.167	5.28	8.250	3.96	11.33	1.32
2.167	1.65	5.250	5.28	8.333	2.31	11.42	1.32
2.250	1.65	5.333	7.92	8.417	2.31	11.50	1.32
2.333	1.98	5.417	7.92	8.500	2.31	11.58	1.32
2.417	1.98	5.500	7.92	8.583	2.31	11.67	1.32
2.500	1.98	5.583	7.92	8.667	2.31	11.75	1.32
2.583	1.98	5.667	7.92	8.750	2.31	11.83	1.32
2.667	1.98	5.750	7.92	8.833	2.31	11.92	1.32
2.750	1.98	5.833	31.68	8.917	2.31	12.00	1.32
2.833	1.98	5.917	31.68	9.000	2.31	12.08	1.32
2.917	1.98	6.000	31.68	9.083	2.31	12.17	1.32
3.000	1.98	6.083	87.12	9.167	2.31	12.25	1.32
3.083	1.98	6.167	87.12	9.250	2.31		

```
Unit Hyd Qpeak  (cms)=   0.271

PEAK FLOW       (cms)=   0.090 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  20.887
TOTAL RAINFALL   (mm)=  66.000
RUNOFF COEFFICIENT   =   0.316

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

------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.98	6.250	87.12	9.33	2.31
0.167	0.00	3.250	1.98	6.333	11.88	9.42	2.31
0.250	0.00	3.333	2.64	6.417	11.88	9.50	2.31
0.333	1.65	3.417	2.64	6.500	11.88	9.58	2.31
0.417	1.65	3.500	2.64	6.583	11.88	9.67	2.31
0.500	1.65	3.583	2.64	6.667	11.88	9.75	2.31
0.583	1.65	3.667	2.64	6.750	11.88	9.83	2.31
0.667	1.65	3.750	2.64	6.833	5.28	9.92	2.31
0.750	1.65	3.833	2.64	6.917	5.28	10.00	2.31
0.833	1.65	3.917	2.64	7.000	5.28	10.08	2.31
0.917	1.65	4.000	2.64	7.083	5.28	10.17	2.31
1.000	1.65	4.083	2.64	7.167	5.28	10.25	2.31
1.083	1.65	4.167	2.64	7.250	5.28	10.33	1.32
1.167	1.65	4.250	2.64	7.333	3.96	10.42	1.32
1.250	1.65	4.333	3.96	7.417	3.96	10.50	1.32
1.333	1.65	4.417	3.96	7.500	3.96	10.58	1.32
1.417	1.65	4.500	3.96	7.583	3.96	10.67	1.32
1.500	1.65	4.583	3.96	7.667	3.96	10.75	1.32
1.583	1.65	4.667	3.96	7.750	3.96	10.83	1.32
1.667	1.65	4.750	3.96	7.833	3.96	10.92	1.32
1.750	1.65	4.833	5.28	7.917	3.96	11.00	1.32
1.833	1.65	4.917	5.28	8.000	3.96	11.08	1.32
1.917	1.65	5.000	5.28	8.083	3.96	11.17	1.32
2.000	1.65	5.083	5.28	8.167	3.96	11.25	1.32
2.083	1.65	5.167	5.28	8.250	3.96	11.33	1.32
2.167	1.65	5.250	5.28	8.333	2.31	11.42	1.32
2.250	1.65	5.333	7.92	8.417	2.31	11.50	1.32
2.333	1.98	5.417	7.92	8.500	2.31	11.58	1.32
2.417	1.98	5.500	7.92	8.583	2.31	11.67	1.32
2.500	1.98	5.583	7.92	8.667	2.31	11.75	1.32
2.583	1.98	5.667	7.92	8.750	2.31	11.83	1.32

```
             2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
             2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
             2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
             2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
             3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
             3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

    Unit Hyd Qpeak  (cms)=   0.177

    PEAK FLOW       (cms)=   0.049 (i)
    TIME TO PEAK    (hrs)=   6.250
    RUNOFF VOLUME    (mm)=  20.757
    TOTAL RAINFALL   (mm)=  66.000
    RUNOFF COEFFICIENT   =   0.314

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66         2.66
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         1.00
    Length            (m)=     188.33        40.00
    Mannings n          =       0.130        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
             0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
             0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
             0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
             0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
             0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
             0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
             0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
             0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
             0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
             0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
             1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
             1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
             1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
             1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
             1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
```

```
             1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
             1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
             1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
             1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
             1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
             1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
             1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
             2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
             2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
             2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
             2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
             2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
             2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
             2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
             2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
             2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
             2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
             2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
             2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
             3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
             3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

    Max.Eff.Inten.(mm/hr)=      87.12        38.29
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      15.71 (ii)   28.47 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.07         0.04
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.28         0.11          0.355 (iii)
    TIME TO PEAK    (hrs)=       6.33         6.58            6.33
    RUNOFF VOLUME    (mm)=      65.00        19.52           35.43
    TOTAL RAINFALL   (mm)=      66.00        66.00           66.00
    RUNOFF COEFFICIENT   =       0.98         0.30            0.54


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
```

```
    Mannings n          =       0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
             0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
             0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
             0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
             0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
             0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
             0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
             0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
             0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
             0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
             0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
             1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
             1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
             1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
             1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
             1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
             1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
             1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
             1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
             1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
             1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
             1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
             1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
             2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
             2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
             2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
             2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
             2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
             2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
             2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
             2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
             2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
             2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
             2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
             2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
             3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
             3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

    Max.Eff.Inten.(mm/hr)=      87.12        38.29
               over (min)        5.00        15.00
    Storage Coeff.  (min)=       3.46 (ii)   13.82 (ii)
    Unit Hyd. Tpeak (min)=       5.00        15.00
    Unit Hyd. peak  (cms)=       0.26         0.08
                                                          *TOTALS*
```

```
    PEAK FLOW       (cms)=       0.29         0.11          0.384 (iii)
    TIME TO PEAK    (hrs)=       6.25         6.33            6.25
    RUNOFF VOLUME    (mm)=      65.00        19.52           35.43
    TOTAL RAINFALL   (mm)=      66.00        66.00           66.00
    RUNOFF COEFFICIENT   =       0.98         0.30            0.54

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430     0.384      6.25      35.43
   OUTFLOW: ID= 1 (  0029)      3.430     0.050      7.00      35.34

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.12
                   TIME SHIFT OF PEAK FLOW        (min)= 45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0672

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):      0.41   0.027     6.33    22.25
      + ID2= 2 (  0029):      3.43   0.050     7.00    35.34
        ====================================================
        ID = 3 (  0007):      3.84   0.067     6.42    33.94

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):      3.84   0.067     6.42    33.94
      + ID2= 2 (  0030):      1.56   0.090     6.33    20.89
        ====================================================
```

```
      ID = 1 (  0007):     5.40   0.157     6.33    30.17

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0007):     5.40   0.157     6.33    30.17
     + ID2= 2 (  0031):     0.65   0.049     6.25    20.76
       ==================================================
       ID = 3 (  0007):     6.05   0.200     6.33    29.16

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0007):     6.05   0.200     6.33    29.16
     + ID2= 2 (  0005):     5.32   0.355     6.33    35.43
       ==================================================
       ID = 1 (  0007):    11.37   0.555     6.33    32.09

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|      OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |      OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000    |   0.4220      0.1535
                          0.0410     0.0120    |   0.4630      0.1758
                          0.0580     0.0253    |   0.6510      0.1989
                          0.0710     0.0399    |   0.7480      0.2228
                          0.0830     0.0559    |   0.8280      0.2476
                          0.0920     0.0732    |   0.8990      0.2733
                          0.2500     0.0918    |   0.9640      0.2998
                          0.3200     0.1116    |   1.0240      0.3263
                          0.3750     0.1321    |   1.0800      0.3528

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0007)     11.370      0.555      6.33      32.09
  OUTFLOW: ID= 1 (  0008)     11.370      0.264      6.92      32.09

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 47.53
                  TIME SHIFT OF PEAK FLOW        (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0958
```

```
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0022):     0.83   0.056     6.33    22.24
     + ID2= 2 (  0008):    11.37   0.264     6.92    32.09
       ==================================================
       ID = 3 (  0016):    12.20   0.279     6.83    31.42

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                            ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    0.00 | 3.167    1.98 | 6.250   87.12 |   9.33    2.31
         0.167    0.00 | 3.250    1.98 | 6.333   11.88 |   9.42    2.31
         0.250    0.00 | 3.333    2.64 | 6.417   11.88 |   9.50    2.31
         0.333    1.65 | 3.417    2.64 | 6.500   11.88 |   9.58    2.31
         0.417    1.65 | 3.500    2.64 | 6.583   11.88 |   9.67    2.31
         0.500    1.65 | 3.583    2.64 | 6.667   11.88 |   9.75    2.31
         0.583    1.65 | 3.667    2.64 | 6.750   11.88 |   9.83    2.31
         0.667    1.65 | 3.750    2.64 | 6.833    5.28 |   9.92    2.31
         0.750    1.65 | 3.833    2.64 | 6.917    5.28 |  10.00    2.31
         0.833    1.65 | 3.917    2.64 | 7.000    5.28 |  10.08    2.31
         0.917    1.65 | 4.000    2.64 | 7.083    5.28 |  10.17    2.31
         1.000    1.65 | 4.083    2.64 | 7.167    5.28 |  10.25    2.31
         1.083    1.65 | 4.167    2.64 | 7.250    5.28 |  10.33    1.32
         1.167    1.65 | 4.250    2.64 | 7.333    3.96 |  10.42    1.32
         1.250    1.65 | 4.333    3.96 | 7.417    3.96 |  10.50    1.32
         1.333    1.65 | 4.417    3.96 | 7.500    3.96 |  10.58    1.32
         1.417    1.65 | 4.500    3.96 | 7.583    3.96 |  10.67    1.32
         1.500    1.65 | 4.583    3.96 | 7.667    3.96 |  10.75    1.32
         1.583    1.65 | 4.667    3.96 | 7.750    3.96 |  10.83    1.32
         1.667    1.65 | 4.750    3.96 | 7.833    3.96 |  10.92    1.32
         1.750    1.65 | 4.833    5.28 | 7.917    3.96 |  11.00    1.32
         1.833    1.65 | 4.917    5.28 | 8.000    3.96 |  11.08    1.32
         1.917    1.65 | 5.000    5.28 | 8.083    3.96 |  11.17    1.32
         2.000    1.65 | 5.083    5.28 | 8.167    3.96 |  11.25    1.32
         2.083    1.65 | 5.167    5.28 | 8.250    3.96 |  11.33    1.32
         2.167    1.65 | 5.250    5.28 | 8.333    2.31 |  11.42    1.32
         2.250    1.65 | 5.333    7.92 | 8.417    2.31 |  11.50    1.32
```

```
         2.333    1.98 | 5.417    7.92 | 8.500    2.31 |  11.58    1.32
         2.417    1.98 | 5.500    7.92 | 8.583    2.31 |  11.67    1.32
         2.500    1.98 | 5.583    7.92 | 8.667    2.31 |  11.75    1.32
         2.583    1.98 | 5.667    7.92 | 8.750    2.31 |  11.83    1.32
         2.667    1.98 | 5.750    7.92 | 8.833    2.31 |  11.92    1.32
         2.750    1.98 | 5.833   31.68 | 8.917    2.31 |  12.00    1.32
         2.833    1.98 | 5.917   31.68 | 9.000    2.31 |  12.08    1.32
         2.917    1.98 | 6.000   31.68 | 9.083    2.31 |  12.17    1.32
         3.000    1.98 | 6.083   87.12 | 9.167    2.31 |  12.25    1.32
         3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

   Unit Hyd Qpeak  (cms)=   0.764

   PEAK FLOW      (cms)=   0.278 (i)
   TIME TO PEAK   (hrs)=   6.833
   RUNOFF VOLUME    (mm)=  17.293
   TOTAL RAINFALL   (mm)=  66.000
   RUNOFF COEFFICIENT   =   0.262

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                            ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    0.00 | 3.167    1.98 | 6.250   87.12 |   9.33    2.31
         0.167    0.00 | 3.250    1.98 | 6.333   11.88 |   9.42    2.31
         0.250    0.00 | 3.333    2.64 | 6.417   11.88 |   9.50    2.31
         0.333    1.65 | 3.417    2.64 | 6.500   11.88 |   9.58    2.31
         0.417    1.65 | 3.500    2.64 | 6.583   11.88 |   9.67    2.31
         0.500    1.65 | 3.583    2.64 | 6.667   11.88 |   9.75    2.31
         0.583    1.65 | 3.667    2.64 | 6.750   11.88 |   9.83    2.31
         0.667    1.65 | 3.750    2.64 | 6.833    5.28 |   9.92    2.31
         0.750    1.65 | 3.833    2.64 | 6.917    5.28 |  10.00    2.31
         0.833    1.65 | 3.917    2.64 | 7.000    5.28 |  10.08    2.31
         0.917    1.65 | 4.000    2.64 | 7.083    5.28 |  10.17    2.31
         1.000    1.65 | 4.083    2.64 | 7.167    5.28 |  10.25    2.31
         1.083    1.65 | 4.167    2.64 | 7.250    5.28 |  10.33    1.32
         1.167    1.65 | 4.250    2.64 | 7.333    3.96 |  10.42    1.32
         1.250    1.65 | 4.333    3.96 | 7.417    3.96 |  10.50    1.32
         1.333    1.65 | 4.417    3.96 | 7.500    3.96 |  10.58    1.32
         1.417    1.65 | 4.500    3.96 | 7.583    3.96 |  10.67    1.32
         1.500    1.65 | 4.583    3.96 | 7.667    3.96 |  10.75    1.32
```

```
         1.583    1.65 | 4.667    3.96 | 7.750    3.96 |  10.83    1.32
         1.667    1.65 | 4.750    3.96 | 7.833    3.96 |  10.92    1.32
         1.750    1.65 | 4.833    5.28 | 7.917    3.96 |  11.00    1.32
         1.833    1.65 | 4.917    5.28 | 8.000    3.96 |  11.08    1.32
         1.917    1.65 | 5.000    5.28 | 8.083    3.96 |  11.17    1.32
         2.000    1.65 | 5.083    5.28 | 8.167    3.96 |  11.25    1.32
         2.083    1.65 | 5.167    5.28 | 8.250    3.96 |  11.33    1.32
         2.167    1.65 | 5.250    5.28 | 8.333    2.31 |  11.42    1.32
         2.250    1.65 | 5.333    7.92 | 8.417    2.31 |  11.50    1.32
         2.333    1.98 | 5.417    7.92 | 8.500    2.31 |  11.58    1.32
         2.417    1.98 | 5.500    7.92 | 8.583    2.31 |  11.67    1.32
         2.500    1.98 | 5.583    7.92 | 8.667    2.31 |  11.75    1.32
         2.583    1.98 | 5.667    7.92 | 8.750    2.31 |  11.83    1.32
         2.667    1.98 | 5.750    7.92 | 8.833    2.31 |  11.92    1.32
         2.750    1.98 | 5.833   31.68 | 8.917    2.31 |  12.00    1.32
         2.833    1.98 | 5.917   31.68 | 9.000    2.31 |  12.08    1.32
         2.917    1.98 | 6.000   31.68 | 9.083    2.31 |  12.17    1.32
         3.000    1.98 | 6.083   87.12 | 9.167    2.31 |  12.25    1.32
         3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

   Unit Hyd Qpeak  (cms)=   0.167

   PEAK FLOW      (cms)=   0.056 (i)
   TIME TO PEAK   (hrs)=   6.333
   RUNOFF VOLUME    (mm)=  22.242
   TOTAL RAINFALL   (mm)=  66.000
   RUNOFF COEFFICIENT   =   0.337

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                            ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    0.00 | 3.167    1.98 | 6.250   87.12 |   9.33    2.31
         0.167    0.00 | 3.250    1.98 | 6.333   11.88 |   9.42    2.31
         0.250    0.00 | 3.333    2.64 | 6.417   11.88 |   9.50    2.31
         0.333    1.65 | 3.417    2.64 | 6.500   11.88 |   9.58    2.31
         0.417    1.65 | 3.500    2.64 | 6.583   11.88 |   9.67    2.31
         0.500    1.65 | 3.583    2.64 | 6.667   11.88 |   9.75    2.31
         0.583    1.65 | 3.667    2.64 | 6.750   11.88 |   9.83    2.31
         0.667    1.65 | 3.750    2.64 | 6.833    5.28 |   9.92    2.31
         0.750    1.65 | 3.833    2.64 | 6.917    5.28 |  10.00    2.31
```

```
          0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
          0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
          1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
          1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
          1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
          1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
          1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
          1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
          1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
          1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
          1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
          1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
          1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
          1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
          2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
          2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
          2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
          2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
          2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
          2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
          2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
          2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
          2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
          2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
          2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
          2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
          3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
          3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW      (cms)=   0.027 (i)
     TIME TO PEAK   (hrs)=   6.333
     RUNOFF VOLUME   (mm)=  22.250
     TOTAL RAINFALL  (mm)=  66.000
     RUNOFF COEFFICIENT  =   0.337

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

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


                         ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
          0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
          0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
          0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
          0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
          0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
          0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
          0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
          0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
          0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
          0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
          1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
          1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
          1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
          1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
          1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
          1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
          1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
          1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
          1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
          1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
          1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
          1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
          2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
          2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
          2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
          2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
          2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
          2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
          2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
          2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
          2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
          2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
          2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
          2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
          3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
          3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

     Max.Eff.Inten.(mm/hr)=      87.12        38.29
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.71 (ii)   28.47 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.28         0.11         0.355 (iii)
     TIME TO PEAK    (hrs)=       6.33         6.58          6.33
     RUNOFF VOLUME    (mm)=      65.00        19.52         35.43
     TOTAL RAINFALL   (mm)=      66.00        66.00         66.00
     RUNOFF COEFFICIENT  =        0.98         0.30          0.54


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                         ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
          0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
          0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
          0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
          0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
          0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
          0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
          0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
          0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
          0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
          0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
          1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
          1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
          1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
          1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
          1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
          1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
          1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
          1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
          1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
          1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
          1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
          1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
          2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
          2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
          2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
          2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
          2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
          2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
          2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
          2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
          2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
          2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
          2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
          2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
          3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
          3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW      (cms)=   0.049 (i)
     TIME TO PEAK   (hrs)=   6.250
     RUNOFF VOLUME   (mm)=  20.757
     TOTAL RAINFALL  (mm)=  66.000
     RUNOFF COEFFICIENT  =   0.314

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                         ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
          0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
          0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
          0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
          0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
          0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
          0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
          0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
          0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
          0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
          0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
          1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
          1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
          1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
          1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
          1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
          1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
          1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
          1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
```

```
             1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
             1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
             1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
             1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
             2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
             2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
             2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
             2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
             2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
             2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
             2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
             2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
             2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
             2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
             2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
             2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
             3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
             3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

    Unit Hyd Qpeak  (cms)=   0.271

    PEAK FLOW       (cms)=   0.090 (i)
    TIME TO PEAK    (hrs)=   6.333
    RUNOFF VOLUME    (mm)=  20.887
    TOTAL RAINFALL   (mm)=  66.000
    RUNOFF COEFFICIENT   =   0.316

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71          1.71
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     151.22         40.00
    Mannings n          =      0.013         0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
             0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
             0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
             0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
             0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
             0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
             0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
             0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
             0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
             0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
             0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
             1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
             1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
             1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
             1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
             1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
             1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
             1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
             1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
             1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
             1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
             1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
             1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
             2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
             2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
             2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
             2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
             2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
             2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
             2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
             2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
             2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
             2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
             2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
             2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
             3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
             3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

    Max.Eff.Inten.(mm/hr)=      87.12        38.29
               over (min)        5.00        15.00
    Storage Coeff.  (min)=       3.46 (ii)   13.82 (ii)
    Unit Hyd. Tpeak (min)=       5.00        15.00
    Unit Hyd. peak  (cms)=       0.26         0.08
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.29         0.11          0.384 (iii)
    TIME TO PEAK    (hrs)=       6.25         6.33           6.25
    RUNOFF VOLUME    (mm)=      65.00        19.52          35.43
    TOTAL RAINFALL   (mm)=      66.00        66.00          66.00
    RUNOFF COEFFICIENT   =       0.98         0.30           0.54

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):      0.41   0.027     6.33    22.25
      + ID2= 2 (  0036):      5.32   0.355     6.33    35.43
        ==================================================
        ID = 3 (  0041):      5.73   0.382     6.33    34.49

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):      5.73   0.382     6.33    34.49
      + ID2= 2 (  0037):      0.65   0.049     6.25    20.76
        ==================================================
        ID = 1 (  0041):      6.38   0.426     6.33    33.09

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):      6.38   0.426     6.33    33.09
      + ID2= 2 (  0038):      1.56   0.090     6.33    20.89
        ==================================================
        ID = 3 (  0041):      7.94   0.515     6.33    30.69

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):      7.94   0.515     6.33    30.69
      + ID2= 2 (  0040):      3.43   0.384     6.25    35.43
        ==================================================
        ID = 1 (  0041):     11.37   0.848     6.25    32.12

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):      0.83   0.056     6.33    22.24
      + ID2= 2 (  0041):     11.37   0.848     6.25    32.12
        ==================================================
        ID = 3 (  0032):     12.20   0.900     6.25    31.45

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

       V    V   I   SSSSS  U   U    A    L              (v 6.2.2011)
       V    V   I   SS     U   U   A A   L
        V  V    I    SS    U   U  AAAAA  L
        V  V    I     SS   U   U  A   A  L
         VV     I   SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
```


```
                   *****  D E T A I L E D   O U T P U T *****


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

  Output  filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\da9b7f30-67ff-4641-9a4c-6b11a6
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\da9b7f30-67ff-4641-9a4c-6b11a6


DATE: 06-15-2023                            TIME: 02:15:49

USER:


COMMENTS: ____________________________________________________________


----------------------------------------------------------------------------------
```

```
-----------------------
  **********************************************
  ** SIMULATION : 025yr 12hr 15min SCS         **
  **********************************************


--------------------
|    READ STORM    |     Filename: C:\Users\r.rajachockalingam\AppD
|                  |               ata\Local\Temp\
|                  |               073789e9-0d0b-43a3-ada4-078b0c00e084\5e378c83
| Ptotal= 78.00 mm |     Comments: created from IDF Group New IDFGroup - 2
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	0.00	3.25	3.12	6.50	14.04	9.75	2.73
0.25	1.95	3.50	3.12	6.75	6.24	10.00	2.73
0.50	1.95	3.75	3.12	7.00	6.24	10.25	1.56
0.75	1.95	4.00	3.12	7.25	4.68	10.50	1.56
1.00	1.95	4.25	4.68	7.50	4.68	10.75	1.56
1.25	1.95	4.50	4.68	7.75	4.68	11.00	1.56
1.50	1.95	4.75	6.24	8.00	4.68	11.25	1.56
1.75	1.95	5.00	6.24	8.25	2.73	11.50	1.56
2.00	1.95	5.25	9.36	8.50	2.73	11.75	1.56
2.25	2.34	5.50	9.36	8.75	2.73	12.00	1.56
2.50	2.34	5.75	37.44	9.00	2.73		
2.75	2.34	6.00	102.96	9.25	2.73		
3.00	2.34	6.25	14.04	9.50	2.73		

```
--------------------------------------------------------------------------------

--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.81         2.81
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     193.56        10.00
     Mannings n          =      0.013        0.250

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


                           ---- TRANSFORMED HYETOGRAPH ----
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.34	6.250	102.96	9.33	2.73
0.167	0.00	3.250	2.34	6.333	14.04	9.42	2.73
0.250	0.00	3.333	3.12	6.417	14.04	9.50	2.73
0.333	1.95	3.417	3.12	6.500	14.04	9.58	2.73
0.417	1.95	3.500	3.12	6.583	14.04	9.67	2.73
0.500	1.95	3.583	3.12	6.667	14.04	9.75	2.73
0.583	1.95	3.667	3.12	6.750	14.04	9.83	2.73
0.667	1.95	3.750	3.12	6.833	6.24	9.92	2.73
0.750	1.95	3.833	3.12	6.917	6.24	10.00	2.73
0.833	1.95	3.917	3.12	7.000	6.24	10.08	2.73
0.917	1.95	4.000	3.12	7.083	6.24	10.17	2.73
1.000	1.95	4.083	3.12	7.167	6.24	10.25	2.73
1.083	1.95	4.167	3.12	7.250	6.24	10.33	1.56
1.167	1.95	4.250	3.12	7.333	4.68	10.42	1.56
1.250	1.95	4.333	4.68	7.417	4.68	10.50	1.56
1.333	1.95	4.417	4.68	7.500	4.68	10.58	1.56
1.417	1.95	4.500	4.68	7.583	4.68	10.67	1.56
1.500	1.95	4.583	4.68	7.667	4.68	10.75	1.56
1.583	1.95	4.667	4.68	7.750	4.68	10.83	1.56
1.667	1.95	4.750	4.68	7.833	4.68	10.92	1.56
1.750	1.95	4.833	6.24	7.917	4.68	11.00	1.56
1.833	1.95	4.917	6.24	8.000	4.68	11.08	1.56
1.917	1.95	5.000	6.24	8.083	4.68	11.17	1.56
2.000	1.95	5.083	6.24	8.167	4.68	11.25	1.56
2.083	1.95	5.167	6.24	8.250	4.68	11.33	1.56
2.167	1.95	5.250	6.24	8.333	2.73	11.42	1.56
2.250	1.95	5.333	9.36	8.417	2.73	11.50	1.56
2.333	2.34	5.417	9.36	8.500	2.73	11.58	1.56
2.417	2.34	5.500	9.36	8.583	2.73	11.67	1.56
2.500	2.34	5.583	9.36	8.667	2.73	11.75	1.56
2.583	2.34	5.667	9.36	8.750	2.73	11.83	1.56
2.667	2.34	5.750	9.36	8.833	2.73	11.92	1.56
2.750	2.34	5.833	37.44	8.917	2.73	12.00	1.56
2.833	2.34	5.917	37.44	9.000	2.73	12.08	1.56
2.917	2.34	6.000	37.44	9.083	2.73	12.17	1.56
3.000	2.34	6.083	102.96	9.167	2.73	12.25	1.56
3.083	2.34	6.167	102.96	9.250	2.73		

```
     Max.Eff.Inten.(mm/hr)=     102.96        55.74
               over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.75 (ii)    7.25 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.25         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.56         0.34          0.895 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.25           6.25
     RUNOFF VOLUME    (mm)=      77.00        26.19          43.98
     TOTAL RAINFALL   (mm)=      78.00        78.00          78.00
     RUNOFF COEFFICIENT   =       0.99         0.34           0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                           ---- TRANSFORMED HYETOGRAPH ----
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.34	6.250	102.96	9.33	2.73
0.167	0.00	3.250	2.34	6.333	14.04	9.42	2.73
0.250	0.00	3.333	3.12	6.417	14.04	9.50	2.73
0.333	1.95	3.417	3.12	6.500	14.04	9.58	2.73
0.417	1.95	3.500	3.12	6.583	14.04	9.67	2.73
0.500	1.95	3.583	3.12	6.667	14.04	9.75	2.73
0.583	1.95	3.667	3.12	6.750	14.04	9.83	2.73
0.667	1.95	3.750	3.12	6.833	6.24	9.92	2.73
0.750	1.95	3.833	3.12	6.917	6.24	10.00	2.73
0.833	1.95	3.917	3.12	7.000	6.24	10.08	2.73
0.917	1.95	4.000	3.12	7.083	6.24	10.17	2.73
1.000	1.95	4.083	3.12	7.167	6.24	10.25	2.73
1.083	1.95	4.167	3.12	7.250	6.24	10.33	1.56
1.167	1.95	4.250	3.12	7.333	4.68	10.42	1.56
1.250	1.95	4.333	4.68	7.417	4.68	10.50	1.56
1.333	1.95	4.417	4.68	7.500	4.68	10.58	1.56
1.417	1.95	4.500	4.68	7.583	4.68	10.67	1.56
1.500	1.95	4.583	4.68	7.667	4.68	10.75	1.56
1.583	1.95	4.667	4.68	7.750	4.68	10.83	1.56
1.667	1.95	4.750	4.68	7.833	4.68	10.92	1.56
1.750	1.95	4.833	6.24	7.917	4.68	11.00	1.56
1.833	1.95	4.917	6.24	8.000	4.68	11.08	1.56
1.917	1.95	5.000	6.24	8.083	4.68	11.17	1.56
2.000	1.95	5.083	6.24	8.167	4.68	11.25	1.56
2.083	1.95	5.167	6.24	8.250	4.68	11.33	1.56
2.167	1.95	5.250	6.24	8.333	2.73	11.42	1.56
2.250	1.95	5.333	9.36	8.417	2.73	11.50	1.56
2.333	2.34	5.417	9.36	8.500	2.73	11.58	1.56
2.417	2.34	5.500	9.36	8.583	2.73	11.67	1.56
2.500	2.34	5.583	9.36	8.667	2.73	11.75	1.56
2.583	2.34	5.667	9.36	8.750	2.73	11.83	1.56
2.667	2.34	5.750	9.36	8.833	2.73	11.92	1.56
2.750	2.34	5.833	37.44	8.917	2.73	12.00	1.56
2.833	2.34	5.917	37.44	9.000	2.73	12.08	1.56
2.917	2.34	6.000	37.44	9.083	2.73	12.17	1.56
3.000	2.34	6.083	102.96	9.167	2.73	12.25	1.56
3.083	2.34	6.167	102.96	9.250	2.73		

```
     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.077 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  30.217
     TOTAL RAINFALL   (mm)=  78.000
     RUNOFF COEFFICIENT   =   0.387

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                           ---- TRANSFORMED HYETOGRAPH ----
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.34	6.250	102.96	9.33	2.73
0.167	0.00	3.250	2.34	6.333	14.04	9.42	2.73
0.250	0.00	3.333	3.12	6.417	14.04	9.50	2.73
0.333	1.95	3.417	3.12	6.500	14.04	9.58	2.73
0.417	1.95	3.500	3.12	6.583	14.04	9.67	2.73
0.500	1.95	3.583	3.12	6.667	14.04	9.75	2.73
0.583	1.95	3.667	3.12	6.750	14.04	9.83	2.73
0.667	1.95	3.750	3.12	6.833	6.24	9.92	2.73
0.750	1.95	3.833	3.12	6.917	6.24	10.00	2.73
0.833	1.95	3.917	3.12	7.000	6.24	10.08	2.73
0.917	1.95	4.000	3.12	7.083	6.24	10.17	2.73
1.000	1.95	4.083	3.12	7.167	6.24	10.25	2.73
1.083	1.95	4.167	3.12	7.250	6.24	10.33	1.56
1.167	1.95	4.250	3.12	7.333	4.68	10.42	1.56
1.250	1.95	4.333	4.68	7.417	4.68	10.50	1.56
1.333	1.95	4.417	4.68	7.500	4.68	10.58	1.56
1.417	1.95	4.500	4.68	7.583	4.68	10.67	1.56
1.500	1.95	4.583	4.68	7.667	4.68	10.75	1.56
1.583	1.95	4.667	4.68	7.750	4.68	10.83	1.56
1.667	1.95	4.750	4.68	7.833	4.68	10.92	1.56
1.750	1.95	4.833	6.24	7.917	4.68	11.00	1.56
1.833	1.95	4.917	6.24	8.000	4.68	11.08	1.56
1.917	1.95	5.000	6.24	8.083	4.68	11.17	1.56
2.000	1.95	5.083	6.24	8.167	4.68	11.25	1.56
2.083	1.95	5.167	6.24	8.250	4.68	11.33	1.56
2.167	1.95	5.250	6.24	8.333	2.73	11.42	1.56
2.250	1.95	5.333	9.36	8.417	2.73	11.50	1.56
2.333	2.34	5.417	9.36	8.500	2.73	11.58	1.56

```
        2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
        2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
        2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
        2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
        2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
        2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
        2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
        3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
        3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

  Unit Hyd Qpeak  (cms)=   0.078

  PEAK FLOW       (cms)=   0.037 (i)
  TIME TO PEAK    (hrs)=   6.333
  RUNOFF VOLUME    (mm)=  30.229
  TOTAL RAINFALL   (mm)=  78.000
  RUNOFF COEFFICIENT   =   0.388

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

------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.22

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

                         ---- TRANSFORMED HYETOGRAPH ----
         TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
        0.083    0.00 | 3.167    2.34 | 6.250  102.96 |   9.33    2.73
        0.167    0.00 | 3.250    2.34 | 6.333   14.04 |   9.42    2.73
        0.250    0.00 | 3.333    3.12 | 6.417   14.04 |   9.50    2.73
        0.333    1.95 | 3.417    3.12 | 6.500   14.04 |   9.58    2.73
        0.417    1.95 | 3.500    3.12 | 6.583   14.04 |   9.67    2.73
        0.500    1.95 | 3.583    3.12 | 6.667   14.04 |   9.75    2.73
        0.583    1.95 | 3.667    3.12 | 6.750   14.04 |   9.83    2.73
        0.667    1.95 | 3.750    3.12 | 6.833    6.24 |   9.92    2.73
        0.750    1.95 | 3.833    3.12 | 6.917    6.24 |  10.00    2.73
        0.833    1.95 | 3.917    3.12 | 7.000    6.24 |  10.08    2.73
        0.917    1.95 | 4.000    3.12 | 7.083    6.24 |  10.17    2.73
        1.000    1.95 | 4.083    3.12 | 7.167    6.24 |  10.25    2.73
        1.083    1.95 | 4.167    3.12 | 7.250    6.24 |  10.33    1.56
        1.167    1.95 | 4.250    3.12 | 7.333    4.68 |  10.42    1.56
        1.250    1.95 | 4.333    4.68 | 7.417    4.68 |  10.50    1.56
        1.333    1.95 | 4.417    4.68 | 7.500    4.68 |  10.58    1.56
        1.417    1.95 | 4.500    4.68 | 7.583    4.68 |  10.67    1.56
        1.500    1.95 | 4.583    4.68 | 7.667    4.68 |  10.75    1.56
        1.583    1.95 | 4.667    4.68 | 7.750    4.68 |  10.83    1.56
```

```
        1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
        1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
        1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
        1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
        2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
        2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
        2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
        2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
        2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
        2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
        2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
        2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
        2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
        2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
        2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
        2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
        3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
        3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

  Unit Hyd Qpeak  (cms)=   0.271

  PEAK FLOW       (cms)=   0.124 (i)
  TIME TO PEAK    (hrs)=   6.333
  RUNOFF VOLUME    (mm)=  28.515
  TOTAL RAINFALL   (mm)=  78.000
  RUNOFF COEFFICIENT   =   0.366

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

------------------------------------------------------------------------------
-------------------
| CALIB             |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

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

                         ---- TRANSFORMED HYETOGRAPH ----
         TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
        0.083    0.00 | 3.167    2.34 | 6.250  102.96 |   9.33    2.73
        0.167    0.00 | 3.250    2.34 | 6.333   14.04 |   9.42    2.73
        0.250    0.00 | 3.333    3.12 | 6.417   14.04 |   9.50    2.73
        0.333    1.95 | 3.417    3.12 | 6.500   14.04 |   9.58    2.73
        0.417    1.95 | 3.500    3.12 | 6.583   14.04 |   9.67    2.73
        0.500    1.95 | 3.583    3.12 | 6.667   14.04 |   9.75    2.73
        0.583    1.95 | 3.667    3.12 | 6.750   14.04 |   9.83    2.73
        0.667    1.95 | 3.750    3.12 | 6.833    6.24 |   9.92    2.73
        0.750    1.95 | 3.833    3.12 | 6.917    6.24 |  10.00    2.73
        0.833    1.95 | 3.917    3.12 | 7.000    6.24 |  10.08    2.73
```

```
        0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
        1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
        1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
        1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
        1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
        1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
        1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
        1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
        1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
        1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
        1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
        1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
        1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
        2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
        2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
        2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
        2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
        2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
        2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
        2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
        2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
        2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
        2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
        2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
        2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
        3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
        3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

  Unit Hyd Qpeak  (cms)=   0.177

  PEAK FLOW       (cms)=   0.067 (i)
  TIME TO PEAK    (hrs)=   6.250
  RUNOFF VOLUME    (mm)=  28.339
  TOTAL RAINFALL   (mm)=  78.000
  RUNOFF COEFFICIENT   =   0.363

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

------------------------------------------------------------------------------
-------------------
| CALIB             |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
  Surface Area     (ha)=       2.66          2.66
  Dep. Storage     (mm)=       1.00          5.00
  Average Slope     (%)=       1.00          1.00
  Length            (m)=     188.33         40.00
  Mannings n          =       0.130         0.250

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

```
                         ---- TRANSFORMED HYETOGRAPH ----
         TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
        0.083    0.00 | 3.167    2.34 | 6.250  102.96 |   9.33    2.73
        0.167    0.00 | 3.250    2.34 | 6.333   14.04 |   9.42    2.73
        0.250    0.00 | 3.333    3.12 | 6.417   14.04 |   9.50    2.73
        0.333    1.95 | 3.417    3.12 | 6.500   14.04 |   9.58    2.73
        0.417    1.95 | 3.500    3.12 | 6.583   14.04 |   9.67    2.73
        0.500    1.95 | 3.583    3.12 | 6.667   14.04 |   9.75    2.73
        0.583    1.95 | 3.667    3.12 | 6.750   14.04 |   9.83    2.73
        0.667    1.95 | 3.750    3.12 | 6.833    6.24 |   9.92    2.73
        0.750    1.95 | 3.833    3.12 | 6.917    6.24 |  10.00    2.73
        0.833    1.95 | 3.917    3.12 | 7.000    6.24 |  10.08    2.73
        0.917    1.95 | 4.000    3.12 | 7.083    6.24 |  10.17    2.73
        1.000    1.95 | 4.083    3.12 | 7.167    6.24 |  10.25    2.73
        1.083    1.95 | 4.167    3.12 | 7.250    6.24 |  10.33    1.56
        1.167    1.95 | 4.250    3.12 | 7.333    4.68 |  10.42    1.56
        1.250    1.95 | 4.333    4.68 | 7.417    4.68 |  10.50    1.56
        1.333    1.95 | 4.417    4.68 | 7.500    4.68 |  10.58    1.56
        1.417    1.95 | 4.500    4.68 | 7.583    4.68 |  10.67    1.56
        1.500    1.95 | 4.583    4.68 | 7.667    4.68 |  10.75    1.56
        1.583    1.95 | 4.667    4.68 | 7.750    4.68 |  10.83    1.56
        1.667    1.95 | 4.750    4.68 | 7.833    4.68 |  10.92    1.56
        1.750    1.95 | 4.833    6.24 | 7.917    4.68 |  11.00    1.56
        1.833    1.95 | 4.917    6.24 | 8.000    4.68 |  11.08    1.56
        1.917    1.95 | 5.000    6.24 | 8.083    4.68 |  11.17    1.56
        2.000    1.95 | 5.083    6.24 | 8.167    4.68 |  11.25    1.56
        2.083    1.95 | 5.167    6.24 | 8.250    4.68 |  11.33    1.56
        2.167    1.95 | 5.250    6.24 | 8.333    2.73 |  11.42    1.56
        2.250    1.95 | 5.333    9.36 | 8.417    2.73 |  11.50    1.56
        2.333    2.34 | 5.417    9.36 | 8.500    2.73 |  11.58    1.56
        2.417    2.34 | 5.500    9.36 | 8.583    2.73 |  11.67    1.56
        2.500    2.34 | 5.583    9.36 | 8.667    2.73 |  11.75    1.56
        2.583    2.34 | 5.667    9.36 | 8.750    2.73 |  11.83    1.56
        2.667    2.34 | 5.750    9.36 | 8.833    2.73 |  11.92    1.56
        2.750    2.34 | 5.833   37.44 | 8.917    2.73 |  12.00    1.56
        2.833    2.34 | 5.917   37.44 | 9.000    2.73 |  12.08    1.56
        2.917    2.34 | 6.000   37.44 | 9.083    2.73 |  12.17    1.56
        3.000    2.34 | 6.083  102.96 | 9.167    2.73 |  12.25    1.56
        3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

  Max.Eff.Inten.(mm/hr)=      102.96        51.58
             over (min)        15.00        30.00
  Storage Coeff.  (min)=       14.70 (ii)   26.02 (ii)
  Unit Hyd. Tpeak (min)=       15.00        30.00
  Unit Hyd. peak  (cms)=        0.08         0.04
                                                            *TOTALS*
  PEAK FLOW       (cms)=        0.34         0.16          0.447 (iii)
  TIME TO PEAK    (hrs)=        6.33         6.58           6.33
  RUNOFF VOLUME    (mm)=       77.00        26.19          43.97
```

```
    TOTAL RAINFALL   (mm)=      78.00        78.00          78.00
    RUNOFF COEFFICIENT   =       0.99         0.34           0.56


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
                0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
                0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
                0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
                0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
                0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
                0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
                0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
                0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
                0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
                0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
                1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
                1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
                1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
                1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
                1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
                1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
                1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
                1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
                1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
                1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
                1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
                1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
                2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
                2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
                2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
                2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
                2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
                2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
                2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
                2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
                2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
                2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
                2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
                2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
                3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
                3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

     Max.Eff.Inten.(mm/hr)=     102.96        55.74
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.24 (ii)   12.15 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.16          0.481 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33           6.25
     RUNOFF VOLUME    (mm)=      77.00        26.19          43.97
     TOTAL RAINFALL   (mm)=      78.00        78.00          78.00
     RUNOFF COEFFICIENT   =       0.99         0.34           0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430     0.481      6.25      43.97
   OUTFLOW: ID= 1 (  0029)      3.430     0.063      7.00      43.88

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.08
                 TIME SHIFT OF PEAK FLOW         (min)= 45.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0839

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID= 1 (  0023):      0.41   0.037     6.33    30.23
     + ID2= 2 (  0029):     3.43   0.063     7.00    43.88
       ==================================================
       ID = 3 (  0007):     3.84   0.086     6.33    42.42

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID= 3 (  0007):      3.84   0.086     6.33    42.42
     + ID2= 2 (  0030):     1.56   0.124     6.33    28.52
       ==================================================
       ID = 1 (  0007):     5.40   0.211     6.33    38.40

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID= 1 (  0007):      5.40   0.211     6.33    38.40
     + ID2= 2 (  0031):     0.65   0.067     6.25    28.34
       ==================================================
       ID = 3 (  0007):     6.05   0.271     6.33    37.32

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID= 3 (  0007):      6.05   0.271     6.33    37.32
     + ID2= 2 (  0005):     5.32   0.447     6.33    43.97
       ==================================================
       ID = 1 (  0007):    11.37   0.717     6.33    40.43

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220     0.1535
                          0.0410     0.0120   |   0.4630     0.1758
                          0.0580     0.0253   |   0.6510     0.1989
                          0.0710     0.0399   |   0.7480     0.2228
                          0.0830     0.0559   |   0.8280     0.2476
                          0.0920     0.0732   |   0.8990     0.2733
                          0.2500     0.0918   |   0.9640     0.2998
                          0.3200     0.1116   |   1.0240     0.3263
                          0.3750     0.1321   |   1.0800     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.370     0.717      6.33      40.43
   OUTFLOW: ID= 1 (  0008)     11.370     0.336      6.92      40.43

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 46.87
                 TIME SHIFT OF PEAK FLOW         (min)= 35.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.1178

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID= 1 (  0022):      0.83   0.077     6.33    30.22
     + ID2= 2 (  0008):    11.37   0.336     6.92    40.43
       ==================================================
       ID = 3 (  0016):    12.20   0.356     6.83    39.73

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
                0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
                0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
                0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
                0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
                0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
```

```
          0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
          0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
          0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
          0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
          0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
          1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
          1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
          1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
          1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
          1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
          1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
          1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
          1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
          1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
          1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
          1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
          1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
          2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
          2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
          2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
          2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
          2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
          2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
          2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
          2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
          2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
          2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
          2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
          2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
          3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
          3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

   Unit Hyd Qpeak  (cms)=   0.764

   PEAK FLOW       (cms)=   0.383 (i)
   TIME TO PEAK    (hrs)=   6.833
   RUNOFF VOLUME    (mm)=  23.625
   TOTAL RAINFALL   (mm)=  78.000
   RUNOFF COEFFICIENT   =   0.303

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

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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

                          ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
          0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
          0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
          0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
          0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
          0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
          0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
          0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
          0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
          0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
          0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
          1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
          1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
          1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
          1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
          1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
          1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
          1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
          1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
          1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
          1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
          1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
          1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
          2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
          2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
          2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
          2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
          2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
          2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
          2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
          2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
          2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
          2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
          2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
          2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
          3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
          3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

   Unit Hyd Qpeak  (cms)=   0.167

   PEAK FLOW       (cms)=   0.077 (i)
   TIME TO PEAK    (hrs)=   6.333
   RUNOFF VOLUME    (mm)=  30.217
   TOTAL RAINFALL   (mm)=  78.000
   RUNOFF COEFFICIENT   =   0.387

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

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

--------------------
| CALIB             |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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

                          ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
          0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
          0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
          0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
          0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
          0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
          0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
          0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
          0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
          0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
          0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
          1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
          1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
          1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
          1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
          1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
          1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
          1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
          1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
          1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
          1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
          1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
          1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
          2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
          2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
          2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
          2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
          2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
          2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
          2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
          2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
          2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
          2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
          2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
          2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
          3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
          3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

   Unit Hyd Qpeak  (cms)=   0.078

   PEAK FLOW       (cms)=   0.037 (i)
   TIME TO PEAK    (hrs)=   6.333
   RUNOFF VOLUME    (mm)=  30.229
   TOTAL RAINFALL   (mm)=  78.000
   RUNOFF COEFFICIENT   =   0.388

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

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
   Surface Area      (ha)=       2.66          2.66
   Dep. Storage      (mm)=       1.00          5.00
   Average Slope      (%)=       1.00          1.00
   Length             (m)=     188.33         40.00
   Mannings n           =      0.130         0.250

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

                          ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
          0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
          0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
          0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
          0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
          0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
          0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
          0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
          0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
          0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
          0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
          1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
          1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
          1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
          1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
          1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
          1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
          1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
          1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
          1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
          1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
          1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
          1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
          2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
          2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
```

```
           2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
           2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
           2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
           2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
           2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
           2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
           2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
           2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
           2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
           2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
           3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
           3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

    Max.Eff.Inten.(mm/hr)=     102.96        51.58
             over (min)       15.00        30.00
    Storage Coeff.  (min)=      14.70 (ii)   26.02 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.08         0.04
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.34         0.16          0.447 (iii)
    TIME TO PEAK    (hrs)=       6.33         6.58           6.33
    RUNOFF VOLUME    (mm)=      77.00        26.19          43.97
    TOTAL RAINFALL   (mm)=      78.00        78.00          78.00
    RUNOFF COEFFICIENT   =       0.99         0.34           0.56


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                              ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
           0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
           0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
           0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
           0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
           0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
           0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
           0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
           0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
           0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
           0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
           1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
           1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
           1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
           1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
           1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
           1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
           1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
           1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
           1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
           1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
           1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
           1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
           2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
           2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
           2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
           2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
           2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
           2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
           2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
           2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
           2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
           2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
           2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
           2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
           3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
           3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

    Unit Hyd Qpeak  (cms)=   0.177

    PEAK FLOW       (cms)=   0.067 (i)
    TIME TO PEAK    (hrs)=   6.250
    RUNOFF VOLUME    (mm)=  28.339
    TOTAL RAINFALL   (mm)=  78.000
    RUNOFF COEFFICIENT   =   0.363

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                              ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
           0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
           0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
           0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
           0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
           0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
           0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
           0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
           0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
           0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
           0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
           1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
           1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
           1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
           1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
           1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
           1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
           1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
           1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
           1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
           1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
           1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
           1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
           2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
           2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
           2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
           2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
           2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
           2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
           2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
           2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
           2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
           2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
           2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
           2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
           3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
           3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

    Unit Hyd Qpeak  (cms)=   0.271

    PEAK FLOW       (cms)=   0.124 (i)
    TIME TO PEAK    (hrs)=   6.333
    RUNOFF VOLUME    (mm)=  28.515
    TOTAL RAINFALL   (mm)=  78.000
    RUNOFF COEFFICIENT   =   0.366

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

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

| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
           0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
           0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
           0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
           0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
           0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
           0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
           0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
           0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
           0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
           0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
           1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
           1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
           1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
           1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
           1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
           1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
           1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
           1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
           1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
           1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
           1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
           1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
           2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
           2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
           2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
           2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
           2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
           2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
           2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
           2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
           2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
           2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
           2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
           2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
```

```
            3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
            3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

     Max.Eff.Inten.(mm/hr)=     102.96        55.74
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.24 (ii)   12.15 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.16          0.481 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33           6.25
     RUNOFF VOLUME    (mm)=      77.00        26.19          43.97
     TOTAL RAINFALL   (mm)=      78.00        78.00          78.00
     RUNOFF COEFFICIENT   =       0.99         0.34           0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.037     6.33    30.23
      + ID2= 2 (  0036):     5.32   0.447     6.33    43.97
        ==================================================
        ID = 3 (  0041):     5.73   0.484     6.33    42.99

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.484     6.33    42.99
      + ID2= 2 (  0037):     0.65   0.067     6.25    28.34
        ==================================================
        ID = 1 (  0041):     6.38   0.544     6.33    41.50

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     6.38   0.544     6.33    41.50
      + ID2= 2 (  0038):     1.56   0.124     6.33    28.52
        ==================================================
        ID = 3 (  0041):     7.94   0.668     6.33    38.95

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     7.94   0.668     6.33    38.95
      + ID2= 2 (  0040):     3.43   0.481     6.25    43.97
        ==================================================
        ID = 1 (  0041):    11.37   1.084     6.25    40.46

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.077     6.33    30.22
      + ID2= 2 (  0041):    11.37   1.084     6.25    40.46
        ==================================================
        ID = 3 (  0032):    12.20   1.156     6.25    39.77

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2011)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
```

```

                   *****  D E T A I L E D   O U T P U T *****


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

  Output  filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\e387f366-ff51-4f79-8e27-b8ee68
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\e387f366-ff51-4f79-8e27-b8ee68

DATE: 06-15-2023                           TIME: 02:15:49

USER:


COMMENTS: ____________________________________________________________


----------------------------------------------------------------------------------
------------------------
  ************************************************
  ** SIMULATION : 050yr 12hr 15min SCS          **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                  |              ata\Local\Temp\
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\b3fa3004
| Ptotal= 86.40 mm |    Comments: created from IDF Group New IDFGroup - 2
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    0.00 |  3.25    3.46 |  6.50   15.55 |  9.75    3.02
                 0.25    2.16 |  3.50    3.46 |  6.75    6.91 | 10.00    3.02
                 0.50    2.16 |  3.75    3.46 |  7.00    6.91 | 10.25    1.73
                 0.75    2.16 |  4.00    3.46 |  7.25    5.18 | 10.50    1.73
                 1.00    2.16 |  4.25    5.18 |  7.50    5.18 | 10.75    1.73
                 1.25    2.16 |  4.50    5.18 |  7.75    5.18 | 11.00    1.73
                 1.50    2.16 |  4.75    6.91 |  8.00    5.18 | 11.25    1.73
                 1.75    2.16 |  5.00    6.91 |  8.25    3.02 | 11.50    1.73
                 2.00    2.16 |  5.25   10.37 |  8.50    3.02 | 11.75    1.73
                 2.25    2.59 |  5.50   10.37 |  8.75    3.02 | 12.00    1.73
                 2.50    2.59 |  5.75   41.47 |  9.00    3.02 |
                 2.75    2.59 |  6.00  114.05 |  9.25    3.02 |
                 3.00    2.59 |  6.25   15.55 |  9.50    3.02 |

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

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

| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.81         2.81
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     193.56        10.00
     Mannings n          =       0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
               0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
               0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
               0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
               0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
               0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
               0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
               0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
               0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
               0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
               0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
               1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
               1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
               1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
               1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
               1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
               1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
               1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
               1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
               1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
               1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
               1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
               1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
               2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
               2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
               2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
               2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
               2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
               2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
               2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
               2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
               2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
               2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
               2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
               2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
```

```
             3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
             3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Max.Eff.Inten.(mm/hr)=     114.05        66.34
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.60 (ii)    6.96 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.26         0.14
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.62         0.41         1.028 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.25          6.25
     RUNOFF VOLUME    (mm)=      85.40        31.21         50.18
     TOTAL RAINFALL   (mm)=      86.40        86.40         86.40
     RUNOFF COEFFICIENT   =       0.99         0.36          0.58

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                           ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
             0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
             0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
             0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
             0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
             0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
             0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
             0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
             0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
             0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
             0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
             1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
             1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
             1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
             1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
             1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
```

```
             1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
             1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
             1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
             1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
             1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
             1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
             1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
             2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
             2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
             2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
             2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
             2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
             2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
             2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
             2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
             2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
             2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
             2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
             2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
             3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
             3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.092 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  36.155
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.418

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

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                           ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
             0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
             0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
             0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
             0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
             0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
             0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
```

```
             0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
             0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
             0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
             0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
             1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
             1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
             1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
             1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
             1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
             1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
             1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
             1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
             1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
             1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
             1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
             1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
             2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
             2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
             2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
             2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
             2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
             2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
             2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
             2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
             2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
             2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
             2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
             2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
             3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
             3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.044 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  36.170
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.419

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

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

                           ---- TRANSFORMED HYETOGRAPH ----
```

```
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
             0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
             0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
             0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
             0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
             0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
             0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
             0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
             0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
             0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
             0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
             1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
             1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
             1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
             1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
             1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
             1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
             1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
             1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
             1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
             1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
             1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
             1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
             2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
             2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
             2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
             2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
             2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
             2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
             2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
             2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
             2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
             2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
             2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
             2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
             3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
             3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.150 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  34.220
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.396

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

-------------------------------------------------------------------------------
--------------------
```

```
| CALIB              |
| NASHYD  (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                              ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    0.00 | 3.167    2.59 | 6.250  114.05 |   9.33    3.02
                  0.167    0.00 | 3.250    2.59 | 6.333   15.55 |   9.42    3.02
                  0.250    0.00 | 3.333    3.46 | 6.417   15.55 |   9.50    3.02
                  0.333    2.16 | 3.417    3.46 | 6.500   15.55 |   9.58    3.02
                  0.417    2.16 | 3.500    3.46 | 6.583   15.55 |   9.67    3.02
                  0.500    2.16 | 3.583    3.46 | 6.667   15.55 |   9.75    3.02
                  0.583    2.16 | 3.667    3.46 | 6.750   15.55 |   9.83    3.02
                  0.667    2.16 | 3.750    3.46 | 6.833    6.91 |   9.92    3.02
                  0.750    2.16 | 3.833    3.46 | 6.917    6.91 |  10.00    3.02
                  0.833    2.16 | 3.917    3.46 | 7.000    6.91 |  10.08    3.02
                  0.917    2.16 | 4.000    3.46 | 7.083    6.91 |  10.17    3.02
                  1.000    2.16 | 4.083    3.46 | 7.167    6.91 |  10.25    3.02
                  1.083    2.16 | 4.167    3.46 | 7.250    6.91 |  10.33    1.73
                  1.167    2.16 | 4.250    3.46 | 7.333    5.18 |  10.42    1.73
                  1.250    2.16 | 4.333    5.18 | 7.417    5.18 |  10.50    1.73
                  1.333    2.16 | 4.417    5.18 | 7.500    5.18 |  10.58    1.73
                  1.417    2.16 | 4.500    5.18 | 7.583    5.18 |  10.67    1.73
                  1.500    2.16 | 4.583    5.18 | 7.667    5.18 |  10.75    1.73
                  1.583    2.16 | 4.667    5.18 | 7.750    5.18 |  10.83    1.73
                  1.667    2.16 | 4.750    5.18 | 7.833    5.18 |  10.92    1.73
                  1.750    2.16 | 4.833    6.91 | 7.917    5.18 |  11.00    1.73
                  1.833    2.16 | 4.917    6.91 | 8.000    5.18 |  11.08    1.73
                  1.917    2.16 | 5.000    6.91 | 8.083    5.18 |  11.17    1.73
                  2.000    2.16 | 5.083    6.91 | 8.167    5.18 |  11.25    1.73
                  2.083    2.16 | 5.167    6.91 | 8.250    5.18 |  11.33    1.73
                  2.167    2.16 | 5.250    6.91 | 8.333    3.02 |  11.42    1.73
                  2.250    2.16 | 5.333   10.37 | 8.417    3.02 |  11.50    1.73
                  2.333    2.59 | 5.417   10.37 | 8.500    3.02 |  11.58    1.73
                  2.417    2.59 | 5.500   10.37 | 8.583    3.02 |  11.67    1.73
                  2.500    2.59 | 5.583   10.37 | 8.667    3.02 |  11.75    1.73
                  2.583    2.59 | 5.667   10.37 | 8.750    3.02 |  11.83    1.73
                  2.667    2.59 | 5.750   10.37 | 8.833    3.02 |  11.92    1.73
                  2.750    2.59 | 5.833   41.47 | 8.917    3.02 |  12.00    1.73
                  2.833    2.59 | 5.917   41.47 | 9.000    3.02 |  12.08    1.73
                  2.917    2.59 | 6.000   41.47 | 9.083    3.02 |  12.17    1.73
                  3.000    2.59 | 6.083  114.05 | 9.167    3.02 |  12.25    1.73
                  3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW      (cms)=   0.081 (i)
     TIME TO PEAK    (hrs)=   6.250
     RUNOFF VOLUME    (mm)=  34.008
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.394

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

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =       0.130        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    0.00 | 3.167    2.59 | 6.250  114.05 |   9.33    3.02
                  0.167    0.00 | 3.250    2.59 | 6.333   15.55 |   9.42    3.02
                  0.250    0.00 | 3.333    3.46 | 6.417   15.55 |   9.50    3.02
                  0.333    2.16 | 3.417    3.46 | 6.500   15.55 |   9.58    3.02
                  0.417    2.16 | 3.500    3.46 | 6.583   15.55 |   9.67    3.02
                  0.500    2.16 | 3.583    3.46 | 6.667   15.55 |   9.75    3.02
                  0.583    2.16 | 3.667    3.46 | 6.750   15.55 |   9.83    3.02
                  0.667    2.16 | 3.750    3.46 | 6.833    6.91 |   9.92    3.02
                  0.750    2.16 | 3.833    3.46 | 6.917    6.91 |  10.00    3.02
                  0.833    2.16 | 3.917    3.46 | 7.000    6.91 |  10.08    3.02
                  0.917    2.16 | 4.000    3.46 | 7.083    6.91 |  10.17    3.02
                  1.000    2.16 | 4.083    3.46 | 7.167    6.91 |  10.25    3.02
                  1.083    2.16 | 4.167    3.46 | 7.250    6.91 |  10.33    1.73
                  1.167    2.16 | 4.250    3.46 | 7.333    5.18 |  10.42    1.73
                  1.250    2.16 | 4.333    5.18 | 7.417    5.18 |  10.50    1.73
                  1.333    2.16 | 4.417    5.18 | 7.500    5.18 |  10.58    1.73
                  1.417    2.16 | 4.500    5.18 | 7.583    5.18 |  10.67    1.73
                  1.500    2.16 | 4.583    5.18 | 7.667    5.18 |  10.75    1.73
                  1.583    2.16 | 4.667    5.18 | 7.750    5.18 |  10.83    1.73
                  1.667    2.16 | 4.750    5.18 | 7.833    5.18 |  10.92    1.73
                  1.750    2.16 | 4.833    6.91 | 7.917    5.18 |  11.00    1.73
                  1.833    2.16 | 4.917    6.91 | 8.000    5.18 |  11.08    1.73
                  1.917    2.16 | 5.000    6.91 | 8.083    5.18 |  11.17    1.73
                  2.000    2.16 | 5.083    6.91 | 8.167    5.18 |  11.25    1.73
                  2.083    2.16 | 5.167    6.91 | 8.250    5.18 |  11.33    1.73
                  2.167    2.16 | 5.250    6.91 | 8.333    3.02 |  11.42    1.73
                  2.250    2.16 | 5.333   10.37 | 8.417    3.02 |  11.50    1.73
                  2.333    2.59 | 5.417   10.37 | 8.500    3.02 |  11.58    1.73
                  2.417    2.59 | 5.500   10.37 | 8.583    3.02 |  11.67    1.73
                  2.500    2.59 | 5.583   10.37 | 8.667    3.02 |  11.75    1.73
                  2.583    2.59 | 5.667   10.37 | 8.750    3.02 |  11.83    1.73
                  2.667    2.59 | 5.750   10.37 | 8.833    3.02 |  11.92    1.73
                  2.750    2.59 | 5.833   41.47 | 8.917    3.02 |  12.00    1.73
                  2.833    2.59 | 5.917   41.47 | 9.000    3.02 |  12.08    1.73
                  2.917    2.59 | 6.000   41.47 | 9.083    3.02 |  12.17    1.73
                  3.000    2.59 | 6.083  114.05 | 9.167    3.02 |  12.25    1.73
                  3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Max.Eff.Inten.(mm/hr)=     114.05        61.59
                over (min)       15.00        25.00
     Storage Coeff.  (min)=      14.11 (ii)   24.66 (ii)
     Unit Hyd. Tpeak (min)=      15.00        25.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                         *TOTALS*
     PEAK FLOW      (cms)=        0.39         0.20          0.542 (iii)
     TIME TO PEAK    (hrs)=       6.33         6.50           6.42
     RUNOFF VOLUME    (mm)=      85.40        31.21          50.18
     TOTAL RAINFALL   (mm)=      86.40        86.40          86.40
     RUNOFF COEFFICIENT   =       0.99         0.36           0.58


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =       0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    0.00 | 3.167    2.59 | 6.250  114.05 |   9.33    3.02
                  0.167    0.00 | 3.250    2.59 | 6.333   15.55 |   9.42    3.02
                  0.250    0.00 | 3.333    3.46 | 6.417   15.55 |   9.50    3.02
                  0.333    2.16 | 3.417    3.46 | 6.500   15.55 |   9.58    3.02
                  0.417    2.16 | 3.500    3.46 | 6.583   15.55 |   9.67    3.02
                  0.500    2.16 | 3.583    3.46 | 6.667   15.55 |   9.75    3.02
                  0.583    2.16 | 3.667    3.46 | 6.750   15.55 |   9.83    3.02
                  0.667    2.16 | 3.750    3.46 | 6.833    6.91 |   9.92    3.02
                  0.750    2.16 | 3.833    3.46 | 6.917    6.91 |  10.00    3.02
                  0.833    2.16 | 3.917    3.46 | 7.000    6.91 |  10.08    3.02
                  0.917    2.16 | 4.000    3.46 | 7.083    6.91 |  10.17    3.02
                  1.000    2.16 | 4.083    3.46 | 7.167    6.91 |  10.25    3.02
                  1.083    2.16 | 4.167    3.46 | 7.250    6.91 |  10.33    1.73
                  1.167    2.16 | 4.250    3.46 | 7.333    5.18 |  10.42    1.73
                  1.250    2.16 | 4.333    5.18 | 7.417    5.18 |  10.50    1.73
                  1.333    2.16 | 4.417    5.18 | 7.500    5.18 |  10.58    1.73
                  1.417    2.16 | 4.500    5.18 | 7.583    5.18 |  10.67    1.73
                  1.500    2.16 | 4.583    5.18 | 7.667    5.18 |  10.75    1.73
                  1.583    2.16 | 4.667    5.18 | 7.750    5.18 |  10.83    1.73
                  1.667    2.16 | 4.750    5.18 | 7.833    5.18 |  10.92    1.73
                  1.750    2.16 | 4.833    6.91 | 7.917    5.18 |  11.00    1.73
                  1.833    2.16 | 4.917    6.91 | 8.000    5.18 |  11.08    1.73
                  1.917    2.16 | 5.000    6.91 | 8.083    5.18 |  11.17    1.73
                  2.000    2.16 | 5.083    6.91 | 8.167    5.18 |  11.25    1.73
                  2.083    2.16 | 5.167    6.91 | 8.250    5.18 |  11.33    1.73
                  2.167    2.16 | 5.250    6.91 | 8.333    3.02 |  11.42    1.73
                  2.250    2.16 | 5.333   10.37 | 8.417    3.02 |  11.50    1.73
                  2.333    2.59 | 5.417   10.37 | 8.500    3.02 |  11.58    1.73
                  2.417    2.59 | 5.500   10.37 | 8.583    3.02 |  11.67    1.73
                  2.500    2.59 | 5.583   10.37 | 8.667    3.02 |  11.75    1.73
                  2.583    2.59 | 5.667   10.37 | 8.750    3.02 |  11.83    1.73
                  2.667    2.59 | 5.750   10.37 | 8.833    3.02 |  11.92    1.73
                  2.750    2.59 | 5.833   41.47 | 8.917    3.02 |  12.00    1.73
                  2.833    2.59 | 5.917   41.47 | 9.000    3.02 |  12.08    1.73
                  2.917    2.59 | 6.000   41.47 | 9.083    3.02 |  12.17    1.73
                  3.000    2.59 | 6.083  114.05 | 9.167    3.02 |  12.25    1.73
                  3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Max.Eff.Inten.(mm/hr)=     114.05        66.34
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.11 (ii)   11.42 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.09
                                                         *TOTALS*
     PEAK FLOW      (cms)=        0.38         0.20          0.551 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33           6.25
     RUNOFF VOLUME    (mm)=      85.40        31.21          50.18
     TOTAL RAINFALL   (mm)=      86.40        86.40          86.40
     RUNOFF COEFFICIENT   =       0.99         0.36           0.58

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.551      6.25      50.18
   OUTFLOW: ID= 1 (  0029)      3.430      0.072      7.00      50.08

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.06
                TIME SHIFT OF PEAK FLOW         (min)= 45.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0960

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.044     6.33    36.17
      + ID2= 2 (  0029):     3.43   0.072     7.00    50.08
        ==================================================
        ID = 3 (  0007):     3.84   0.101     6.33    48.59

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.101     6.33    48.59
      + ID2= 2 (  0030):     1.56   0.150     6.33    34.22
        ==================================================
        ID = 1 (  0007):     5.40   0.251     6.33    44.44

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.40   0.251     6.33    44.44
```

```
      + ID2= 2 (  0031):     0.65   0.081     6.25    34.01
        ==================================================
        ID = 3 (  0007):     6.05   0.323     6.33    43.32

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     6.05   0.323     6.33    43.32
      + ID2= 2 (  0005):     5.32   0.542     6.42    50.18
        ==================================================
        ID = 1 (  0007):    11.37   0.861     6.33    46.53

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220     0.1535
                          0.0410     0.0120   |   0.4630     0.1758
                          0.0580     0.0253   |   0.6510     0.1989
                          0.0710     0.0399   |   0.7480     0.2228
                          0.0830     0.0559   |   0.8280     0.2476
                          0.0920     0.0732   |   0.8990     0.2733
                          0.2500     0.0918   |   0.9640     0.2998
                          0.3200     0.1116   |   1.0240     0.3263
                          0.3750     0.1321   |   1.0800     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.370      0.861      6.33      46.53
   OUTFLOW: ID= 1 (  0008)     11.370      0.386      6.92      46.52

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 44.80
                TIME SHIFT OF PEAK FLOW         (min)= 35.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1372

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.092     6.33    36.15
      + ID2= 2 (  0008):    11.37   0.386     6.92    46.52
        ==================================================
        ID = 3 (  0016):    12.20   0.411     6.75    45.82
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                           ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    2.59 | 6.250  114.05 |   9.33    3.02
                 0.167    0.00 | 3.250    2.59 | 6.333   15.55 |   9.42    3.02
                 0.250    0.00 | 3.333    3.46 | 6.417   15.55 |   9.50    3.02
                 0.333    2.16 | 3.417    3.46 | 6.500   15.55 |   9.58    3.02
                 0.417    2.16 | 3.500    3.46 | 6.583   15.55 |   9.67    3.02
                 0.500    2.16 | 3.583    3.46 | 6.667   15.55 |   9.75    3.02
                 0.583    2.16 | 3.667    3.46 | 6.750   15.55 |   9.83    3.02
                 0.667    2.16 | 3.750    3.46 | 6.833    6.91 |   9.92    3.02
                 0.750    2.16 | 3.833    3.46 | 6.917    6.91 |  10.00    3.02
                 0.833    2.16 | 3.917    3.46 | 7.000    6.91 |  10.08    3.02
                 0.917    2.16 | 4.000    3.46 | 7.083    6.91 |  10.17    3.02
                 1.000    2.16 | 4.083    3.46 | 7.167    6.91 |  10.25    3.02
                 1.083    2.16 | 4.167    3.46 | 7.250    6.91 |  10.33    1.73
                 1.167    2.16 | 4.250    3.46 | 7.333    5.18 |  10.42    1.73
                 1.250    2.16 | 4.333    5.18 | 7.417    5.18 |  10.50    1.73
                 1.333    2.16 | 4.417    5.18 | 7.500    5.18 |  10.58    1.73
                 1.417    2.16 | 4.500    5.18 | 7.583    5.18 |  10.67    1.73
                 1.500    2.16 | 4.583    5.18 | 7.667    5.18 |  10.75    1.73
                 1.583    2.16 | 4.667    5.18 | 7.750    5.18 |  10.83    1.73
                 1.667    2.16 | 4.750    5.18 | 7.833    5.18 |  10.92    1.73
                 1.750    2.16 | 4.833    6.91 | 7.917    5.18 |  11.00    1.73
                 1.833    2.16 | 4.917    6.91 | 8.000    5.18 |  11.08    1.73
                 1.917    2.16 | 5.000    6.91 | 8.083    5.18 |  11.17    1.73
                 2.000    2.16 | 5.083    6.91 | 8.167    5.18 |  11.25    1.73
                 2.083    2.16 | 5.167    6.91 | 8.250    5.18 |  11.33    1.73
                 2.167    2.16 | 5.250    6.91 | 8.333    3.02 |  11.42    1.73
                 2.250    2.16 | 5.333   10.37 | 8.417    3.02 |  11.50    1.73
                 2.333    2.59 | 5.417   10.37 | 8.500    3.02 |  11.58    1.73
                 2.417    2.59 | 5.500   10.37 | 8.583    3.02 |  11.67    1.73
                 2.500    2.59 | 5.583   10.37 | 8.667    3.02 |  11.75    1.73
                 2.583    2.59 | 5.667   10.37 | 8.750    3.02 |  11.83    1.73
                 2.667    2.59 | 5.750   10.37 | 8.833    3.02 |  11.92    1.73
                 2.750    2.59 | 5.833   41.47 | 8.917    3.02 |  12.00    1.73
                 2.833    2.59 | 5.917   41.47 | 9.000    3.02 |  12.08    1.73
                 2.917    2.59 | 6.000   41.47 | 9.083    3.02 |  12.17    1.73
                 3.000    2.59 | 6.083  114.05 | 9.167    3.02 |  12.25    1.73
                 3.083    2.59 | 6.167  114.05 | 9.250    3.02 |
```

```
     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW      (cms)=   0.463 (i)
     TIME TO PEAK    (hrs)=   6.833
     RUNOFF VOLUME    (mm)=  28.421
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.329

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                           ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    2.59 | 6.250  114.05 |   9.33    3.02
                 0.167    0.00 | 3.250    2.59 | 6.333   15.55 |   9.42    3.02
                 0.250    0.00 | 3.333    3.46 | 6.417   15.55 |   9.50    3.02
                 0.333    2.16 | 3.417    3.46 | 6.500   15.55 |   9.58    3.02
                 0.417    2.16 | 3.500    3.46 | 6.583   15.55 |   9.67    3.02
                 0.500    2.16 | 3.583    3.46 | 6.667   15.55 |   9.75    3.02
                 0.583    2.16 | 3.667    3.46 | 6.750   15.55 |   9.83    3.02
                 0.667    2.16 | 3.750    3.46 | 6.833    6.91 |   9.92    3.02
                 0.750    2.16 | 3.833    3.46 | 6.917    6.91 |  10.00    3.02
                 0.833    2.16 | 3.917    3.46 | 7.000    6.91 |  10.08    3.02
                 0.917    2.16 | 4.000    3.46 | 7.083    6.91 |  10.17    3.02
                 1.000    2.16 | 4.083    3.46 | 7.167    6.91 |  10.25    3.02
                 1.083    2.16 | 4.167    3.46 | 7.250    6.91 |  10.33    1.73
                 1.167    2.16 | 4.250    3.46 | 7.333    5.18 |  10.42    1.73
                 1.250    2.16 | 4.333    5.18 | 7.417    5.18 |  10.50    1.73
                 1.333    2.16 | 4.417    5.18 | 7.500    5.18 |  10.58    1.73
                 1.417    2.16 | 4.500    5.18 | 7.583    5.18 |  10.67    1.73
                 1.500    2.16 | 4.583    5.18 | 7.667    5.18 |  10.75    1.73
                 1.583    2.16 | 4.667    5.18 | 7.750    5.18 |  10.83    1.73
                 1.667    2.16 | 4.750    5.18 | 7.833    5.18 |  10.92    1.73
                 1.750    2.16 | 4.833    6.91 | 7.917    5.18 |  11.00    1.73
                 1.833    2.16 | 4.917    6.91 | 8.000    5.18 |  11.08    1.73
                 1.917    2.16 | 5.000    6.91 | 8.083    5.18 |  11.17    1.73
                 2.000    2.16 | 5.083    6.91 | 8.167    5.18 |  11.25    1.73
                 2.083    2.16 | 5.167    6.91 | 8.250    5.18 |  11.33    1.73
                 2.167    2.16 | 5.250    6.91 | 8.333    3.02 |  11.42    1.73
                 2.250    2.16 | 5.333   10.37 | 8.417    3.02 |  11.50    1.73
                 2.333    2.59 | 5.417   10.37 | 8.500    3.02 |  11.58    1.73
```

```
             2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
             2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
             2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
             2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
             2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
             2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
             2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
             3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
             3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.092 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  36.155
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.418

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

------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                             ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    2.59 | 6.250  114.05 |   9.33    3.02
             0.167    0.00 | 3.250    2.59 | 6.333   15.55 |   9.42    3.02
             0.250    0.00 | 3.333    3.46 | 6.417   15.55 |   9.50    3.02
             0.333    2.16 | 3.417    3.46 | 6.500   15.55 |   9.58    3.02
             0.417    2.16 | 3.500    3.46 | 6.583   15.55 |   9.67    3.02
             0.500    2.16 | 3.583    3.46 | 6.667   15.55 |   9.75    3.02
             0.583    2.16 | 3.667    3.46 | 6.750   15.55 |   9.83    3.02
             0.667    2.16 | 3.750    3.46 | 6.833    6.91 |   9.92    3.02
             0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
             0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
             0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
             1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
             1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
             1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
             1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
             1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
             1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
             1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
             1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
             1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
             1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
             1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
             1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
             2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
             2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
             2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
             2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
             2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
             2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
             2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
             2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
             2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
             2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
             2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
             2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
             3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
             3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.044 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  36.170
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.419

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

------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66          2.66
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     188.33         40.00
     Mannings n          =      0.130         0.250

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


                             ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    2.59 | 6.250  114.05 |   9.33    3.02
             0.167    0.00 | 3.250    2.59 | 6.333   15.55 |   9.42    3.02
             0.250    0.00 | 3.333    3.46 | 6.417   15.55 |   9.50    3.02
             0.333    2.16 | 3.417    3.46 | 6.500   15.55 |   9.58    3.02
             0.417    2.16 | 3.500    3.46 | 6.583   15.55 |   9.67    3.02
             0.500    2.16 | 3.583    3.46 | 6.667   15.55 |   9.75    3.02
             0.583    2.16 | 3.667    3.46 | 6.750   15.55 |   9.83    3.02
             0.667    2.16 | 3.750    3.46 | 6.833    6.91 |   9.92    3.02
             0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
             0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
             0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
             1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
             1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
             1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
             1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
             1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
             1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
             1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
             1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
             1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
             1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
             1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
             1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
             2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
             2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
             2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
             2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
             2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
             2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
             2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
             2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
             2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
             2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
             2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
             2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
             3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
             3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Max.Eff.Inten.(mm/hr)=     114.05        61.59
                over (min)       15.00        25.00
     Storage Coeff.  (min)=      14.11 (ii)   24.66 (ii)
     Unit Hyd. Tpeak (min)=      15.00        25.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.39         0.20          0.542 (iii)
     TIME TO PEAK    (hrs)=       6.33         6.50           6.42
     RUNOFF VOLUME    (mm)=      85.40        31.21          50.18
     TOTAL RAINFALL   (mm)=      86.40        86.40          86.40
     RUNOFF COEFFICIENT   =       0.99         0.36           0.58


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                             ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    2.59 | 6.250  114.05 |   9.33    3.02
             0.167    0.00 | 3.250    2.59 | 6.333   15.55 |   9.42    3.02
             0.250    0.00 | 3.333    3.46 | 6.417   15.55 |   9.50    3.02
             0.333    2.16 | 3.417    3.46 | 6.500   15.55 |   9.58    3.02
             0.417    2.16 | 3.500    3.46 | 6.583   15.55 |   9.67    3.02
             0.500    2.16 | 3.583    3.46 | 6.667   15.55 |   9.75    3.02
             0.583    2.16 | 3.667    3.46 | 6.750   15.55 |   9.83    3.02
             0.667    2.16 | 3.750    3.46 | 6.833    6.91 |   9.92    3.02
             0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
             0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
             0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
             1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
             1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
             1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
             1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
             1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
             1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
             1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
             1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
             1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
             1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
             1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
             1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
             2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
             2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
             2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
             2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
             2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
             2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
             2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
             2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
             2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
             2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
             2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
             2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
             3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
             3.083    2.59 | 6.167  114.05 | 9.250    3.02 |
```

```
    Unit Hyd Qpeak  (cms)=   0.177

    PEAK FLOW       (cms)=   0.081 (i)
    TIME TO PEAK    (hrs)=   6.250
    RUNOFF VOLUME    (mm)=  34.008
    TOTAL RAINFALL   (mm)=  86.400
    RUNOFF COEFFICIENT   =   0.394

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                            ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
                  0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
                  0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
                  0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
                  0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
                  0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
                  0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
                  0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
                  0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
                  0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
                  0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
                  1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
                  1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
                  1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
                  1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
                  1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
                  1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
                  1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
                  1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
                  1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
                  1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
                  1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
                  1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
                  2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
                  2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
                  2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
                  2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
                  2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
                  2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
                  2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
                  2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
                  2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
                  2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
                  2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
                  2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
                  3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
                  3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

    Unit Hyd Qpeak  (cms)=   0.271

    PEAK FLOW       (cms)=   0.150 (i)
    TIME TO PEAK    (hrs)=   6.333
    RUNOFF VOLUME    (mm)=  34.220
    TOTAL RAINFALL   (mm)=  86.400
    RUNOFF COEFFICIENT   =   0.396

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71          1.71
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     151.22         40.00
    Mannings n          =      0.013         0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
                  0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
                  0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
                  0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
                  0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
                  0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
                  0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
                  0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
                  0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
                  0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
                  0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
                  1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
                  1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
                  1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
                  1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
                  1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
                  1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
                  1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
                  1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
                  1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
                  1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
                  1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
                  1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
                  2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
                  2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
                  2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
                  2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
                  2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
                  2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
                  2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
                  2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
                  2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
                  2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
                  2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
                  2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
                  3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
                  3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

    Max.Eff.Inten.(mm/hr)=     114.05        66.34
               over (min)        5.00        15.00
    Storage Coeff.  (min)=       3.11 (ii)   11.42 (ii)
    Unit Hyd. Tpeak (min)=       5.00        15.00
    Unit Hyd. peak  (cms)=       0.27         0.09
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.38         0.20          0.551 (iii)
    TIME TO PEAK    (hrs)=       6.25         6.33           6.25
    RUNOFF VOLUME    (mm)=      85.40        31.21          50.18
    TOTAL RAINFALL   (mm)=      86.40        86.40          86.40
    RUNOFF COEFFICIENT   =       0.99         0.36           0.58

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0033):      0.41   0.044     6.33    36.17
     + ID2= 2 (  0036):      5.32   0.542     6.42    50.18
       ===================================================
       ID = 3 (  0041):      5.73   0.582     6.33    49.17

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0041):      5.73   0.582     6.33    49.17
     + ID2= 2 (  0037):      0.65   0.081     6.25    34.01
       ===================================================
       ID = 1 (  0041):      6.38   0.654     6.33    47.63

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0041):      6.38   0.654     6.33    47.63
     + ID2= 2 (  0038):      1.56   0.150     6.33    34.22
       ===================================================
       ID = 3 (  0041):      7.94   0.804     6.33    44.99

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0041):      7.94   0.804     6.33    44.99
     + ID2= 2 (  0040):      3.43   0.551     6.25    50.18
       ===================================================
       ID = 1 (  0041):     11.37   1.277     6.25    46.56

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0039):      0.83   0.092     6.33    36.15
     + ID2= 2 (  0041):     11.37   1.277     6.25    46.56
       ===================================================
       ID = 3 (  0032):     12.20   1.364     6.25    45.85

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

```
--------------------------------------------------------------------------------
==================================================================================
========================

      V    V   I    SSSSS  U   U    A    L              (v 6.2.2011)
      V    V   I    SS     U   U   A A   L
       V  V    I     SS    U   U  AAAAA  L
       V  V    I      SS   U   U  A   A  L
        VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
      O   O    T      T    H   H   Y Y   MM MM  O   O
      O   O    T      T    H   H    Y    M   M  O   O
       OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2021 Smart City Water Inc
All rights reserved.

                   *****  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\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\31c89148-d84a-4193-b080-5177fa
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\31c89148-d84a-4193-b080-5177fa

DATE: 06-15-2023                          TIME: 02:15:49

USER:


COMMENTS: ____________________________________________________________


----------------------------------------------------------------------------------
------------------------
  **********************************************
  ** SIMULATION : 100yr 12hr 15min SCS         **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                  |              ata\Local\Temp\
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\c34a575a
```

```
| Ptotal= 96.00 mm |    Comments: created from IDF Group New IDFGroup - 2
--------------------
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.00    0.00 |  3.25    3.84 |  6.50   17.28 |  9.75    3.36
            0.25    2.40 |  3.50    3.84 |  6.75    7.68 | 10.00    3.36
            0.50    2.40 |  3.75    3.84 |  7.00    7.68 | 10.25    1.92
            0.75    2.40 |  4.00    3.84 |  7.25    5.76 | 10.50    1.92
            1.00    2.40 |  4.25    5.76 |  7.50    5.76 | 10.75    1.92
            1.25    2.40 |  4.50    5.76 |  7.75    5.76 | 11.00    1.92
            1.50    2.40 |  4.75    7.68 |  8.00    5.76 | 11.25    1.92
            1.75    2.40 |  5.00    7.68 |  8.25    3.36 | 11.50    1.92
            2.00    2.40 |  5.25   11.52 |  8.50    3.36 | 11.75    1.92
            2.25    2.88 |  5.50   11.52 |  8.75    3.36 | 12.00    1.92
            2.50    2.88 |  5.75   46.08 |  9.00    3.36 |
            2.75    2.88 |  6.00  126.72 |  9.25    3.36 |
            3.00    2.88 |  6.25   17.28 |  9.50    3.36 |

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

--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.81          2.81
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          2.00
     Length            (m)=    193.56         10.00
     Mannings n          =      0.013         0.250

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


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
               0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
               0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
               0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
               0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
               0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
               0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
               0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
               0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
               0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
               0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
               1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
               1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
               1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
```

```
               1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
               1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
               1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
               1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
               1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
               1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
               1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
               1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
               1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
               2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
               2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
               2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
               2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
               2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
               2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
               2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
               2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
               2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
               2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
               2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
               2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
               3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
               3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Max.Eff.Inten.(mm/hr)=     126.72        79.06
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.45 (ii)    6.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.26         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.69         0.50         1.185 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.25          6.25
     RUNOFF VOLUME    (mm)=      95.00        37.26         57.47
     TOTAL RAINFALL   (mm)=      96.00        96.00         96.00
     RUNOFF COEFFICIENT   =       0.99         0.39          0.60

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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

```
                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
               0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
               0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
               0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
               0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
               0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
               0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
               0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
               0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
               0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
               0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
               1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
               1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
               1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
               1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
               1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
               1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
               1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
               1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
               1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
               1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
               1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
               1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
               2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
               2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
               2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
               2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
               2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
               2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
               2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
               2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
               2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
               2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
               2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
               2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
               3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
               3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.110 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  43.235
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.450

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

```
----------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
                0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
                0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
                0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
                0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
                0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
                0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
                0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
                0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
                0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
                0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
                1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
                1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
                1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
                1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
                1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
                1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
                1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
                1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
                1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
                1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
                1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
                1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
                2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
                2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
                2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
                2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
                2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
                2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
                2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
                2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
                2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
                2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
                2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
                2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
                3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
                3.083    2.88 | 6.167  126.72 | 9.250    3.36 |
```

```
     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.053 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  43.252
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.451

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

----------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
                0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
                0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
                0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
                0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
                0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
                0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
                0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
                0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
                0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
                0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
                1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
                1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
                1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
                1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
                1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
                1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
                1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
                1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
                1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
                1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
                1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
                1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
                2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
                2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
                2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
                2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
                2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
                2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
```

```
                2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
                2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
                2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
                2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
                2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
                2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
                3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
                3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.181 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  41.047
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.428

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

----------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
                0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
                0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
                0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
                0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
                0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
                0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
                0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
                0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
                0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
                0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
                1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
                1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
                1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
                1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
                1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
                1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
                1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
                1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
                1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
```

```
                1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
                1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
                1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
                2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
                2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
                2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
                2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
                2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
                2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
                2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
                2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
                2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
                2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
                2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
                2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
                3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
                3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.098 (i)
     TIME TO PEAK    (hrs)=   6.250
     RUNOFF VOLUME    (mm)=  40.793
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.425

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

----------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66          2.66
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     188.33         40.00
     Mannings n           =      0.130         0.250

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


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
                0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
                0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
                0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
                0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
```

```
            0.500    2.40 | 3.583    3.84 | 6.667   17.28 |   9.75    3.36
            0.583    2.40 | 3.667    3.84 | 6.750   17.28 |   9.83    3.36
            0.667    2.40 | 3.750    3.84 | 6.833    7.68 |   9.92    3.36
            0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
            0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
            0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
            1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
            1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
            1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
            1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
            1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
            1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
            1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
            1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
            1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
            1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
            1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
            1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
            2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
            2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
            2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
            2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
            2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
            2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
            2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
            2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
            2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
            2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
            2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
            2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
            3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
            3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Max.Eff.Inten.(mm/hr)=     126.72        79.06
                over (min)       15.00        25.00
     Storage Coeff.  (min)=      13.53 (ii)   23.07 (ii)
     Unit Hyd. Tpeak (min)=      15.00        25.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.44         0.25          0.631 (iii)
     TIME TO PEAK    (hrs)=       6.33         6.50           6.42
     RUNOFF VOLUME    (mm)=      95.00        37.26          57.47
     TOTAL RAINFALL   (mm)=      96.00        96.00          96.00
     RUNOFF COEFFICIENT   =       0.99         0.39           0.60


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

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


                                  ---- TRANSFORMED HYETOGRAPH ----
                      TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                       hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                     0.083    0.00 | 3.167    2.88 | 6.250  126.72 |   9.33    3.36
                     0.167    0.00 | 3.250    2.88 | 6.333   17.28 |   9.42    3.36
                     0.250    0.00 | 3.333    3.84 | 6.417   17.28 |   9.50    3.36
                     0.333    2.40 | 3.417    3.84 | 6.500   17.28 |   9.58    3.36
                     0.417    2.40 | 3.500    3.84 | 6.583   17.28 |   9.67    3.36
                     0.500    2.40 | 3.583    3.84 | 6.667   17.28 |   9.75    3.36
                     0.583    2.40 | 3.667    3.84 | 6.750   17.28 |   9.83    3.36
                     0.667    2.40 | 3.750    3.84 | 6.833    7.68 |   9.92    3.36
                     0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
                     0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
                     0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
                     1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
                     1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
                     1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
                     1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
                     1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
                     1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
                     1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
                     1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
                     1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
                     1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
                     1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
                     1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
                     2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
                     2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
                     2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
                     2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
                     2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
                     2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
                     2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
                     2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
                     2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
                     2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
```

```
            2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
            2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
            3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
            3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Max.Eff.Inten.(mm/hr)=     126.72        79.06
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.98 (ii)   10.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.42         0.24          0.634 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33           6.25
     RUNOFF VOLUME    (mm)=      95.00        37.26          57.47
     TOTAL RAINFALL   (mm)=      96.00        96.00          96.00
     RUNOFF COEFFICIENT   =       0.99         0.39           0.60

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430     0.634      6.25      57.47
   OUTFLOW: ID= 1 (  0029)      3.430     0.083      6.92      57.37

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 13.04
                  TIME SHIFT OF PEAK FLOW         (min)= 40.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1102

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.053     6.33    43.25
      + ID2= 2 (  0029):     3.43   0.083     6.92    57.37
        ==================================================
        ID = 3 (  0007):     3.84   0.118     6.33    55.86
```

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.118     6.33    55.86
      + ID2= 2 (  0030):     1.56   0.181     6.33    41.05
        ==================================================
        ID = 1 (  0007):     5.40   0.299     6.33    51.58

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.40   0.299     6.33    51.58
      + ID2= 2 (  0031):     0.65   0.098     6.25    40.79
        ==================================================
        ID = 3 (  0007):     6.05   0.385     6.33    50.42

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     6.05   0.385     6.33    50.42
      + ID2= 2 (  0005):     5.32   0.631     6.42    57.47
        ==================================================
        ID = 1 (  0007):    11.37   1.010     6.33    53.72

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220     0.1535
                          0.0410     0.0120   |   0.4630     0.1758
                          0.0580     0.0253   |   0.6510     0.1989
                          0.0710     0.0399   |   0.7480     0.2228
                          0.0830     0.0559   |   0.8280     0.2476
                          0.0920     0.0732   |   0.8990     0.2733
                          0.2500     0.0918   |   0.9640     0.2998
                          0.3200     0.1116   |   1.0240     0.3263
```

```
                     0.3750     0.1321   |   1.0800      0.3528

                           AREA     QPEAK     TPEAK       R.V.
                           (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.370      1.010      6.33      53.72
   OUTFLOW: ID= 1 (  0008)     11.370      0.436      6.92      53.71

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 43.17
                  TIME SHIFT OF PEAK FLOW         (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1614

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0022):     0.83    0.110     6.33    43.23
     + ID2= 2 (  0008):    11.37    0.436     6.92    53.71
       ====================================================
       ID = 3 (  0016):    12.20    0.467     6.75    53.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    2.88 | 6.250  126.72 |   9.33    3.36
               0.167    0.00 | 3.250    2.88 | 6.333   17.28 |   9.42    3.36
               0.250    0.00 | 3.333    3.84 | 6.417   17.28 |   9.50    3.36
               0.333    2.40 | 3.417    3.84 | 6.500   17.28 |   9.58    3.36
               0.417    2.40 | 3.500    3.84 | 6.583   17.28 |   9.67    3.36
               0.500    2.40 | 3.583    3.84 | 6.667   17.28 |   9.75    3.36
               0.583    2.40 | 3.667    3.84 | 6.750   17.28 |   9.83    3.36
               0.667    2.40 | 3.750    3.84 | 6.833    7.68 |   9.92    3.36
               0.750    2.40 | 3.833    3.84 | 6.917    7.68 |  10.00    3.36
               0.833    2.40 | 3.917    3.84 | 7.000    7.68 |  10.08    3.36
               0.917    2.40 | 4.000    3.84 | 7.083    7.68 |  10.17    3.36
               1.000    2.40 | 4.083    3.84 | 7.167    7.68 |  10.25    3.36
               1.083    2.40 | 4.167    3.84 | 7.250    7.68 |  10.33    1.92
               1.167    2.40 | 4.250    3.84 | 7.333    5.76 |  10.42    1.92
               1.250    2.40 | 4.333    5.76 | 7.417    5.76 |  10.50    1.92
               1.333    2.40 | 4.417    5.76 | 7.500    5.76 |  10.58    1.92
```

```
               1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
               1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
               1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
               1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
               1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
               1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
               1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
               2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
               2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
               2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
               2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
               2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
               2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
               2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
               2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
               2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
               2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
               2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
               2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
               3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
               3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.560 (i)
     TIME TO PEAK    (hrs)=   6.833
     RUNOFF VOLUME    (mm)=  34.222
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.356

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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

                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    2.88 | 6.250  126.72 |   9.33    3.36
               0.167    0.00 | 3.250    2.88 | 6.333   17.28 |   9.42    3.36
               0.250    0.00 | 3.333    3.84 | 6.417   17.28 |   9.50    3.36
               0.333    2.40 | 3.417    3.84 | 6.500   17.28 |   9.58    3.36
               0.417    2.40 | 3.500    3.84 | 6.583   17.28 |   9.67    3.36
               0.500    2.40 | 3.583    3.84 | 6.667   17.28 |   9.75    3.36
               0.583    2.40 | 3.667    3.84 | 6.750   17.28 |   9.83    3.36
```

```
               0.667    2.40 | 3.750    3.84 | 6.833    7.68 |   9.92    3.36
               0.750    2.40 | 3.833    3.84 | 6.917    7.68 |  10.00    3.36
               0.833    2.40 | 3.917    3.84 | 7.000    7.68 |  10.08    3.36
               0.917    2.40 | 4.000    3.84 | 7.083    7.68 |  10.17    3.36
               1.000    2.40 | 4.083    3.84 | 7.167    7.68 |  10.25    3.36
               1.083    2.40 | 4.167    3.84 | 7.250    7.68 |  10.33    1.92
               1.167    2.40 | 4.250    3.84 | 7.333    5.76 |  10.42    1.92
               1.250    2.40 | 4.333    5.76 | 7.417    5.76 |  10.50    1.92
               1.333    2.40 | 4.417    5.76 | 7.500    5.76 |  10.58    1.92
               1.417    2.40 | 4.500    5.76 | 7.583    5.76 |  10.67    1.92
               1.500    2.40 | 4.583    5.76 | 7.667    5.76 |  10.75    1.92
               1.583    2.40 | 4.667    5.76 | 7.750    5.76 |  10.83    1.92
               1.667    2.40 | 4.750    5.76 | 7.833    5.76 |  10.92    1.92
               1.750    2.40 | 4.833    7.68 | 7.917    5.76 |  11.00    1.92
               1.833    2.40 | 4.917    7.68 | 8.000    5.76 |  11.08    1.92
               1.917    2.40 | 5.000    7.68 | 8.083    5.76 |  11.17    1.92
               2.000    2.40 | 5.083    7.68 | 8.167    5.76 |  11.25    1.92
               2.083    2.40 | 5.167    7.68 | 8.250    5.76 |  11.33    1.92
               2.167    2.40 | 5.250    7.68 | 8.333    3.36 |  11.42    1.92
               2.250    2.40 | 5.333   11.52 | 8.417    3.36 |  11.50    1.92
               2.333    2.88 | 5.417   11.52 | 8.500    3.36 |  11.58    1.92
               2.417    2.88 | 5.500   11.52 | 8.583    3.36 |  11.67    1.92
               2.500    2.88 | 5.583   11.52 | 8.667    3.36 |  11.75    1.92
               2.583    2.88 | 5.667   11.52 | 8.750    3.36 |  11.83    1.92
               2.667    2.88 | 5.750   11.52 | 8.833    3.36 |  11.92    1.92
               2.750    2.88 | 5.833   46.08 | 8.917    3.36 |  12.00    1.92
               2.833    2.88 | 5.917   46.08 | 9.000    3.36 |  12.08    1.92
               2.917    2.88 | 6.000   46.08 | 9.083    3.36 |  12.17    1.92
               3.000    2.88 | 6.083  126.72 | 9.167    3.36 |  12.25    1.92
               3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.110 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  43.235
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.450

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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

                                ---- TRANSFORMED HYETOGRAPH ----
```

```
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    2.88 | 6.250  126.72 |   9.33    3.36
               0.167    0.00 | 3.250    2.88 | 6.333   17.28 |   9.42    3.36
               0.250    0.00 | 3.333    3.84 | 6.417   17.28 |   9.50    3.36
               0.333    2.40 | 3.417    3.84 | 6.500   17.28 |   9.58    3.36
               0.417    2.40 | 3.500    3.84 | 6.583   17.28 |   9.67    3.36
               0.500    2.40 | 3.583    3.84 | 6.667   17.28 |   9.75    3.36
               0.583    2.40 | 3.667    3.84 | 6.750   17.28 |   9.83    3.36
               0.667    2.40 | 3.750    3.84 | 6.833    7.68 |   9.92    3.36
               0.750    2.40 | 3.833    3.84 | 6.917    7.68 |  10.00    3.36
               0.833    2.40 | 3.917    3.84 | 7.000    7.68 |  10.08    3.36
               0.917    2.40 | 4.000    3.84 | 7.083    7.68 |  10.17    3.36
               1.000    2.40 | 4.083    3.84 | 7.167    7.68 |  10.25    3.36
               1.083    2.40 | 4.167    3.84 | 7.250    7.68 |  10.33    1.92
               1.167    2.40 | 4.250    3.84 | 7.333    5.76 |  10.42    1.92
               1.250    2.40 | 4.333    5.76 | 7.417    5.76 |  10.50    1.92
               1.333    2.40 | 4.417    5.76 | 7.500    5.76 |  10.58    1.92
               1.417    2.40 | 4.500    5.76 | 7.583    5.76 |  10.67    1.92
               1.500    2.40 | 4.583    5.76 | 7.667    5.76 |  10.75    1.92
               1.583    2.40 | 4.667    5.76 | 7.750    5.76 |  10.83    1.92
               1.667    2.40 | 4.750    5.76 | 7.833    5.76 |  10.92    1.92
               1.750    2.40 | 4.833    7.68 | 7.917    5.76 |  11.00    1.92
               1.833    2.40 | 4.917    7.68 | 8.000    5.76 |  11.08    1.92
               1.917    2.40 | 5.000    7.68 | 8.083    5.76 |  11.17    1.92
               2.000    2.40 | 5.083    7.68 | 8.167    5.76 |  11.25    1.92
               2.083    2.40 | 5.167    7.68 | 8.250    5.76 |  11.33    1.92
               2.167    2.40 | 5.250    7.68 | 8.333    3.36 |  11.42    1.92
               2.250    2.40 | 5.333   11.52 | 8.417    3.36 |  11.50    1.92
               2.333    2.88 | 5.417   11.52 | 8.500    3.36 |  11.58    1.92
               2.417    2.88 | 5.500   11.52 | 8.583    3.36 |  11.67    1.92
               2.500    2.88 | 5.583   11.52 | 8.667    3.36 |  11.75    1.92
               2.583    2.88 | 5.667   11.52 | 8.750    3.36 |  11.83    1.92
               2.667    2.88 | 5.750   11.52 | 8.833    3.36 |  11.92    1.92
               2.750    2.88 | 5.833   46.08 | 8.917    3.36 |  12.00    1.92
               2.833    2.88 | 5.917   46.08 | 9.000    3.36 |  12.08    1.92
               2.917    2.88 | 6.000   46.08 | 9.083    3.36 |  12.17    1.92
               3.000    2.88 | 6.083  126.72 | 9.167    3.36 |  12.25    1.92
               3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.053 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  43.252
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.451

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

-------------------------------------------------------------------------------
--------------------
```

```
| CALIB              |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66          2.66
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     188.33         40.00
     Mannings n           =      0.130         0.250

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


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.88 | 6.250  126.72 |   9.33    3.36
                0.167    0.00 | 3.250    2.88 | 6.333   17.28 |   9.42    3.36
                0.250    0.00 | 3.333    3.84 | 6.417   17.28 |   9.50    3.36
                0.333    2.40 | 3.417    3.84 | 6.500   17.28 |   9.58    3.36
                0.417    2.40 | 3.500    3.84 | 6.583   17.28 |   9.67    3.36
                0.500    2.40 | 3.583    3.84 | 6.667   17.28 |   9.75    3.36
                0.583    2.40 | 3.667    3.84 | 6.750   17.28 |   9.83    3.36
                0.667    2.40 | 3.750    3.84 | 6.833    7.68 |   9.92    3.36
                0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
                0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
                0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
                1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
                1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
                1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
                1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
                1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
                1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
                1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
                1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
                1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
                1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
                1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
                1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
                2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
                2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
                2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
                2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
                2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
                2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
                2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
                2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
                2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
                2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
                2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
                2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
```

```
                3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
                3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Max.Eff.Inten.(mm/hr)=     126.72        79.06
                over (min)        15.00        25.00
     Storage Coeff.  (min)=      13.53 (ii)   23.07 (ii)
     Unit Hyd. Tpeak (min)=      15.00        25.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.44         0.25         0.631 (iii)
     TIME TO PEAK    (hrs)=       6.33         6.50          6.42
     RUNOFF VOLUME    (mm)=      95.00        37.26         57.47
     TOTAL RAINFALL   (mm)=      96.00        96.00         96.00
     RUNOFF COEFFICIENT   =       0.99         0.39          0.60


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.88 | 6.250  126.72 |   9.33    3.36
                0.167    0.00 | 3.250    2.88 | 6.333   17.28 |   9.42    3.36
                0.250    0.00 | 3.333    3.84 | 6.417   17.28 |   9.50    3.36
                0.333    2.40 | 3.417    3.84 | 6.500   17.28 |   9.58    3.36
                0.417    2.40 | 3.500    3.84 | 6.583   17.28 |   9.67    3.36
                0.500    2.40 | 3.583    3.84 | 6.667   17.28 |   9.75    3.36
                0.583    2.40 | 3.667    3.84 | 6.750   17.28 |   9.83    3.36
                0.667    2.40 | 3.750    3.84 | 6.833    7.68 |   9.92    3.36
                0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
                0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
                0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
                1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
                1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
                1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
                1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
                1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
                1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
```

```
                1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
                1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
                1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
                1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
                1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
                1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
                2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
                2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
                2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
                2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
                2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
                2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
                2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
                2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
                2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
                2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
                2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
                2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
                3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
                3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.098 (i)
     TIME TO PEAK    (hrs)=   6.250
     RUNOFF VOLUME    (mm)=  40.793
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.425

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.88 | 6.250  126.72 |   9.33    3.36
                0.167    0.00 | 3.250    2.88 | 6.333   17.28 |   9.42    3.36
                0.250    0.00 | 3.333    3.84 | 6.417   17.28 |   9.50    3.36
                0.333    2.40 | 3.417    3.84 | 6.500   17.28 |   9.58    3.36
                0.417    2.40 | 3.500    3.84 | 6.583   17.28 |   9.67    3.36
                0.500    2.40 | 3.583    3.84 | 6.667   17.28 |   9.75    3.36
                0.583    2.40 | 3.667    3.84 | 6.750   17.28 |   9.83    3.36
                0.667    2.40 | 3.750    3.84 | 6.833    7.68 |   9.92    3.36
```

```
                0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
                0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
                0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
                1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
                1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
                1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
                1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
                1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
                1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
                1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
                1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
                1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
                1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
                1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
                1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
                2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
                2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
                2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
                2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
                2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
                2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
                2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
                2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
                2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
                2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
                2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
                2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
                3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
                3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.181 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  41.047
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.428

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71          1.71
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     151.22         40.00
     Mannings n           =      0.013         0.250
```

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


                  ---- TRANSFORMED HYETOGRAPH ----
         TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
        0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
        0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
        0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
        0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
        0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
        0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
        0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
        0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
        0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
        0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
        0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
        1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
        1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
        1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
        1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
        1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
        1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
        1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
        1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
        1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
        1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
        1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
        1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
        2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
        2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
        2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
        2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
        2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
        2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
        2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
        2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
        2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
        2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
        2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
        2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
        3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
        3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

Max.Eff.Inten.(mm/hr)=     126.72        79.06
           over (min)        5.00        15.00
Storage Coeff.  (min)=       2.98 (ii)   10.73 (ii)
Unit Hyd. Tpeak (min)=       5.00        15.00
Unit Hyd. peak  (cms)=       0.28         0.09
                                                     *TOTALS*
PEAK FLOW      (cms)=       0.42         0.24          0.634 (iii)
TIME TO PEAK    (hrs)=      6.25         6.33           6.25
RUNOFF VOLUME    (mm)=     95.00        37.26          57.47
TOTAL RAINFALL   (mm)=     96.00        96.00          96.00
RUNOFF COEFFICIENT   =      0.99         0.39           0.60

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

  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
       CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):      0.41   0.053     6.33    43.25
      + ID2= 2 (  0036):      5.32   0.631     6.42    57.47
        ===================================================
        ID = 3 (  0041):      5.73   0.679     6.33    56.45

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):      5.73   0.679     6.33    56.45
      + ID2= 2 (  0037):      0.65   0.098     6.25    40.79
        ===================================================
        ID = 1 (  0041):      6.38   0.765     6.33    54.85

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):      6.38   0.765     6.33    54.85
      + ID2= 2 (  0038):      1.56   0.181     6.33    41.05
        ===================================================
        ID = 3 (  0041):      7.94   0.946     6.33    52.14

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):      7.94   0.946     6.33    52.14
      + ID2= 2 (  0040):      3.43   0.634     6.25    57.47
        ===================================================
        ID = 1 (  0041):     11.37   1.490     6.25    53.75

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):      0.83   0.110     6.33    43.23
      + ID2= 2 (  0041):     11.37   1.490     6.25    53.75
        ===================================================
        ID = 3 (  0032):     12.20   1.595     6.25    53.03

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

       V    V   I    SSSSS  U    U    A    L              (v 6.2.2011)
       V    V   I    SS     U    U   A A   L
        V  V    I     SS    U    U  AAAAA  L
        V  V    I      SS   U    U  A   A  L
         VV     I    SSSSS  UUUUU  A    A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```



```
                   *****  D E T A I L E D   O U T P U T *****


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

  Output  filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\f82b2933-6454-44e7-825f-1f59f9
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\f82b2933-6454-44e7-825f-1f59f9


DATE: 06-15-2023                             TIME: 02:15:46

USER:


COMMENTS: _____________________________________________________________

--------------------------------------------------------------------------------------
------------------------
  **********************************************
  ** SIMULATION : 2-002yr 4hr 10min Chicago     **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                  |              ata\Local\Temp\
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\36b3cd67
| Ptotal= 31.29 mm |    Comments: created from IDF Group New IDFGroup - 2
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.45 |  1.00   13.68 |  2.00    5.08 |  3.00    2.85
                0.17    2.76 |  1.17   71.35 |  2.17    4.44 |  3.17    2.67
                0.33    3.17 |  1.33   17.30 |  2.33    3.96 |  3.33    2.52
                0.50    3.78 |  1.50   10.08 |  2.50    3.59 |  3.50    2.39
                0.67    4.76 |  1.67    7.43 |  2.67    3.30 |  3.67    2.27
                0.83    6.70 |  1.83    5.99 |  2.83    3.05 |  3.83    2.16

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

--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.81         2.81
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     193.56        10.00
     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    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
               0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
               0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
               0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
               0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
               0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
               0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
               0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
               0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
               0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
               0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
               1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Max.Eff.Inten.(mm/hr)=      71.35        10.26
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.35 (ii)    8.40 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.23         0.12
                                                             *TOTALS*
     PEAK FLOW      (cms)=        0.36         0.06           0.398 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42            1.33
     RUNOFF VOLUME    (mm)=      30.29         4.61           13.60
     TOTAL RAINFALL   (mm)=      31.29        31.29           31.29
     RUNOFF COEFFICIENT   =       0.97         0.15            0.43

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
               0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
               0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
               0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
               0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
               0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
```

```
               0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
               0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
               0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
               0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
               0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
               1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW      (cms)=   0.007 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   4.266
     TOTAL RAINFALL   (mm)=  31.287
     RUNOFF COEFFICIENT   =   0.136

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
               0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
               0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
               0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
               0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
               0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
               0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
               0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
               0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
               0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
               0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
               1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW      (cms)=   0.004 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   4.268
     TOTAL RAINFALL   (mm)=  31.287
     RUNOFF COEFFICIENT   =   0.136

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
               0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
               0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
               0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
               0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
               0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
               0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
               0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
               0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
               0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
               0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
               1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW      (cms)=   0.012 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   3.927
     TOTAL RAINFALL   (mm)=  31.287
     RUNOFF COEFFICIENT   =   0.126

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                                        ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
               0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
```

```
               0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
               0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
               0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
               0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
               0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
               0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
               0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
               0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
               0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
               1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW      (cms)=   0.006 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   3.902
     TOTAL RAINFALL   (mm)=  31.287
     RUNOFF COEFFICIENT   =   0.125

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n           =      0.130        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    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
               0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
               0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
               0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
               0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
               0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
               0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
               0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
               0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
               0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
               0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
               1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16
```

```
    Max.Eff.Inten.(mm/hr)=      44.33         5.85
               over (min)       20.00        50.00
    Storage Coeff.  (min)=      20.59 (ii)   47.63 (ii)
    Unit Hyd. Tpeak (min)=      20.00        50.00
    Unit Hyd. peak  (cms)=       0.06         0.02
                                                            *TOTALS*
    PEAK FLOW       (cms)=       0.15         0.02           0.153 (iii)
    TIME TO PEAK    (hrs)=       1.58         2.25            1.58
    RUNOFF VOLUME    (mm)=      30.29         4.61           13.59
    TOTAL RAINFALL   (mm)=      31.29        31.29           31.29
    RUNOFF COEFFICIENT   =       0.97         0.15            0.43


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71          1.71
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     151.22         40.00
    Mannings n          =      0.013         0.250

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


                                  ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16
```

```
    Max.Eff.Inten.(mm/hr)=      71.35         6.44
               over (min)        5.00        25.00
    Storage Coeff.  (min)=       3.75 (ii)   24.89 (ii)
    Unit Hyd. Tpeak (min)=       5.00        25.00
    Unit Hyd. peak  (cms)=       0.25         0.05
                                                            *TOTALS*
    PEAK FLOW       (cms)=       0.22         0.02           0.228 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.67            1.33
    RUNOFF VOLUME    (mm)=      30.29         4.61           13.60
    TOTAL RAINFALL   (mm)=      31.29        31.29           31.29
    RUNOFF COEFFICIENT   =       0.97         0.15            0.43

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0028)      3.430     0.228      1.33      13.60
  OUTFLOW: ID= 1 (  0029)      3.430     0.021      2.67      13.50

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.25
                TIME SHIFT OF PEAK FLOW         (min)= 80.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0281

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.004     1.58     4.27
      + ID2= 2 (  0029):     3.43   0.021     2.67    13.50
        ===================================================
        ID = 3 (  0007):     3.84   0.023     2.42    12.51

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

--------------------
```

```
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.023     2.42    12.51
      + ID2= 2 (  0030):     1.56   0.012     1.67     3.93
        ===================================================
        ID = 1 (  0007):     5.40   0.033     1.67    10.03

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.40   0.033     1.67    10.03
      + ID2= 2 (  0031):     0.65   0.006     1.50     3.90
        ===================================================
        ID = 3 (  0007):     6.05   0.038     1.67     9.37

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     6.05   0.038     1.67     9.37
      + ID2= 2 (  0005):     5.32   0.153     1.58    13.59
        ===================================================
        ID = 1 (  0007):    11.37   0.190     1.58    11.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220     0.1535
                          0.0410     0.0120   |   0.4630     0.1758
                          0.0580     0.0253   |   0.6510     0.1989
                          0.0710     0.0399   |   0.7480     0.2228
                          0.0830     0.0559   |   0.8280     0.2476
                          0.0920     0.0732   |   0.8990     0.2733
                          0.2500     0.0918   |   0.9640     0.2998
                          0.3200     0.1116   |   1.0240     0.3263
                          0.3750     0.1321   |   1.0800     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0007)     11.370     0.190      1.58      11.35
```

```
  OUTFLOW: ID= 1 (  0008)     11.370     0.070      2.83      11.34

                PEAK   FLOW   REDUCTION [Qout/Qin](%)= 36.70
                TIME SHIFT OF PEAK FLOW         (min)= 75.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.0387

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.007     1.58     4.27
      + ID2= 2 (  0008):    11.37   0.070     2.83    11.34
        ===================================================
        ID = 3 (  0016):    12.20   0.073     2.75    10.86

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                                  ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

    Unit Hyd Qpeak  (cms)=   0.764

    PEAK FLOW       (cms)=   0.053 (i)
    TIME TO PEAK    (hrs)=   2.167
    RUNOFF VOLUME    (mm)=   3.556
    TOTAL RAINFALL   (mm)=  31.287
    RUNOFF COEFFICIENT   =   0.114
```

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                         ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

    Unit Hyd Qpeak  (cms)=   0.167

    PEAK FLOW       (cms)=   0.007 (i)
    TIME TO PEAK    (hrs)=   1.583
    RUNOFF VOLUME    (mm)=   4.266
    TOTAL RAINFALL   (mm)=  31.287
    RUNOFF COEFFICIENT   =   0.136

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                         ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

    Unit Hyd Qpeak  (cms)=   0.078

    PEAK FLOW       (cms)=   0.004 (i)
    TIME TO PEAK    (hrs)=   1.583
    RUNOFF VOLUME    (mm)=   4.268
    TOTAL RAINFALL   (mm)=  31.287
    RUNOFF COEFFICIENT   =   0.136

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66          2.66
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          1.00
    Length            (m)=     188.33         40.00
    Mannings n          =      0.130         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    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

    Max.Eff.Inten.(mm/hr)=      44.33         5.85
               over (min)       20.00        50.00
    Storage Coeff.  (min)=      20.59 (ii)   47.63 (ii)
    Unit Hyd. Tpeak (min)=      20.00        50.00
    Unit Hyd. peak  (cms)=       0.06         0.02
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.15         0.02          0.153 (iii)
    TIME TO PEAK    (hrs)=       1.58         2.25           1.58
    RUNOFF VOLUME    (mm)=      30.29         4.61          13.59
    TOTAL RAINFALL   (mm)=      31.29        31.29          31.29
    RUNOFF COEFFICIENT   =       0.97         0.15           0.43


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                         ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

    Unit Hyd Qpeak  (cms)=   0.177

    PEAK FLOW       (cms)=   0.006 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=   3.902
    TOTAL RAINFALL   (mm)=  31.287
    RUNOFF COEFFICIENT   =   0.125

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                         ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

    Unit Hyd Qpeak  (cms)=   0.271

    PEAK FLOW       (cms)=   0.012 (i)
    TIME TO PEAK    (hrs)=   1.667
    RUNOFF VOLUME    (mm)=   3.927
    TOTAL RAINFALL   (mm)=  31.287
    RUNOFF COEFFICIENT   =   0.126

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71          1.71
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          2.00
    Length            (m)=     151.22         40.00
```

```
     Mannings n          =     0.013       0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Max.Eff.Inten.(mm/hr)=      71.35        6.44
                over (min)        5.00       25.00
     Storage Coeff.  (min)=       3.75 (ii)   24.89 (ii)
     Unit Hyd. Tpeak (min)=       5.00       25.00
     Unit Hyd. peak  (cms)=       0.25        0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.22        0.02          0.228 (iii)
     TIME TO PEAK    (hrs)=       1.33        1.67           1.33
     RUNOFF VOLUME    (mm)=      30.29        4.61          13.60
     TOTAL RAINFALL   (mm)=      31.29       31.29          31.29
     RUNOFF COEFFICIENT   =       0.97        0.15           0.43

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.004     1.58     4.27
      + ID2= 2 (  0036):     5.32   0.153     1.58    13.59
        ===================================================
        ID = 3 (  0041):     5.73   0.156     1.58    12.93
```

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.156     1.58    12.93
      + ID2= 2 (  0037):     0.65   0.006     1.50     3.90
        ===================================================
        ID = 1 (  0041):     6.38   0.162     1.58    12.01

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     6.38   0.162     1.58    12.01
      + ID2= 2 (  0038):     1.56   0.012     1.67     3.93
        ===================================================
        ID = 3 (  0041):     7.94   0.173     1.58    10.42

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     7.94   0.173     1.58    10.42
      + ID2= 2 (  0040):     3.43   0.228     1.33    13.60
        ===================================================
        ID = 1 (  0041):    11.37   0.317     1.33    11.38

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.007     1.58     4.27
      + ID2= 2 (  0041):    11.37   0.317     1.33    11.38
        ===================================================
        ID = 3 (  0032):    12.20   0.320     1.33    10.89

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

```
       V    V   I    SSSSS  U   U    A    L              (v 6.2.2011)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
```


```
                  *****  D E T A I L E D   O U T P U T *****


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

  Output  filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\6a5948be-f7d0-4ef1-9bb6-200d1f
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\6a5948be-f7d0-4ef1-9bb6-200d1f


DATE: 06-15-2023                           TIME: 02:15:47

USER:



COMMENTS: _____________________________________________________________


-----------------------------------------------------------------------------------
-----------------------
  **********************************************
  ** SIMULATION : 2-005yr 4hr 10min Chicago     **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                  |              ata\Local\Temp\
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\e64c0150
| Ptotal= 41.38 mm |    Comments: created from IDF Group New IDFGroup - 2
--------------------
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

```
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.00    3.23 |  1.00   18.09 |  2.00    6.70 |  3.00    3.75
                  0.17    3.63 |  1.17   94.66 |  2.17    5.86 |  3.17    3.52
                  0.33    4.18 |  1.33   22.88 |  2.33    5.23 |  3.33    3.32
                  0.50    4.98 |  1.50   13.31 |  2.50    4.74 |  3.50    3.14
                  0.67    6.28 |  1.67    9.80 |  2.67    4.35 |  3.67    2.99
                  0.83    8.85 |  1.83    7.91 |  2.83    4.02 |  3.83    2.85

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

--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.81         2.81
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     193.56        10.00
     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    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                 0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                 0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                 0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                 0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                 0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                 0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                 0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                 0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                 0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                 0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                 1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Max.Eff.Inten.(mm/hr)=      94.66       19.23
                over (min)        5.00       10.00
     Storage Coeff.  (min)=       3.88 (ii)    7.50 (ii)
     Unit Hyd. Tpeak (min)=       5.00       10.00
     Unit Hyd. peak  (cms)=       0.25        0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.49        0.11          0.567 (iii)
     TIME TO PEAK    (hrs)=       1.33        1.42           1.33
     RUNOFF VOLUME    (mm)=      40.38        8.13          19.42
     TOTAL RAINFALL   (mm)=      41.38       41.38          41.38
     RUNOFF COEFFICIENT   =       0.98        0.20           0.47
```

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                              ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                  0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                  0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                  0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                  0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                  0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                  0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                  0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                  0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                  0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                  0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                  1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   8.466
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.205

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                              ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                  0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                  0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                  0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                  0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                  0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                  0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                  0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                  0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                  0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                  0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                  1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.008 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   8.469
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.205

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                              ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                  0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                  0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                  0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                  0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                  0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                  0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                  0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                  0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                  0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                  0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                  1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.027 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   7.847
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.190

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                              ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                  0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                  0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                  0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                  0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                  0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                  0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                  0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                  0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                  0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                  0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                  1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.014 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=   7.798
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.188

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        2.66         2.66
     Dep. Storage     (mm)=        1.00         5.00
     Average Slope     (%)=        1.00         1.00
     Length            (m)=      188.33        40.00
     Mannings n          =        0.130        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    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                  0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                  0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                  0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                  0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                  0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                  0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                  0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                  0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                  0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                  0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                  1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Max.Eff.Inten.(mm/hr)=      58.77        13.48
               over (min)       20.00        40.00
     Storage Coeff.  (min)=      18.39 (ii)   37.76 (ii)
     Unit Hyd. Tpeak (min)=      20.00        40.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.21         0.04          0.223 (iii)
     TIME TO PEAK    (hrs)=       1.58         2.00           1.58
     RUNOFF VOLUME    (mm)=      40.38         8.13          19.41
     TOTAL RAINFALL   (mm)=      41.38        41.38          41.38
     RUNOFF COEFFICIENT   =       0.98         0.20           0.47


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
```

```
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS   PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
               0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
               0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
               0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
               0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
               0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
               0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
               0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
               0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
               0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
               0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
               1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Max.Eff.Inten.(mm/hr)=      94.66        15.30
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.35 (ii)   18.30 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.26         0.06
                                                           *TOTALS*
     PEAK FLOW      (cms)=        0.30         0.04          0.315 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.58           1.33
     RUNOFF VOLUME    (mm)=      40.38         8.13          19.41
     TOTAL RAINFALL   (mm)=      41.38        41.38          41.38
     RUNOFF COEFFICIENT   =       0.98         0.20           0.47

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
```

```
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.315      1.33      19.41
   OUTFLOW: ID= 1 (  0029)      3.430      0.030      2.58      19.32

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.66
                     TIME SHIFT OF PEAK FLOW        (min)= 75.00
                     MAXIMUM  STORAGE   USED      (ha.m.)=  0.0406

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

--------------------
| ADD HYD  (  0007)|
|  1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.008     1.50     8.47
      + ID2= 2 (  0029):     3.43   0.030     2.58    19.32
        ==================================================
        ID = 3 (  0007):     3.84   0.033     2.17    18.16

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

--------------------
| ADD HYD  (  0007)|
|  3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.033     2.17    18.16
      + ID2= 2 (  0030):     1.56   0.027     1.58     7.85
        ==================================================
        ID = 1 (  0007):     5.40   0.059     1.58    15.18

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

--------------------
| ADD HYD  (  0007)|
|  1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.40   0.059     1.58    15.18
      + ID2= 2 (  0031):     0.65   0.014     1.42     7.80
        ==================================================
        ID = 3 (  0007):     6.05   0.071     1.58    14.39

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

--------------------
```

```
| ADD HYD  (  0007)|
|  3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     6.05   0.071     1.58    14.39
      + ID2= 2 (  0005):     5.32   0.223     1.58    19.41
        ==================================================
        ID = 1 (  0007):    11.37   0.294     1.58    16.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220     0.1535
                          0.0410     0.0120   |   0.4630     0.1758
                          0.0580     0.0253   |   0.6510     0.1989
                          0.0710     0.0399   |   0.7480     0.2228
                          0.0830     0.0559   |   0.8280     0.2476
                          0.0920     0.0732   |   0.8990     0.2733
                          0.2500     0.0918   |   0.9640     0.2998
                          0.3200     0.1116   |   1.0240     0.3263
                          0.3750     0.1321   |   1.0800     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.370      0.294      1.58      16.74
   OUTFLOW: ID= 1 (  0008)     11.370      0.089      3.17      16.73

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)= 30.25
                     TIME SHIFT OF PEAK FLOW        (min)= 95.00
                     MAXIMUM  STORAGE   USED      (ha.m.)=  0.0674

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

--------------------
| ADD HYD  (  0016)|
|  1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.017     1.50     8.47
      + ID2= 2 (  0008):    11.37   0.089     3.17    16.73
        ==================================================
        ID = 3 (  0016):    12.20   0.093     2.92    16.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61
```

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


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
               0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
               0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
               0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
               0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
               0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
               0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
               0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
               0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
               0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
               0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
               1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW      (cms)=   0.105 (i)
     TIME TO PEAK    (hrs)=   2.167
     RUNOFF VOLUME    (mm)=   6.703
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.162

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
               0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
               0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
               0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
               0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
               0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
               0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
               0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
               0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
```

```
            0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
            0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
            1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   8.466
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.205

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                        ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
            0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
            0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
            0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
            0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
            0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
            0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
            0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
            0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
            0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
            0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
            1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.008 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   8.469
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.205

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

--------------------------------------------------------------------------------
--------------------
```

```
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=       2.66         2.66
     Dep. Storage    (mm)=       1.00         5.00
     Average Slope    (%)=       1.00         1.00
     Length           (m)=     188.33        40.00
     Mannings n          =      0.130        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    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
            0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
            0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
            0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
            0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
            0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
            0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
            0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
            0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
            0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
            0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
            1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Max.Eff.Inten.(mm/hr)=      58.77        13.48
                over (min)       20.00        40.00
     Storage Coeff.  (min)=      18.39 (ii)   37.76 (ii)
     Unit Hyd. Tpeak (min)=      20.00        40.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.21         0.04         0.223 (iii)
     TIME TO PEAK    (hrs)=       1.58         2.00          1.58
     RUNOFF VOLUME    (mm)=      40.38         8.13         19.41
     TOTAL RAINFALL   (mm)=      41.38        41.38         41.38
     RUNOFF COEFFICIENT   =       0.98         0.20          0.47


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
```

```
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                        ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
            0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
            0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
            0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
            0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
            0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
            0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
            0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
            0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
            0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
            0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
            1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.014 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=   7.798
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.188

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                        ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
            0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
            0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
            0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
            0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
            0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
```

```
            0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
            0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
            0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
            0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
            0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
            1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.027 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   7.847
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.190

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area    (ha)=       1.71         1.71
     Dep. Storage    (mm)=       1.00         5.00
     Average Slope    (%)=       1.00         2.00
     Length           (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
            0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
            0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
            0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
            0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
            0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
            0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
            0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
            0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
            0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
            0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
            1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Max.Eff.Inten.(mm/hr)=      94.66        15.30
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.35 (ii)   18.30 (ii)
```

```
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.26         0.06
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.30         0.04          0.315 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.58           1.33
     RUNOFF VOLUME    (mm)=      40.38         8.13          19.41
     TOTAL RAINFALL   (mm)=      41.38        41.38          41.38
     RUNOFF COEFFICIENT   =       0.98         0.20           0.47

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.008     1.50     8.47
      + ID2= 2 (  0036):     5.32   0.223     1.58    19.41
        ===================================================
        ID = 3 (  0041):     5.73   0.231     1.58    18.63

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.231     1.58    18.63
      + ID2= 2 (  0037):     0.65   0.014     1.42     7.80
        ===================================================
        ID = 1 (  0041):     6.38   0.243     1.58    17.53

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     6.38   0.243     1.58    17.53
      + ID2= 2 (  0038):     1.56   0.027     1.58     7.85
        ===================================================
        ID = 3 (  0041):     7.94   0.270     1.58    15.62
```

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     7.94   0.270     1.58    15.62
      + ID2= 2 (  0040):     3.43   0.315     1.33    19.41
        ===================================================
        ID = 1 (  0041):    11.37   0.457     1.33    16.77

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.017     1.50     8.47
      + ID2= 2 (  0041):    11.37   0.457     1.33    16.77
        ===================================================
        ID = 3 (  0032):    12.20   0.466     1.33    16.20

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2011)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
```



```
                   *****  D E T A I L E D   O U T P U T *****


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

  Output  filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\d61ef36d-bf63-46ca-b062-ef10e4
```

```
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\d61ef36d-bf63-46ca-b062-ef10e4


DATE: 06-15-2023                          TIME: 02:15:47

USER:


COMMENTS: ____________________________________________________________


----------------------------------------------------------------------------------
------------------------
  ************************************************
  ** SIMULATION : 2-010yr 4hr 10min Chicago     **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                  |              ata\Local\Temp\
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\81712ad3
| Ptotal= 48.34 mm |    Comments: created from IDF Group New IDFGroup - 2
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    3.78 |  1.00   21.14 |  2.00    7.85 |  3.00    4.40
                 0.17    4.26 |  1.17  110.25 |  2.17    6.86 |  3.17    4.13
                 0.33    4.90 |  1.33   26.74 |  2.33    6.13 |  3.33    3.89
                 0.50    5.83 |  1.50   15.57 |  2.50    5.55 |  3.50    3.69
                 0.67    7.35 |  1.67   11.47 |  2.67    5.09 |  3.67    3.50
                 0.83   10.36 |  1.83    9.26 |  2.83    4.72 |  3.83    3.34

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

--------------------
| CALIB            |
| STANDHYD ( 0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.81         2.81
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     193.56        10.00
     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    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
              0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
              0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
              0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
              0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
              0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
              0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
              0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
              0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
              0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
              0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
              1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Max.Eff.Inten.(mm/hr)=     110.25        26.58
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       3.65 (ii)    7.06 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.25         0.14
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.57         0.15          0.689 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      47.34        10.98          23.71
     TOTAL RAINFALL   (mm)=      48.34        48.34          48.34
     RUNOFF COEFFICIENT   =       0.98         0.23           0.49

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                         ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN | TIME    RAIN |' TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |  hrs   mm/hr |'  hrs   mm/hr |   hrs   mm/hr
              0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
              0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
```

```
          0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
          0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
          0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
          0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
          0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
          0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
          0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
          0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
          0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
          1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.026 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  11.924
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.247

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

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                         ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
          0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
          0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
          0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
          0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
          0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
          0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
          0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
          0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
          0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
          0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
          1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.012 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  11.928
```

```
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.247

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

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                         ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
          0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
          0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
          0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
          0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
          0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
          0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
          0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
          0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
          0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
          0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
          1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.041 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  11.099
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.230

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

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                         ---- TRANSFORMED HYETOGRAPH ----
```

```
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
          0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
          0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
          0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
          0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
          0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
          0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
          0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
          0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
          0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
          0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
          1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.022 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  11.030
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.228

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

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        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    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
          0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
          0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
          0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
          0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
          0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
          0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
          0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
```

```
          0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
          0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
          0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
          1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Max.Eff.Inten.(mm/hr)=      82.41        18.48
                over (min)       15.00        35.00
     Storage Coeff.  (min)=      16.07 (ii)   33.14 (ii)
     Unit Hyd. Tpeak (min)=      15.00        35.00
     Unit Hyd. peak  (cms)=       0.07         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.06          0.292 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.83           1.50
     RUNOFF VOLUME    (mm)=      47.34        10.98          23.71
     TOTAL RAINFALL   (mm)=      48.34        48.34          48.34
     RUNOFF COEFFICIENT   =       0.98         0.23           0.49


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                         ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
          0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
          0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
          0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
          0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
          0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
          0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
          0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
          0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
```

```
            0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
            0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
            1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Max.Eff.Inten.(mm/hr)=     110.25        21.07
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.15 (ii)   16.31 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.27         0.06
                                                              *TOTALS*
     PEAK FLOW      (cms)=        0.36         0.06           0.374 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.58            1.33
     RUNOFF VOLUME    (mm)=      47.34        10.98           23.71
     TOTAL RAINFALL   (mm)=      48.34        48.34           48.34
     RUNOFF COEFFICIENT   =       0.98         0.23            0.49

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  59.0    Ia = Dep. 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( 0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.374      1.33      23.71
   OUTFLOW: ID= 1 (  0029)      3.430      0.037      2.58      23.61

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.95
                   TIME SHIFT OF PEAK FLOW         (min)= 75.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0496

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.012     1.50    11.93
      + ID2= 2 (  0029):     3.43   0.037     2.58    23.61
        ===================================================
        ID = 3 (  0007):     3.84   0.042     1.75    22.36
```

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.042     1.75    22.36
      + ID2= 2 (  0030):     1.56   0.041     1.58    11.10
        ===================================================
        ID = 1 (  0007):     5.40   0.081     1.58    19.11

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.40   0.081     1.58    19.11
      + ID2= 2 (  0031):     0.65   0.022     1.42    11.03
        ===================================================
        ID = 3 (  0007):     6.05   0.099     1.50    18.24

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     6.05   0.099     1.50    18.24
      + ID2= 2 (  0005):     5.32   0.292     1.50    23.71
        ===================================================
        ID = 1 (  0007):    11.37   0.391     1.50    20.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR( 0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220     0.1535
                          0.0410     0.0120   |   0.4630     0.1758
                          0.0580     0.0253   |   0.6510     0.1989
                          0.0710     0.0399   |   0.7480     0.2228
                          0.0830     0.0559   |   0.8280     0.2476
                          0.0920     0.0732   |   0.8990     0.2733
                          0.2500     0.0918   |   0.9640     0.2998
                          0.3200     0.1116   |   1.0240     0.3263
                          0.3750     0.1321   |   1.0800     0.3528
```

```
                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.370      0.391      1.50      20.80
   OUTFLOW: ID= 1 (  0008)     11.370      0.147      2.50      20.79

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 37.58
                   TIME SHIFT OF PEAK FLOW         (min)= 60.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0797

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.026     1.50    11.92
      + ID2= 2 (  0008):    11.37   0.147     2.50    20.79
        ===================================================
        ID = 3 (  0016):    12.20   0.154     2.50    20.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                                ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
             0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
             0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
             0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
             0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
             0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
             0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
             0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
             0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
             0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
             0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
             1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW      (cms)=   0.149 (i)
     TIME TO PEAK    (hrs)=   2.083
```

```
     RUNOFF VOLUME    (mm)=   9.318
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.193

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                                ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
             0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
             0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
             0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
             0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
             0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
             0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
             0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
             0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
             0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
             0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
             1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW      (cms)=   0.026 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  11.924
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.247

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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

```
                    ---- TRANSFORMED HYETOGRAPH ----
         TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
        0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
        0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
        0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
        0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
        0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
        0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
        0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
        0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
        0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
        0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
        0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
        1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW      (cms)=   0.012 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  11.928
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.247

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        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    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
        0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
        0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
        0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
        0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
        0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
        0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
        0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
        0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
        0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
        0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
        1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Max.Eff.Inten.(mm/hr)=      82.41        18.48
                over (min)       15.00        35.00
     Storage Coeff.  (min)=      16.07 (ii)   33.14 (ii)
     Unit Hyd. Tpeak (min)=      15.00        35.00
     Unit Hyd. peak  (cms)=       0.07         0.03
                                                        *TOTALS*
     PEAK FLOW      (cms)=       0.27         0.06          0.292 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.83           1.50
     RUNOFF VOLUME    (mm)=      47.34        10.98          23.71
     TOTAL RAINFALL   (mm)=      48.34        48.34          48.34
     RUNOFF COEFFICIENT   =       0.98         0.23           0.49


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                    ---- TRANSFORMED HYETOGRAPH ----
         TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
        0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
        0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
        0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
        0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
        0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
        0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
        0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
        0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
        0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
        0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
        0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
        1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW      (cms)=   0.022 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  11.030
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.228

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                    ---- TRANSFORMED HYETOGRAPH ----
         TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
        0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
        0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
        0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
        0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
        0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
        0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
        0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
        0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
        0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
        0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
        0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
        1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW      (cms)=   0.041 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  11.099
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.230

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                    ---- TRANSFORMED HYETOGRAPH ----
         TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
        0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
        0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
        0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
        0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
        0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
        0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
        0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
        0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
        0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
        0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
        0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
        1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Max.Eff.Inten.(mm/hr)=     110.25        21.07
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.15 (ii)   16.31 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.27         0.06
                                                        *TOTALS*
     PEAK FLOW      (cms)=       0.36         0.06          0.374 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.58           1.33
     RUNOFF VOLUME    (mm)=      47.34        10.98          23.71
     TOTAL RAINFALL   (mm)=      48.34        48.34          48.34
     RUNOFF COEFFICIENT   =       0.98         0.23           0.49

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.012     1.50    11.93
```

```
      + ID2= 2 (  0036):     5.32   0.292     1.50    23.71
        =================================================
        ID = 3 (  0041):     5.73   0.305     1.50    22.86

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.305     1.50    22.86
      + ID2= 2 (  0037):     0.65   0.022     1.42    11.03
        =================================================
        ID = 1 (  0041):     6.38   0.325     1.50    21.66

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     6.38   0.325     1.50    21.66
      + ID2= 2 (  0038):     1.56   0.041     1.58    11.10
        =================================================
        ID = 3 (  0041):     7.94   0.365     1.50    19.58

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     7.94   0.365     1.50    19.58
      + ID2= 2 (  0040):     3.43   0.374     1.33    23.71
        =================================================
        ID = 1 (  0041):    11.37   0.603     1.33    20.83

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.026     1.50    11.92
      + ID2= 2 (  0041):    11.37   0.603     1.33    20.83
        =================================================
        ID = 3 (  0032):    12.20   0.617     1.33    20.22
```

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

       V    V   I    SSSSS  U   U    A    L              (v 6.2.2011)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2021 Smart City Water Inc
All rights reserved.

                   *****  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\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\7ccc5064-45ad-4e72-9bdd-52779b
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\7ccc5064-45ad-4e72-9bdd-52779b

DATE: 06-15-2023                           TIME: 02:15:47

USER:

COMMENTS: ____________________________________________________________

------------------------------------------------------------------------------------------
--------------------
  ************************************************
  ** SIMULATION : 2-025yr 4hr 10min Chicago     **
  ************************************************

--------------------
|    READ STORM     |    Filename: C:\Users\r.rajachockalingam\AppD
|                   |              ata\Local\Temp\
```

```
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\53809fdb
| Ptotal= 56.70 mm |    Comments: created from IDF Group New IDFGroup - 2
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    4.44 |  1.00   24.80 |  2.00    9.21 |  3.00    5.16
                 0.17    4.99 |  1.17  129.30 |  2.17    8.05 |  3.17    4.84
                 0.33    5.75 |  1.33   31.36 |  2.33    7.18 |  3.33    4.56
                 0.50    6.84 |  1.50   18.26 |  2.50    6.51 |  3.50    4.32
                 0.67    8.62 |  1.67   13.46 |  2.67    5.97 |  3.67    4.11
                 0.83   12.15 |  1.83   10.86 |  2.83    5.53 |  3.83    3.92

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

--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.81          2.81
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     193.56         10.00
     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    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Max.Eff.Inten.(mm/hr)=     129.30         36.73
                over (min)        5.00         10.00
     Storage Coeff.  (min)=       3.43 (ii)     6.62 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.26          0.14
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.68          0.22           0.847 (iii)
```

```
     TIME TO PEAK    (hrs)=       1.33         1.42          1.33
     RUNOFF VOLUME    (mm)=      55.70        14.81         29.12
     TOTAL RAINFALL   (mm)=      56.70        56.70         56.70
     RUNOFF COEFFICIENT   =       0.98         0.26          0.51

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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

                          ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.038 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  16.562
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.292

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
```

```
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                         ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.018 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  16.569
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.292

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                         ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.059 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  15.486
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.273

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                         ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.033 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  15.389
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.271

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

```
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66          2.66
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     188.33         40.00
     Mannings n          =      0.130         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    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Max.Eff.Inten.(mm/hr)=      96.65         28.99
                over (min)       15.00         30.00
     Storage Coeff.  (min)=      15.07 (ii)    29.33 (ii)
     Unit Hyd. Tpeak (min)=      15.00         30.00
     Unit Hyd. peak  (cms)=       0.07          0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.32          0.09          0.368 (iii)
     TIME TO PEAK    (hrs)=       1.50          1.75           1.50
     RUNOFF VOLUME    (mm)=      55.70         14.81          29.12
     TOTAL RAINFALL   (mm)=      56.70         56.70          56.70
     RUNOFF COEFFICIENT   =       0.98          0.26           0.51

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71          1.71
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     151.22         40.00
     Mannings n          =      0.013         0.250

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


                         ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Max.Eff.Inten.(mm/hr)=     129.30         28.99
                over (min)        5.00         15.00
     Storage Coeff.  (min)=       2.95 (ii)    14.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00         15.00
     Unit Hyd. peak  (cms)=       0.28          0.08
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.42          0.09          0.461 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.50           1.33
     RUNOFF VOLUME    (mm)=      55.70         14.81          29.12
     TOTAL RAINFALL   (mm)=      56.70         56.70          56.70
     RUNOFF COEFFICIENT   =       0.98          0.26           0.51

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900      0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.461      1.33      29.12
   OUTFLOW: ID= 1 (  0029)      3.430      0.046      2.58      29.02

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  9.98
                   TIME SHIFT OF PEAK FLOW         (min)= 75.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0613

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.018     1.50    16.57
      + ID2= 2 (  0029):     3.43   0.046     2.58    29.02
        ==================================================
        ID = 3 (  0007):     3.84   0.054     1.67    27.69

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.054     1.67    27.69
      + ID2= 2 (  0030):     1.56   0.059     1.58    15.49
        ==================================================
        ID = 1 (  0007):     5.40   0.113     1.58    24.17

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.40   0.113     1.58    24.17
      + ID2= 2 (  0031):     0.65   0.033     1.42    15.39
        ==================================================
        ID = 3 (  0007):     6.05   0.140     1.50    23.22

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     6.05   0.140     1.50    23.22
      + ID2= 2 (  0005):     5.32   0.368     1.50    29.12
        ==================================================
        ID = 1 (  0007):    11.37   0.508     1.50    25.98

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220      0.1535
                          0.0410     0.0120   |   0.4630      0.1758
                          0.0580     0.0253   |   0.6510      0.1989
                          0.0710     0.0399   |   0.7480      0.2228
                          0.0830     0.0559   |   0.8280      0.2476
                          0.0920     0.0732   |   0.8990      0.2733
                          0.2500     0.0918   |   0.9640      0.2998
                          0.3200     0.1116   |   1.0240      0.3263
                          0.3750     0.1321   |   1.0800      0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.370      0.508      1.50      25.98
   OUTFLOW: ID= 1 (  0008)     11.370      0.230      2.17      25.97

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.26
                   TIME SHIFT OF PEAK FLOW         (min)= 40.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0896

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.038     1.50    16.56
      + ID2= 2 (  0008):    11.37   0.230     2.17    25.97
        ==================================================
        ID = 3 (  0016):    12.20   0.243     2.17    25.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.210 (i)
     TIME TO PEAK    (hrs)=   2.083
     RUNOFF VOLUME    (mm)=  12.871
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.227

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.038 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  16.562
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.292

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.018 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  16.569
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.292
```

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66         2.66
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         1.00
    Length            (m)=     188.33        40.00
    Mannings n          =      0.130        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    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

    Max.Eff.Inten.(mm/hr)=      96.65        28.99
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      15.07 (ii)   29.33 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.07         0.04
                                                            *TOTALS*
    PEAK FLOW       (cms)=       0.32         0.09           0.368 (iii)
    TIME TO PEAK    (hrs)=       1.50         1.75            1.50
    RUNOFF VOLUME    (mm)=      55.70        14.81           29.12
    TOTAL RAINFALL   (mm)=      56.70        56.70           56.70
    RUNOFF COEFFICIENT   =       0.98         0.26            0.51


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

    Unit Hyd Qpeak  (cms)=   0.177

    PEAK FLOW       (cms)=   0.033 (i)
    TIME TO PEAK    (hrs)=   1.417
    RUNOFF VOLUME    (mm)=  15.389
    TOTAL RAINFALL   (mm)=  56.700
    RUNOFF COEFFICIENT   =   0.271

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
```

```
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

    Unit Hyd Qpeak  (cms)=   0.271

    PEAK FLOW       (cms)=   0.059 (i)
    TIME TO PEAK    (hrs)=   1.583
    RUNOFF VOLUME    (mm)=  15.486
    TOTAL RAINFALL   (mm)=  56.700
    RUNOFF COEFFICIENT   =   0.273

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92
```

```
    Max.Eff.Inten.(mm/hr)=     129.30        28.99
               over (min)        5.00        15.00
    Storage Coeff.  (min)=       2.95 (ii)   14.54 (ii)
    Unit Hyd. Tpeak (min)=       5.00        15.00
    Unit Hyd. peak  (cms)=       0.28         0.08
                                                            *TOTALS*
    PEAK FLOW       (cms)=       0.42         0.09           0.461 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.50            1.33
    RUNOFF VOLUME    (mm)=      55.70        14.81           29.12
    TOTAL RAINFALL   (mm)=      56.70        56.70           56.70
    RUNOFF COEFFICIENT   =       0.98         0.26            0.51

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0033):       0.41   0.018     1.50    16.57
     + ID2= 2 (  0036):       5.32   0.368     1.50    29.12
       ==================================================
       ID = 3 (  0041):       5.73   0.386     1.50    28.22

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0041):       5.73   0.386     1.50    28.22
     + ID2= 2 (  0037):       0.65   0.033     1.42    15.39
       ==================================================
       ID = 1 (  0041):       6.38   0.416     1.50    26.91

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0041):       6.38   0.416     1.50    26.91
```

```
      + ID2= 2 (  0038):     1.56   0.059     1.58    15.49
        ==================================================
        ID = 3 (  0041):     7.94   0.475     1.50    24.67

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     7.94   0.475     1.50    24.67
      + ID2= 2 (  0040):     3.43   0.461     1.33    29.12
        ==================================================
        ID = 1 (  0041):    11.37   0.760     1.33    26.01

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.038     1.50    16.56
      + ID2= 2 (  0041):    11.37   0.760     1.33    26.01
        ==================================================
        ID = 3 (  0032):    12.20   0.782     1.33    25.37

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

       V    V   I    SSSSS  U   U    A    L             (v 6.2.2011)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2021 Smart City Water Inc
All rights reserved.

                   *****  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\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\0190bef0-d295-4ffa-89e8-0f7b80
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\0190bef0-d295-4ffa-89e8-0f7b80


DATE: 06-15-2023                            TIME: 02:15:47

USER:



COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------
------------------------
  **********************************************
  ** SIMULATION : 2-050yr 4hr 10min Chicago     **
  **********************************************


--------------------
|    READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                  |              ata\Local\Temp\
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\64963d3c
| Ptotal= 63.12 mm |    Comments: created from IDF Group New IDFGroup - 2
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    4.96 |  1.00   27.61 |'  2.00   10.27 |  3.00    5.76
                 0.17    5.58 |  1.17  143.50 |   2.17    8.98 |  3.17    5.40
                 0.33    6.42 |  1.33   34.91 |   2.33    8.02 |  3.33    5.10
                 0.50    7.64 |  1.50   20.35 |   2.50    7.27 |  3.50    4.83
                 0.67    9.62 |  1.67   15.00 |   2.67    6.67 |  3.67    4.59
                 0.83   13.55 |  1.83   12.12 |   2.83    6.17 |  3.83    4.38

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


--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.81         2.81
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     193.56        10.00
```

```
     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    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
               0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
               0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
               0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
               0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
               0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
               0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
               0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
               0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
               0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
               0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
               1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Max.Eff.Inten.(mm/hr)=     143.50       45.22
               over (min)         5.00       10.00
     Storage Coeff.  (min)=       3.29 (ii)    6.35 (ii)
     Unit Hyd. Tpeak (min)=       5.00       10.00
     Unit Hyd. peak  (cms)=       0.27        0.15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.75        0.27          0.970 (iii)
     TIME TO PEAK    (hrs)=       1.33        1.42           1.33
     RUNOFF VOLUME    (mm)=      62.12       18.01          33.45
     TOTAL RAINFALL   (mm)=      63.12       63.12          63.12
     RUNOFF COEFFICIENT   =       0.98        0.29           0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                              ---- TRANSFORMED HYETOGRAPH ----
```

```
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW      (cms)=   0.048 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  20.429
     TOTAL RAINFALL   (mm)=  63.117
     RUNOFF COEFFICIENT   =   0.324

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Unit Hyd Qpeak  (cms)=   0.078
```

```
    PEAK FLOW       (cms)=   0.023 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=  20.437
    TOTAL RAINFALL   (mm)=  63.117
    RUNOFF COEFFICIENT   =   0.324

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

    Unit Hyd Qpeak  (cms)=   0.271

    PEAK FLOW       (cms)=   0.076 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=  19.159
    TOTAL RAINFALL   (mm)=  63.117
    RUNOFF COEFFICIENT   =   0.304

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

    Unit Hyd Qpeak  (cms)=   0.177

    PEAK FLOW       (cms)=   0.042 (i)
    TIME TO PEAK    (hrs)=   1.417
    RUNOFF VOLUME    (mm)=  19.041
    TOTAL RAINFALL   (mm)=  63.117
    RUNOFF COEFFICIENT   =   0.302

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS   PERVIOUS (i)
    Surface Area    (ha)=       2.66         2.66
    Dep. Storage    (mm)=       1.00         5.00
    Average Slope    (%)=       1.00         1.00
    Length           (m)=     188.33        40.00
    Mannings n          =      0.130        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    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

    Max.Eff.Inten.(mm/hr)=     107.30        35.61
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      14.46 (ii)   27.59 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.08         0.04
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.37         0.11         0.423 (iii)
    TIME TO PEAK    (hrs)=       1.50         1.75          1.50
    RUNOFF VOLUME    (mm)=      62.12        18.01         33.44
    TOTAL RAINFALL   (mm)=      63.12        63.12         63.12
    RUNOFF COEFFICIENT   =       0.98         0.29          0.53


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS   PERVIOUS (i)
    Surface Area    (ha)=       1.71         1.71
    Dep. Storage    (mm)=       1.00         5.00
    Average Slope    (%)=       1.00         2.00
    Length           (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

    Max.Eff.Inten.(mm/hr)=     143.50        45.22
               over (min)        5.00        15.00
    Storage Coeff.  (min)=       2.83 (ii)   12.53 (ii)
    Unit Hyd. Tpeak (min)=       5.00        15.00
    Unit Hyd. peak  (cms)=       0.28         0.08
                                                        *TOTALS*
    PEAK FLOW       (cms)=       0.47         0.12         0.523 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.50          1.33
    RUNOFF VOLUME    (mm)=      62.12        18.01         33.45
    TOTAL RAINFALL   (mm)=      63.12        63.12         63.12
    RUNOFF COEFFICIENT   =       0.98         0.29          0.53

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0028)      3.430      0.523      1.33      33.45
  OUTFLOW: ID= 1 (  0029)      3.430      0.053      2.58      33.35

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.10
                  TIME SHIFT OF PEAK FLOW         (min)= 75.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0705

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.023     1.50    20.44
```

```
    + ID2= 2 (  0029):     3.43   0.053     2.58    33.35
      ==================================================
      ID = 3 (  0007):     3.84   0.064     1.67    31.97

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

--------------------
| ADD HYD  (  0007)|
|  3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 3 (  0007):     3.84   0.064     1.67    31.97
    + ID2= 2 (  0030):     1.56   0.076     1.50    19.16
      ==================================================
      ID = 1 (  0007):     5.40   0.139     1.58    28.27

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

--------------------
| ADD HYD  (  0007)|
|  1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0007):     5.40   0.139     1.58    28.27
    + ID2= 2 (  0031):     0.65   0.042     1.42    19.04
      ==================================================
      ID = 3 (  0007):     6.05   0.174     1.50    27.28

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

--------------------
| ADD HYD  (  0007)|
|  3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 3 (  0007):     6.05   0.174     1.50    27.28
    + ID2= 2 (  0005):     5.32   0.423     1.50    33.44
      ==================================================
      ID = 1 (  0007):    11.37   0.598     1.50    30.16

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220     0.1535
                          0.0410     0.0120   |   0.4630     0.1758
                          0.0580     0.0253   |   0.6510     0.1989
                          0.0710     0.0399   |   0.7480     0.2228
                          0.0830     0.0559   |   0.8280     0.2476
                          0.0920     0.0732   |   0.8990     0.2733
                          0.2500     0.0918   |   0.9640     0.2998
                          0.3200     0.1116   |   1.0240     0.3263
                          0.3750     0.1321   |   1.0800     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.370     0.598      1.50      30.16
   OUTFLOW: ID= 1 (  0008)     11.370     0.275      2.17      30.16

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 46.06
                 TIME SHIFT OF PEAK FLOW         (min)= 40.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0990

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

--------------------
| ADD HYD  (  0016)|
|  1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
      ID1= 1 (  0022):     0.83   0.048     1.50    20.43
    + ID2= 2 (  0008):    11.37   0.275     2.17    30.16
      ==================================================
      ID = 3 (  0016):    12.20   0.291     2.08    29.50

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                            ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

   Unit Hyd Qpeak  (cms)=   0.764

   PEAK FLOW       (cms)=   0.262 (i)
   TIME TO PEAK    (hrs)=   2.083
   RUNOFF VOLUME    (mm)=  15.873
   TOTAL RAINFALL   (mm)=  63.117
   RUNOFF COEFFICIENT   =   0.251

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                            ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

   Unit Hyd Qpeak  (cms)=   0.167

   PEAK FLOW       (cms)=   0.048 (i)
   TIME TO PEAK    (hrs)=   1.500
   RUNOFF VOLUME    (mm)=  20.429
   TOTAL RAINFALL   (mm)=  63.117
   RUNOFF COEFFICIENT   =   0.324

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                            ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

   Unit Hyd Qpeak  (cms)=   0.078

   PEAK FLOW       (cms)=   0.023 (i)
   TIME TO PEAK    (hrs)=   1.500
   RUNOFF VOLUME    (mm)=  20.437
   TOTAL RAINFALL   (mm)=  63.117
   RUNOFF COEFFICIENT   =   0.324

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
   Surface Area     (ha)=       2.66         2.66
   Dep. Storage     (mm)=       1.00         5.00
   Average Slope     (%)=       1.00         1.00
   Length            (m)=     188.33        40.00
   Mannings n          =       0.130        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    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
```

```
             0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
             0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
             0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
             0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
             0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
             0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
             0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
             0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
             1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Max.Eff.Inten.(mm/hr)=     107.30        35.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      14.46 (ii)   27.59 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.37         0.11          0.423 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.75           1.50
     RUNOFF VOLUME    (mm)=      62.12        18.01          33.44
     TOTAL RAINFALL   (mm)=      63.12        63.12          63.12
     RUNOFF COEFFICIENT   =       0.98         0.29           0.53


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                            ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
             0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
             0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
             0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
             0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
             0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
             0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
             0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
             0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
             0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
```

```
             0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
             1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.042 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  19.041
     TOTAL RAINFALL   (mm)=  63.117
     RUNOFF COEFFICIENT   =   0.302

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                            ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
             0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
             0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
             0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
             0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
             0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
             0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
             0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
             0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
             0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
             0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
             1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.076 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  19.159
     TOTAL RAINFALL   (mm)=  63.117
     RUNOFF COEFFICIENT   =   0.304

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
```

```
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
             0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
             0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
             0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
             0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
             0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
             0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
             0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
             0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
             0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
             0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
             1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Max.Eff.Inten.(mm/hr)=     143.50        45.22
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.83 (ii)   12.53 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.08
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.47         0.12          0.523 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      62.12        18.01          33.45
     TOTAL RAINFALL   (mm)=      63.12        63.12          63.12
     RUNOFF COEFFICIENT   =       0.98         0.29           0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|  1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0033):      0.41   0.023     1.50    20.44
     + ID2= 2 (  0036):      5.32   0.423     1.50    33.44
       ===================================================
       ID = 3 (  0041):      5.73   0.446     1.50    32.51

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

--------------------
| ADD HYD  (  0041)|
|  3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0041):      5.73   0.446     1.50    32.51
     + ID2= 2 (  0037):      0.65   0.042     1.42    19.04
       ===================================================
       ID = 1 (  0041):      6.38   0.484     1.50    31.14

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

--------------------
| ADD HYD  (  0041)|
|  1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0041):      6.38   0.484     1.50    31.14
     + ID2= 2 (  0038):      1.56   0.076     1.50    19.16
       ===================================================
       ID = 3 (  0041):      7.94   0.560     1.50    28.79

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

--------------------
| ADD HYD  (  0041)|
|  3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0041):      7.94   0.560     1.50    28.79
     + ID2= 2 (  0040):      3.43   0.523     1.33    33.45
       ===================================================
       ID = 1 (  0041):     11.37   0.878     1.33    30.19

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

--------------------
| ADD HYD  (  0032)|
|  1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0039):      0.83   0.048     1.50    20.43
```

```
   + ID2= 2 (  0041):    11.37   0.878     1.33    30.19
     ==================================================
     ID = 3 (  0032):    12.20   0.908     1.33    29.53

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

     V    V   I    SSSSS  U   U    A    L              (v 6.2.2011)
     V    V   I    SS     U   U   A A   L
      V  V    I     SS    U   U  AAAAA  L
      V  V    I      SS   U   U  A   A  L
       VV     I    SSSSS  UUUUU  A   A  LLLLL

      OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
     O   O    T      T    H   H   Y Y   MM MM  O   O
     O   O    T      T    H   H    Y    M   M  O   O
      OOO     T      T    H   H    Y    M   M   OOO
Developed and Distributed by Smart City Water Inc
Copyright 2007 - 2021 Smart City Water Inc
All rights reserved.

                   *****  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\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\d7b5f2ef-03fb-4ece-8a0d-3aa02d
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\d7b5f2ef-03fb-4ece-8a0d-3aa02d


DATE: 06-15-2023                          TIME: 02:15:48

USER:


COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------
------------------------
  ************************************************
  ** SIMULATION : 2-100yr 4hr 10min Chicago     **
  ************************************************
```

```
--------------------
|    READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                  |              ata\Local\Temp\
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\e8f7a499
| Ptotal= 69.46 mm |    Comments: created from IDF Group New IDFGroup - 2
--------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    5.46 |  1.00   30.39 |  2.00   11.31 |  3.00    6.34
                 0.17    6.14 |  1.17  157.92 |  2.17    9.88 |  3.17    5.95
                 0.33    7.06 |  1.33   38.42 |  2.33    8.83 |  3.33    5.61
                 0.50    8.40 |  1.50   22.40 |  2.50    8.00 |  3.50    5.31
                 0.67   10.58 |  1.67   16.51 |  2.67    7.34 |  3.67    5.05
                 0.83   14.91 |  1.83   13.33 |  2.83    6.80 |  3.83    4.82

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

--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.81          2.81
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          2.00
     Length            (m)=     193.56         10.00
     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    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Max.Eff.Inten.(mm/hr)=      157.92        54.39
                over (min)         5.00        10.00
     Storage Coeff.  (min)=        3.16 (ii)    6.11 (ii)
```

```
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.27         0.15
                                                          *TOTALS*
     PEAK FLOW      (cms)=       0.83         0.33          1.100 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42           1.33
     RUNOFF VOLUME    (mm)=      68.46        21.38          37.86
     TOTAL RAINFALL   (mm)=      69.46        69.46          69.46
     RUNOFF COEFFICIENT   =       0.99         0.31           0.54

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW      (cms)=   0.059 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  24.473
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.352

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

```
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW      (cms)=   0.028 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  24.483
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.352

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
```

```
             0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
             0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
             0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
             0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
             0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
             0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
             0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
             0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
             0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
             1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

    Unit Hyd Qpeak  (cms)=   0.271

    PEAK FLOW       (cms)=   0.094 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=  23.016
    TOTAL RAINFALL   (mm)=  69.460
    RUNOFF COEFFICIENT   =   0.331

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                            ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
             0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
             0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
             0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
             0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
             0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
             0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
             0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
             0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
             0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
             0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
             1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

    Unit Hyd Qpeak  (cms)=   0.177

    PEAK FLOW       (cms)=   0.051 (i)
    TIME TO PEAK    (hrs)=   1.417
    RUNOFF VOLUME    (mm)=  22.874
    TOTAL RAINFALL   (mm)=  69.460
    RUNOFF COEFFICIENT   =   0.329

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66         2.66
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         1.00
    Length            (m)=     188.33        40.00
    Mannings n          =      0.130        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    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
             0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
             0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
             0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
             0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
             0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
             0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
             0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
             0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
             0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
             0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
             1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

    Max.Eff.Inten.(mm/hr)=     118.09        42.74
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      13.91 (ii)   26.12 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.08         0.04
                                                         *TOTALS*
    PEAK FLOW       (cms)=       0.41         0.13         0.481 (iii)
    TIME TO PEAK    (hrs)=       1.50         1.75          1.50
    RUNOFF VOLUME    (mm)=      68.46        21.38         37.85
    TOTAL RAINFALL   (mm)=      69.46        69.46         69.46
    RUNOFF COEFFICIENT   =       0.99         0.31          0.54


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

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


                            ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
             0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
             0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
             0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
             0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
             0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
             0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
             0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
             0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
             0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
             0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
             1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

    Max.Eff.Inten.(mm/hr)=     157.92        54.39
               over (min)        5.00        15.00
    Storage Coeff.  (min)=       2.73 (ii)   11.73 (ii)
    Unit Hyd. Tpeak (min)=       5.00        15.00
    Unit Hyd. peak  (cms)=       0.29         0.09
                                                         *TOTALS*
    PEAK FLOW       (cms)=       0.52         0.14         0.587 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.50          1.33
    RUNOFF VOLUME    (mm)=      68.46        21.38         37.85
    TOTAL RAINFALL   (mm)=      69.46        69.46         69.46
    RUNOFF COEFFICIENT   =       0.99         0.31          0.54

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430     0.587      1.33      37.85
   OUTFLOW: ID= 1 (  0029)      3.430     0.060      2.50      37.76

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 10.21
                  TIME SHIFT OF PEAK FLOW        (min)= 70.00
                  MAXIMUM  STORAGE   USED      (ha.m.)=  0.0799

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


--------------------
| ADD HYD  (  0007)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.028     1.50    24.48
      + ID2= 2 (  0029):     3.43   0.060     2.50    37.76
        ===================================================
        ID = 3 (  0007):     3.84   0.074     1.58    36.34

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

--------------------
| ADD HYD  (  0007)|
|  3 +  2 =  1     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.074     1.58    36.34
      + ID2= 2 (  0030):     1.56   0.094     1.50    23.02
        ===================================================
        ID = 1 (  0007):     5.40   0.166     1.58    32.49

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

--------------------
| ADD HYD  (  0007)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.40   0.166     1.58    32.49
```

```
      + ID2= 2 (  0031):     0.65   0.051     1.42    22.87
        ==================================================
        ID = 3 (  0007):     6.05   0.211     1.50    31.46

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     6.05   0.211     1.50    31.46
      + ID2= 2 (  0005):     5.32   0.481     1.50    37.85
        ==================================================
        ID = 1 (  0007):    11.37   0.692     1.50    34.45

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220     0.1535
                          0.0410     0.0120   |   0.4630     0.1758
                          0.0580     0.0253   |   0.6510     0.1989
                          0.0710     0.0399   |   0.7480     0.2228
                          0.0830     0.0559   |   0.8280     0.2476
                          0.0920     0.0732   |   0.8990     0.2733
                          0.2500     0.0918   |   0.9640     0.2998
                          0.3200     0.1116   |   1.0240     0.3263
                          0.3750     0.1321   |   1.0800     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.370      0.692      1.50      34.45
   OUTFLOW: ID= 1 (  0008)     11.370      0.317      2.17      34.44

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 45.83
                  TIME SHIFT OF PEAK FLOW        (min)= 40.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1108

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.059     1.50    24.47
      + ID2= 2 (  0008):    11.37   0.317     2.17    34.44
        ==================================================
        ID = 3 (  0016):    12.20   0.336     2.08    33.77
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
              0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
              0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
              0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
              0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
              0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
              0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
              0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
              0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
              0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
              0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
              1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.317 (i)
     TIME TO PEAK    (hrs)=   2.083
     RUNOFF VOLUME    (mm)=  19.050
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.274

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
```

```
              0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
              0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
              0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
              0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
              0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
              0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
              0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
              0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
              0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
              0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
              1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.059 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  24.473
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.352

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
              0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
              0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
              0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
              0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
              0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
              0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
              0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
              0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
              0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
              0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
              1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.028 (i)
     TIME TO PEAK    (hrs)=   1.500
```

```
     RUNOFF VOLUME    (mm)=  24.483
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.352

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =       0.130        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    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
              0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
              0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
              0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
              0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
              0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
              0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
              0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
              0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
              0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
              0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
              1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Max.Eff.Inten.(mm/hr)=     118.09        42.74
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      13.91 (ii)   26.12 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.41         0.13         0.481 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.75          1.50
     RUNOFF VOLUME    (mm)=      68.46        21.38         37.85
     TOTAL RAINFALL   (mm)=      69.46        69.46         69.46
     RUNOFF COEFFICIENT   =       0.99         0.31          0.54


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

```
          CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

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


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.051 (i)
     TIME TO PEAK    (hrs)=   1.417
     RUNOFF VOLUME    (mm)=  22.874
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.329

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.094 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  23.016
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.331

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Max.Eff.Inten.(mm/hr)=     157.92        54.39
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.73 (ii)   11.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.29         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.52         0.14          0.587 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      68.46        21.38          37.85
     TOTAL RAINFALL   (mm)=      69.46        69.46          69.46
     RUNOFF COEFFICIENT   =       0.99         0.31           0.54

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.028     1.50    24.48
      + ID2= 2 (  0036):     5.32   0.481     1.50    37.85
        ===============================================
        ID = 3 (  0041):     5.73   0.510     1.50    36.90

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.510     1.50    36.90
      + ID2= 2 (  0037):     0.65   0.051     1.42    22.87
        ===============================================
        ID = 1 (  0041):     6.38   0.556     1.50    35.47

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     6.38   0.556     1.50    35.47
      + ID2= 2 (  0038):     1.56   0.094     1.50    23.02
        ===============================================
        ID = 3 (  0041):     7.94   0.649     1.50    33.02

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     7.94   0.649     1.50    33.02
      + ID2= 2 (  0040):     3.43   0.587     1.33    37.85
        ===============================================
        ID = 1 (  0041):    11.37   1.001     1.33    34.48

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.059     1.50    24.47
      + ID2= 2 (  0041):    11.37   1.001     1.33    34.48
        ===============================================
        ID = 3 (  0032):    12.20   1.039     1.33    33.80

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

       V    V   I    SSSSS  U    U    A     L              (v 6.2.2011)
       V    V   I    SS     U    U   A A    L
        V  V    I     SS    U    U  AAAAA   L
        V  V    I      SS   U    U  A   A   L
         VV     I    SSSSS  UUUUU  A     A  LLLLL

        OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
       O   O    T      T    H   H   Y Y   MM MM  O   O
       O   O    T      T    H   H    Y    M   M  O   O
        OOO     T      T    H   H    Y    M   M   OOO
```

Developed and Distributed by Smart City Water Inc

```
             *****  D E T A I L E D   O U T P U T *****


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

  Output  filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\aed83e90-3df7-4aba-a7ed-7ee224
  Summary filename:
C:\Users\r.rajachockalingam\AppData\Local\Civica\VH5\98a3b801-fe45-439a-999a-909776
f7886e\aed83e90-3df7-4aba-a7ed-7ee224


DATE: 06-15-2023                          TIME: 02:15:50

USER:



COMMENTS: ____________________________________________________________


-----------------------------------------------------------------------------------
-----------------------
  **********************************************
  ** SIMULATION : 25mm Chicago Storm           **
  **********************************************


-------------------
|    READ STORM    |    Filename: C:\Users\r.rajachockalingam\AppD
|                  |              ata\Local\Temp\
|                  |              073789e9-0d0b-43a3-ada4-078b0c00e084\63c7cc5a
| Ptotal= 24.91 mm |    Comments:
-------------------
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.00    1.64 |  1.00    6.46 |  2.00    4.30 |  3.00    2.17
                 0.08    1.73 |  1.08    9.64 |  2.08    3.94 |  3.08    2.09
                 0.17    1.84 |  1.17   21.94 |  2.17    3.64 |  3.17    2.01
                 0.25    1.96 |  1.25   83.39 |  2.25    3.39 |  3.25    1.95
                 0.33    2.10 |  1.33   28.52 |  2.33    3.18 |  3.33    1.89
                 0.42    2.27 |  1.42   15.63 |  2.42    3.00 |  3.42    1.83
                 0.50    2.48 |  1.50   10.96 |  2.50    2.83 |  3.50    1.77
                 0.58    2.73 |  1.58    8.53 |  2.58    2.69 |  3.58    1.72
                 0.67    3.05 |  1.67    7.04 |  2.67    2.56 |  3.67    1.68
                 0.75    3.48 |  1.75    6.03 |  2.75    2.45 |  3.75    1.63
                 0.83    4.07 |  1.83    5.30 |  2.83    2.34 |  3.83    1.59
                 0.92    4.96 |  1.92    4.74 |  2.92    2.25 |  3.92    1.55

-------------------------------------------------------------------------------
```

```
-------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   5.62
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.81         2.81
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     193.56        10.00
     Mannings n          =       0.013        0.250

     Max.Eff.Inten.(mm/hr)=      83.39         6.59
                over (min)        5.00        10.00
     Storage Coeff.  (min)=       4.08 (ii)    7.89 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.24         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.35         0.03         0.364 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50          1.33
     RUNOFF VOLUME    (mm)=      23.91         2.83         10.21
     TOTAL RAINFALL   (mm)=      24.91        24.91         24.91
     RUNOFF COEFFICIENT   =       0.96         0.11          0.41

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.19

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.003 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   2.228
     TOTAL RAINFALL   (mm)=  24.913
     RUNOFF COEFFICIENT   =   0.089

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

-------------------------------------------------------------------------------
-------------------
| CALIB            |
```

```
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.002 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   2.228
     TOTAL RAINFALL   (mm)=  24.913
     RUNOFF COEFFICIENT   =   0.089

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

-------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0030)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.22

     Unit Hyd Qpeak  (cms)=   0.271

     PEAK FLOW       (cms)=   0.006 (i)
     TIME TO PEAK    (hrs)=   1.750
     RUNOFF VOLUME    (mm)=   2.040
     TOTAL RAINFALL   (mm)=  24.913
     RUNOFF COEFFICIENT   =   0.082

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

-------------------------------------------------------------------------------
-------------------
| CALIB            |
| NASHYD   (  0031)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
-------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.003 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   2.027
     TOTAL RAINFALL   (mm)=  24.913
     RUNOFF COEFFICIENT   =   0.081

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

-------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
```

```
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =       0.130        0.250

     Max.Eff.Inten.(mm/hr)=      32.09         3.41
                over (min)       25.00        60.00
     Storage Coeff.  (min)=      23.43 (ii)   56.98 (ii)
     Unit Hyd. Tpeak (min)=      25.00        60.00
     Unit Hyd. peak  (cms)=       0.05         0.02
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.01         0.114 (iii)
     TIME TO PEAK    (hrs)=       1.67         2.50          1.67
     RUNOFF VOLUME    (mm)=      23.91         2.83         10.20
     TOTAL RAINFALL   (mm)=      24.91        24.91         24.91
     RUNOFF COEFFICIENT   =       0.96         0.11          0.41


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
-------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
-------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =       0.013        0.250

     Max.Eff.Inten.(mm/hr)=      83.39         3.73
                over (min)        5.00        30.00
     Storage Coeff.  (min)=       3.52 (ii)   29.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00        30.00
     Unit Hyd. peak  (cms)=       0.26         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.23         0.01         0.227 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.92          1.33
     RUNOFF VOLUME    (mm)=      23.91         2.83         10.20
     TOTAL RAINFALL   (mm)=      24.91        24.91         24.91
     RUNOFF COEFFICIENT   =       0.96         0.11          0.41
```

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0900     0.1200

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.227      1.33      10.20
   OUTFLOW: ID= 1 (  0029)      3.430      0.016      2.58      10.11

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=  7.10
                   TIME SHIFT OF PEAK FLOW         (min)= 75.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0215

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.002     1.67     2.23
      + ID2= 2 (  0029):     3.43   0.016     2.58    10.11
        ==================================================
        ID = 3 (  0007):     3.84   0.017     2.42     9.27

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.017     2.42     9.27
      + ID2= 2 (  0030):     1.56   0.006     1.75     2.04
        ==================================================
        ID = 1 (  0007):     5.40   0.022     1.83     7.18

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

```
--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.40   0.022     1.83     7.18
      + ID2= 2 (  0031):     0.65   0.003     1.58     2.03
        ==================================================
        ID = 3 (  0007):     6.05   0.024     1.75     6.62

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     6.05   0.024     1.75     6.62
      + ID2= 2 (  0005):     5.32   0.114     1.67    10.20
        ==================================================
        ID = 1 (  0007):    11.37   0.138     1.67     8.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.4220     0.1535
                          0.0410     0.0120   |   0.4630     0.1758
                          0.0580     0.0253   |   0.6510     0.1989
                          0.0710     0.0399   |   0.7480     0.2228
                          0.0830     0.0559   |   0.8280     0.2476
                          0.0920     0.0732   |   0.8990     0.2733
                          0.2500     0.0918   |   0.9640     0.2998
                          0.3200     0.1116   |   1.0240     0.3263
                          0.3750     0.1321   |   1.0800     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.370      0.138      1.67       8.30
   OUTFLOW: ID= 1 (  0008)     11.370      0.059      2.75       8.29

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 42.46
                   TIME SHIFT OF PEAK FLOW         (min)= 65.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0259

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.003     1.67     2.23
      + ID2= 2 (  0008):    11.37   0.059     2.75     8.29
        ==================================================
        ID = 3 (  0016):    12.20   0.060     2.67     7.88

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.031 (i)
     TIME TO PEAK    (hrs)=   2.250
     RUNOFF VOLUME    (mm)=   2.017
     TOTAL RAINFALL   (mm)=  24.913
     RUNOFF COEFFICIENT   =   0.081

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.003 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   2.228
     TOTAL RAINFALL   (mm)=  24.913
     RUNOFF COEFFICIENT   =   0.089

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.002 (i)
     TIME TO PEAK    (hrs)=   1.667
```

```
     RUNOFF VOLUME    (mm)=   2.228
     TOTAL RAINFALL   (mm)=  24.913
     RUNOFF COEFFICIENT   =   0.089

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =       0.130        0.250

     Max.Eff.Inten.(mm/hr)=      32.09         3.41
                over (min)       25.00        60.00
     Storage Coeff.  (min)=      23.43 (ii)   56.98 (ii)
     Unit Hyd. Tpeak (min)=      25.00        60.00
     Unit Hyd. peak  (cms)=       0.05         0.02
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.11         0.01          0.114 (iii)
     TIME TO PEAK    (hrs)=       1.67         2.50           1.67
     RUNOFF VOLUME    (mm)=      23.91         2.83          10.20
     TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
     RUNOFF COEFFICIENT   =       0.96         0.11           0.41


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   0.65   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.14

     Unit Hyd Qpeak  (cms)=   0.177

     PEAK FLOW       (cms)=   0.003 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   2.027
     TOTAL RAINFALL   (mm)=  24.913
     RUNOFF COEFFICIENT   =   0.081
```

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0038)|   Area    (ha)=   1.56   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

    Unit Hyd Qpeak  (cms)=   0.271

    PEAK FLOW       (cms)=   0.006 (i)
    TIME TO PEAK    (hrs)=   1.750
    RUNOFF VOLUME    (mm)=   2.040
    TOTAL RAINFALL   (mm)=  24.913
    RUNOFF COEFFICIENT   =   0.082

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

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

    Max.Eff.Inten.(mm/hr)=      83.39         3.73
               over (min)       5.00        30.00
    Storage Coeff.  (min)=       3.52 (ii)   29.82 (ii)
    Unit Hyd. Tpeak (min)=       5.00        30.00
    Unit Hyd. peak  (cms)=       0.26         0.04
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.23         0.01          0.227 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.92           1.33
    RUNOFF VOLUME    (mm)=      23.91         2.83          10.20
    TOTAL RAINFALL   (mm)=      24.91        24.91          24.91
    RUNOFF COEFFICIENT   =       0.96         0.11           0.41

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.002     1.67     2.23
      + ID2= 2 (  0036):     5.32   0.114     1.67    10.20
        ====================================================
        ID = 3 (  0041):     5.73   0.116     1.67     9.63

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.116     1.67     9.63
      + ID2= 2 (  0037):     0.65   0.003     1.58     2.03
        ====================================================
        ID = 1 (  0041):     6.38   0.118     1.67     8.86

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     6.38   0.118     1.67     8.86
      + ID2= 2 (  0038):     1.56   0.006     1.75     2.04
        ====================================================
        ID = 3 (  0041):     7.94   0.124     1.67     7.52

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     7.94   0.124     1.67     7.52
      + ID2= 2 (  0040):     3.43   0.227     1.33    10.20
        ====================================================
        ID = 1 (  0041):    11.37   0.264     1.33     8.33

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

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

| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.003     1.67     2.23
      + ID2= 2 (  0041):    11.37   0.264     1.33     8.33
        ====================================================
        ID = 3 (  0032):    12.20   0.265     1.33     7.91

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

 FINISH
==================================================================================
========================
```

APPENDIX G

WATER BALANCE

McINTOSH PERRY

CCO-13-9668-01 - PERTHMORE SUBDIVISION - Water Balance Information - Monthly Review

The site exhibits five primary types of pervious land use / soil combinations:

	Values from Thornthwaite-Mather Table 10				Table 10 Values Applied to Site Conditions		
Pre-development / Post-development	Soil Type	Available Water (mm)	Root Zone (m)	Applicable Soil Moisture Rentention Table	Available Average Soil Depth (m)	Soil Moisture Retention Table Given Soil Depth (mm)	Values to use (mm)
Pasture overtopping sandy soils (class B soils)	Sandy Loam	150	1	150	0.6	90	100
Pasture overtopping sandy soils (class C soils)	Silty/Clay Loam	250	1	250	0.6	150	150
Forest overtopping sandy soils (class B soils)	Sandy Loam	150	2	300	0.6	180	200
Forest overtopping sandy soils (class C soils)	Silty/Clay Loam	250	1.6	400	0.6	240	250

Summary of data below:

Soil Moisture Storage	Surplus
75	398
100	391
125	387
150	384
200	380
250	377
350	373
400	371

Soil Moisture Storage Data

75mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		217	0	0	0	0	11	0	11	228
February	-8.1	0	0	54	54		271	0	0	0	0	5	0	5	276
March	-2.3	0	0	64	64		336	0	0	0	0	2	0	2	338
April	6.3	1.4	32	75	43		75	0	32	0	43	22	26	48	166
May	13.3	4.4	79	80	2		75	0	79	0	2	12	117	129	206
June	18.5	7.2	112	93	-19	-19	57	-18	111	1	0	6	59	65	122
July	21	8.8	133	92	-41	-60	33	-24	116	17	0	3	29	32	65
August	19.8	8.0	114	86	-29	-88	22	-11	97	18	0	2	15	17	39
September	15	5.3	73	90	17		39	17	73	0	0	1	7	8	47
October	8	2.0	34	86	52		75	36	34	0	17	9	4	13	105
November	1.5	0.2	5	82	77		75	0	5	0	77	43	2	45	197
December	-6.2	0	0	76	76		151	0	0	0	0	22	1	23	174
		37.4	580	944				0	545	35	138	138	260	398	

Monthly T and P from Environment Canada — Table 25 - 75mm soil moisture retention in Thornthwaite [1957]

Heat Index (I) 37.4

a: 1.06

100mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		241	0	0	0	0	11	0	11	252
February	-8.1	0	0	54	54		296	0	0	0	0	5	0	5	301
March	-2.3	0	0	64	64		360	0	0	0	0	2	0	2	362
April	6.3	1.4	32	75	43		100	0	32	0	43	22	26	48	191
May	13.3	4.4	79	80	2		100	0	79	0	2	12	117	129	231
June	18.5	7.2	112	93	-19	-19	82	-18	111	1	0	6	59	65	147
July	21	8.8	133	92	-41	-60	54	-28	120	13	0	3	29	32	86
August	19.8	8.0	114	86	-29	-88	40	-14	100	15	0	2	15	17	57
September	15	5.3	73	90	17		57	17	73	0	0	1	7	8	65
October	8	2.0	34	86	52		100	43	34	0	10	5	4	9	119
November	1.5	0.2	5	82	77		100	0	5	0	77	41	2	43	220
December	-6.2	0	0	76	76		176	0	0	0	0	21	1	22	198
		37.4	580	944				0	552	28	131	131	260	391	

Monthly T and P from Environment Canada — Table 26 - 100mm soil moisture retention in Thornthwaite [1957]

Heat Index (I)

a: 37.4

125mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		267	0	0	0	0	10	0	10	277
February	-8.1	0	0	54	54		321	0	0	0	0	5	0	5	326
March	-2.3	0	0	64	64		386	0	0	0	0	2	0	2	388
April	6.3	1.4	32	75	43		125	0	32	0	43	23	26	49	217
May	13.3	4.4	79	80	2		125	0	79	0	2	12	117	129	256
June	18.5	7.2	112	93	-19	-19	106	-19	112	0	0	6	59	65	171
July	21	8.8	133	92	-41	-60	76	-30	122	11	0	3	29	32	108
August	19.8	8.0	114	86	-29	-88	61	-15	101	14	0	2	15	17	78
September	15	5.3	73	90	17		78	17	73	0	0	1	7	8	86
October	8	2.0	34	86	52		125	47	34	0	6	3	4	7	138
November	1.5	0.2	5	82	77		125	0	5	0	77	40	2	42	244
December	-6.2	0	0	76	76		201	0	0	0	0	20	1	21	222
		37.4	580	944				0	556	24	127	127	260	387	

Monthly T from Environment Canada — Table 27 - 100mm soil moisture retention in Thornthwaite [1957]

Heat Index (I) 37.4

a: 1.06

150mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		292	0	0	0	0	10	0	10	302
February	-8.1	0	0	54	54		346	0	0	0	0	5	0	5	351
March	-2.3	0	0	64	64		411	0	0	0	0	2	0	2	413
April	6.3	1.4	32	75	43		150	0	32	0	43	23	26	49	242
May	13.3	4.4	79	80	2		150	0	79	0	2	12	117	129	281
June	18.5	7.2	112	93	-19	-19	132	-18	111	1	0	6	59	65	197
July	21	8.8	133	92	-41	-60	100	-32	124	9	0	3	29	32	132
August	19.8	8.0	114	86	-29	-88	83	-17	103	12	0	2	15	17	100
September	15	5.3	73	90	17		100	17	73	0	0	1	7	8	108
October	8	2.0	34	86	52		150	50	34	0	3	2	4	6	159
November	1.5	0.2	5	82	77		150	0	5	0	77	39	2	41	268
December	-6.2	0	0	76	76		226	0	0	0	0	19	1	20	246
		37.4	580	944				0	559	21	124	124	260	384	

Monthly T from Environment Canada

Table 28 - 150mm soil moisture retention in Thornthwaite [1957]

Heat Index (I) 37.4

a: 1.06

200mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		341	0	0	0	0	10	0	10	351
February	-8.1	0	0	54	54		396	0	0	0	0	5	0	5	401
March	-2.3	0	0	64	64		460	0	0	0	0	2	0	2	462
April	6.3	1.4	32	75	43		200	0	32	0	43	22	26	48	291
May	13.3	4.4	79	80	2		200	0	79	0	2	12	117	129	331
June	18.5	7.2	112	93	-19	-19	182	-18	111	1	0	6	59	65	247
July	21	8.8	133	92	-41	-60	148	-34	126	7	0	3	29	32	180
August	19.8	8.0	114	86	-29	-88	128	-20	106	9	0	2	15	17	145
September	15	5.3	73	90	17		145	17	73	0	0	1	7	8	153
October	8	2.0	34	86	52		198	52	34	0	0	0	4	4	202
November	1.5	0.2	5	82	77		200	2	5	0	75	38	2	40	315
December	-6.2	0	0	76	76		276	0	0	0	0	19	1	20	296
		37.4	580	944				0	564	16	120	120	260	380	

Monthly T from Environment Canada

Table 29 - 200mm soil moisture retention in Thornthwaite [1957]

Heat Index (I) 37.4

a: 1.06

250mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		392	0	0	0	0	9	0	9	401
February	-8.1	0	0	54	54		446	0	0	0	0	5	0	5	451
March	-2.3	0	0	64	64		511	0	0	0	0	2	0	2	513
April	6.3	1.4	32	75	43		250	0	32	0	43	23	26	49	342
May	13.3	4.4	79	80	2		250	0	79	0	2	12	117	129	381
June	18.5	7.2	112	93	-19	-19	231	-19	112	0	0	6	59	65	296
July	21	8.8	133	92	-41	-60	196	-35	127	6	0	3	29	32	228
August	19.8	8.0	114	86	-29	-88	175	-21	107	8	0	2	15	17	192
September	15	5.3	73	90	17		192	17	73	0	0	1	7	8	200
October	8	2.0	34	86	52		245	52	34	0	0	0	4	4	249
November	1.5	0.2	5	82	77		250	5	5	0	72	36	2	38	360
December	-6.2	0	0	76	76		326	0	0	0	0	18	1	19	345
		37.4	580	944				0	567	13	117	117	260	377	

Monthly T from Environment Canada

Table 30 - 250mm soil moisture retention in Thornthwaite [1957]

Heat Index (I) 37.4

a: 1.06

350mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		492	0	0	0	0	9	0	9	501
February	-8.1	0	0	54	54		546	0	0	0	0	4	0	4	550
March	-2.3	0	0	64	64		611	0	0	0	0	2	0	2	613
April	6.3	1.4	32	75	43		350	0	32	0	43	23	26	49	442
May	13.3	4.4	79	80	2		350	0	79	0	2	12	117	129	481
June	18.5	7.2	112	93	-19	-19	331	-19	112	0	0	6	59	65	396
July	21	8.8	133	92	-41	-60	294	-37	129	4	0	3	29	32	326
August	19.8	8.0	114	86	-29	-88	271	-23	109	6	0	2	15	17	288
September	15	5.3	73	90	17		288	17	73	0	0	1	7	8	296
October	8	2.0	34	86	52		341	52	34	0	0	0	4	4	345
November	1.5	0.2	5	82	77		350	9	5	0	68	34	2	36	454
December	-6.2	0	0	76	76		426	0	0	0	0	17	1	18	444
		37.4	580	944				0	571	9	113	113	260	373	

Monthly T from Environment Canada

Table 32 - 350mm soil moisture retention in Thornthwaite [1957]

Heat Index (I) 37.4

a: 1.06

400mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		542	0	0	0	0	8	0	8	550
February	-8.1	0	0	54	54		596	0	0	0	0	4	0	4	600
March	-2.3	0	0	64	64		661	0	0	0	0	2	0	2	663
April	6.3	1.4	32	75	43		400	0	32	0	43	23	26	49	492
May	13.3	4.4	79	80	2		400	0	79	0	2	12	117	129	531
June	18.5	7.2	112	93	-19	-19	381	-19	112	0	0	6	59	65	446
July	21	8.8	133	92	-41	-60	344	-37	129	4	0	3	29	32	376
August	19.8	8.0	114	86	-29	-88	320	-24	110	5	0	2	15	17	337
September	15	5.3	73	90	17		337	17	73	0	0	1	7	8	345
October	8	2.0	34	86	52		390	52	34	0	0	0	4	4	394
November	1.5	0.2	5	82	77		400	10	5	0	66	33	2	35	501
December	-6.2	0	0	76	76		476	0	0	0	0	17	1	18	494
		37.4	580	944				0	572	8	111	111	260	371	

Monthly T from Environment Canada

Table 33 - 450mm soil moisture retention in Thornthwaite [1957]

Heat Index (I) 37.4

a: 1.06

CCO-13-9668-01 - PERTHMORE SUBDIVISION - WATER BUDGET - PRE-DEVELOPMENT

Water Balance / Water Budget Assessment

	Development Lands to Perth Long Swamp (A1)						
Land Use	**Forest**		**Pasture**		**Gravel**	**Asphalt**	**Total**
Soil (HSG)	**C**	**B**	**C**	**B**			
Soil Characterization	***Silt/Clay Loam (250)***	***Sandy Loam (200)***	***Silt/Clay Loam (150)***	***Sandy Loam (100)***			
Area (m^2)	34300	15600	17600	54500	-	-	122000
Pervious Area (m^2)	34300	15600	17600	54500	-	-	122000
Impervious Area (m^2)	-	-	-	-	-	-	-
Infiltration Factors							
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	-	-	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	-	-	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	-	-	
MOE infiltration Factor	0.522	0.572	0.422	0.472	-	-	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	-	-	
Run-off Coefficient	0.478	0.428	0.578	0.528	-	-	
Runoff from Impervious Surfaces*	0	0	0	0	-	-	
Inputs (per Unit Area)							
Precipitation (mm/year)	944	944	944	944	-	-	944
Run-on (mm/year)	0	0	0	0	-	-	0
Other Inputs (mm/year)	0	0	0	0	-	-	0
Total Inputs (mm/year)	944	944	944	944	-	-	944
Outputs (per Unit Area)							
Precipitation Surplus (mm/year)	377	380	384	391	-	-	385
Net Surplus (mm/year)	377	380	384	391	-	-	385
Evapotranspiration (mm/year)	567	564	560	553	-	-	559
Infiltration (mm/year)	197	217	162	185	-	-	189
Rooftop Infiltration (mm/year)	0	0	0	0	-	-	0
Total Infiltration (mm/year)	197	217	162	185	-	-	189
Runoff Pervious Areas	180	163	222	206	-	-	771
Runoff Impervious Areas	0	0	0	0	-	-	0
Total Runoff (mm/year)	180	163	222	206	-	-	196
Total Outputs (mm/year)	944	944	944	944	-	-	944
Difference (Inputs - Outputs)	0	0	0	0	-	-	0
Inputs (Volume)							
Precipitation (m^3/year)	32379	14726	16614	51448	-	-	115168
Run-on (m^3/year)	0	0	0	0	-	-	0
Other Inputs m^3/year)	0	0	0	0	-	-	0
Total Inputs (m^3/year)	32379	14726	16614	51448	-	-	115168
Outputs (Volume)							
Precipitation Surplus (m^3/year)	12931	5928	6758	21310	-	-	46927
Net Surplus (m^3/year)	12931	5928	6758	21310	-	-	46927
Evapotranspiration (m^3/year)	19448	8798	9856	30139	-	-	68241
Infiltration (m^3/year)	6750	3391	2852	10058	-	-	23051
Rooftop infiltration (m^3/year)	0	0	0	0	-	-	0
Total Infiltration (m^3/year)	6750	3391	2852	10058	-	-	23051
Runoff Pervious Areas (m^3/year)	6181	2537	3906	11251	-	-	23876
Runoff Impervious Areas (m^3/year)	0	0	0	0	-	-	0
Total Runoff (m^3/year)	6181	2537	3906	11251	-	-	23876
Total Outputs (m^3/year)	**32379**	**14726**	**16614**	**51448**	-	-	**115168**
Difference (Inputs - Outputs)	0	0	0	0	-	-	0

CCO-13-9668-01 - PERTHMORE SUBDIVISION - WATER BUDGET - POST-DEVELOPMENT

Water Balance / Water Budget Assessment

Development Lands to Perth Long Swamp (Block 70, SWM Block, Residential Lots and Roadway)

Land Use	Forest		Pasture					
Soil (HSG)	**C**	**B**	**C**	**B**				
Soil Characterization	***Silt/Clay Loam (250)***	***Sandy Loam (200)***	***Silt/Clay Loam (150)***	***Sandy Loam (100)***	***Sand (75)***	**Gravel**	**Asphalt**	**Total**
Area (m^2)	8300	0	17400	13300	0	0	26600	65600
Pervious Area (m^2)	8300	0	17400	13300	0	-	-	39000
Impervious Area (m^2)	-	-	-	-	-	0	26600	26600
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.35	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0.1	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.43	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	573
Net Surplus (mm/year)	377	380	384	391	398	398	850	573
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	371
Infiltration (mm/year)	197	217	162	185	227	88	85	140
Rooftop and Trench Infiltration (mm/year)	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	197	217	162	185	227	88	85	140
Runoff Pervious Areas	180	163	222	206	171	0	0	942
Runoff Impervious Areas	0	0	0	0	0	310	765	1075
Total Runoff (mm/year)	180	163	222	206	171	310	765	434
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	7835	0	16426	12555	0	0	25110	61926
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	7835	0	16426	12555	0	0	25110	61926
Outputs (Volume)								
Precipitation Surplus (m^3/year)	3129	0	6682	5200	0	0	22599	37610
Net Surplus (m^3/year)	3129	0	6682	5200	0	0	22599	37610
Evapotranspiration (m^3/year)	4706	0	9744	7355	0	0	2511	24316
Infiltration (m^3/year)	1633	0	2820	2455	0	0	2260	9168
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	1633	0	2820	2455	0	0	2260	9168
Runoff Pervious Areas (m^3/year)	1496	0	3862	2746	0	0	0	8103
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	20339	20339
Total Runoff (m^3/year)	1496	0	3862	2746	0	0	20339	28443
Total Outputs (m^3/year)	**7835**	**0**	**16426**	**12555**	**0**	**0**	**25110**	**61926**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Development Lands to Perth Long Swamp (West Block)

Land Use	Forest		Pasture					
Soil (HSG)	**C**	**B**	**C**	**B**				
Soil Characterization	***Silt/Clay Loam (250)***	***Sandy Loam (200)***	***Silt/Clay Loam (150)***	***Sandy Loam (100)***	***Sand (75)***	**Gravel**	**Asphalt**	**Total**
Area (m^2)	0	0	0	10290	0	0	24010	34300
Pervious Area (m^2)	0	0	0	10290	0	-	-	10290
Impervious Area (m^2)	-	-	-	-	-	0	24010	24010
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.3	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.52	0.22	0	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.52	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.48	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	712
Net Surplus (mm/year)	377	380	384	391	398	398	850	712
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	232
Infiltration (mm/year)	197	217	162	185	207	88	0	55
Rooftop and Trench Infiltration (mm/year)	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	197	217	162	185	207	88	0	55
Runoff Pervious Areas	180	163	222	206	191	0	0	962
Runoff Impervious Areas	0	0	0	0	0	310	850	1160
Total Runoff (mm/year)	180	163	222	206	191	310	850	657
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	0	0	0	9714	0	0	22665	32379
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	0	0	0	9714	0	0	22665	32379
Outputs (Volume)								
Precipitation Surplus (m^3/year)	0	0	0	4023	0	0	20399	24422
Net Surplus (m^3/year)	0	0	0	4023	0	0	20399	24422
Evapotranspiration (m^3/year)	0	0	0	5690	0	0	2267	7957
Infiltration (m^3/year)	0	0	0	1899	0	0	0	1899
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	0	0	0	1899	0	0	0	1899
Runoff Pervious Areas (m^3/year)	0	0	0	2124	0	0	0	2124
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	20399	20399
Total Runoff (m^3/year)	0	0	0	2124	0	0	20399	22523
Total Outputs (m^3/year)	**0**	**0**	**0**	**9714**	**0**	**0**	**22665**	**32379**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Development Lands to Perth Long Swamp (Central Block)

Land Use	Forest		Pasture					
Soil (HSG)	**C**	**B**	**C**	**B**				
Soil Characterization	***Silt/Clay Loam (250)***	***Sandy Loam (200)***	***Silt/Clay Loam (150)***	***Sandy Loam (100)***	***Sand (75)***	**Gravel**	**Asphalt**	**Total**
Area (m^2)	0	1560	0	3120	0	0	10920	15600
Pervious Area (m^2)	0	1560	0	3120	0	-	-	4680
Impervious Area (m^2)	-	-	-	-	-	0	10920	10920
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.3	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.52	0.22	0	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.52	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.48	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	711
Net Surplus (mm/year)	377	380	384	391	398	398	850	711
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	233
Infiltration (mm/year)	197	217	162	185	207	88	0	59
Rooftop and Trench Infiltration (mm/year)	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	197	217	162	185	207	88	0	59
Runoff Pervious Areas	180	163	222	206	191	0	0	962
Runoff Impervious Areas	0	0	0	0	0	310	850	1160
Total Runoff (mm/year)	180	163	222	206	191	310	850	652
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	0	1473	0	2945	0	0	10308	14726
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	0	1473	0	2945	0	0	10308	14726
Outputs (Volume)								
Precipitation Surplus (m^3/year)	0	593	0	1220	0	0	9278	11090
Net Surplus (m^3/year)	0	593	0	1220	0	0	9278	11090
Evapotranspiration (m^3/year)	0	880	0	1725	0	0	1031	3636
Infiltration (m^3/year)	0	339	0	576	0	0	0	915
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	0	339	0	576	0	0	0	915
Runoff Pervious Areas (m^3/year)	0	254	0	644	0	0	0	898
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	9278	9278
Total Runoff (m^3/year)	0	254	0	644	0	0	9278	10175
Total Outputs (m^3/year)	**0**	**1473**	**0**	**2945**	**0**	**0**	**10308**	**14726**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Development Lands to Perth Long Swamp (East Block)

Land Use	Forest		Pasture					
Soil (HSG)	**C**	**B**	**C**	**B**				
Soil Characterization	***Silt/Clay Loam (250)***	***Sandy Loam (200)***	***Silt/Clay Loam (150)***	***Sandy Loam (100)***	***Sand (75)***	**Gravel**	**Asphalt**	**Total**
Area (m^2)	650	0	1300	0	0	0	4550	6500
Pervious Area (m^2)	650	0	1300	0	0	-	-	1950
Impervious Area (m^2)	-	-	-	-	-	0	4550	4550
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.3	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.52	0.22	0	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.52	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.48	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	709
Net Surplus (mm/year)	377	380	384	391	398	398	850	709
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	235
Infiltration (mm/year)	197	217	162	185	207	88	0	52
Rooftop and Trench Infiltration (mm/year)	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	197	217	162	185	207	88	0	52
Runoff Pervious Areas	180	163	222	206	191	0	0	962
Runoff Impervious Areas	0	0	0	0	0	310	850	1160
Total Runoff (mm/year)	180	163	222	206	191	310	850	657
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	614	0	1227	0	0	0	4295	6136
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	614	0	1227	0	0	0	4295	6136
Outputs (Volume)								
Precipitation Surplus (m^3/year)	245	0	499	0	0	0	3866	4610
Net Surplus (m^3/year)	245	0	499	0	0	0	3866	4610
Evapotranspiration (m^3/year)	369	0	728	0	0	0	430	1526
Infiltration (m^3/year)	128	0	211	0	0	0	0	339
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	128	0	211	0	0	0	0	339
Runoff Pervious Areas (m^3/year)	117	0	289	0	0	0	0	406
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	3866	3866
Total Runoff (m^3/year)	117	0	289	0	0	0	3866	4271
Total Outputs (m^3/year)	**614**	**0**	**1227**	**0**	**0**	**0**	**4295**	**6136**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

CCO-13-9668-01 - PERTHMORE SUBDIVISION - WATER BUDGET - MITIGATION REQUIRED

Water Balance / Water Budget Assessment

Data Input	
944	mm of precipitation per year avg.
118.4	days with precipitation per year avg.
10	mm design rainfall event

1981 to 2010 Canadian Climate Normals station data

Days with Rainfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
>= 0.2 mm	4.4	3.9	6.7	10.9	13.4	13.2	11.9	11	12.3	13.7	11	6	118.4	A
>= 5 mm	1.6	1.2	2.1	4	4.9	5.8	5.4	4.8	5.1	5	4.2	2.3	46.5	A
>= 10 mm	0.87	0.57	1	2	2.7	2.9	3.1	2.8	3.2	2.7	2.1	1.2	25.2	A
>= 25 mm	0.13	0.07	0.10	0.33	0.47	0.73	0.77	0.67	0.60	0.47	0.43	0.13	4.9	A

Environment Canada	Days exceeding rainfall noted	Days per section	Minimum volume of rain (mm)
0.2 mm	118.4	71.9	14
5 mm	46.5	21.3	107
10 mm	25.2	25.2	252
		Total	373

*Example - Days per section over 5mm = 46.5 - 25.2 = 21.3 days (which are more than 5 mm but, less than 10 mm).
21.3 days x 5 mm = 107 mm

	Development Lands to Perth Long Swamp (Block 70, SWM Block, Residential Lots and Roadway)	**Development Lands to Perth Long Swamp (West Block #67)**
Area of Asphalt (m^2)	26600	24010
Asphalt Runoff Coefficient	0.9	0.9
Volume of Runoff in 5 mm Event (m^3) to be infiltrated	120	108
Mitigation Required (m^3/year)	2873	2593
Annual Volume to be infiltrated by designing for 5 mm Event	2897	2615

By installing trenches sized for the 5 mm event, the annual volume to be infiltrated will exceed that of the mitigation required by the water balance mitigation.

Infiltration Area Footprint Calculation

Phase 6:	**For 0.5m depth**		**For 0.75m depth**	
Infiltration Target=	120	m^3	120	m^3
Assumed trench depth=	0.5	m^3	0.75	m^3
Porosity =	0.4		0.4	
Trench footprint area required=	**600**	**m^2**	**400**	**m^2**

West Block:	**For 0.5m depth**		**For 0.75m depth**	
Infiltration Target=	108	m^3	108	m^3
Assumed trench depth=	0.5	m^3	0.75	m^3
Porosity =	0.4		0.4	
Trench footprint area required=	**540**	**m^2**	**360**	**m^2**

CCO-13-9668-01 - PERTHMORE SUBDIVISION - WATER BUDGET - POST-DEVELOPMENT WITH MITIGATION

Water Balance / Water Budget Assessment

Development Lands to Perth Long Swamp (Block 70, SWM Block, Residential Lots and Roadway)

Land Use	Forest		Pasture					
Soil (HSG)	C	B	C	B				
Soil Characterization	Silt/Clay Loam (250)	Sandy Loam (200)	Silt/Clay Loam (150)	Sandy Loam (100)	Sand (75)	Gravel	Asphalt	Total
Area (m^2)	8300	0	17400	13300	0	0	26600	65600
Pervious Area (m^2)	8300	0	17400	13300	0	-	-	39000
Impervious Area (m^2)	-	-	-	-	-	0	26600	26600
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.35	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0.1	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.43	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	573
Net Surplus (mm/year)	377	380	384	391	398	398	850	573
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	371
Infiltration (mm/year)	197	217	162	185	227	88	85	140
Rooftop and Infiltration Basin (mm/year)	0	0	0	0	0	0	108	44
Total Infiltration (mm/year)	197	217	162	185	227	88	193	184
Runoff Pervious Areas	180	163	222	206	171	0	0	942
Runoff Impervious Areas	0	0	0	0	0	310	657	967
Total Runoff (mm/year)	180	163	222	206	171	310	657	390
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	7835	0	16426	12555	0	0	25110	61926
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	7835	0	16426	12555	0	0	25110	61926
Outputs (Volume)								
Precipitation Surplus (m^3/year)	3129	0	6682	5200	0	0	22599	37610
Net Surplus (m^3/year)	3129	0	6682	5200	0	0	22599	37610
Evapotranspiration (m^3/year)	4706	0	9744	7355	0	0	2511	24316
Infiltration (m^3/year)	1633	0	2820	2455	0	0	2260	9168
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	2873	2873
Total Infiltration (m^3/year)	1633	0	2820	2455	0	0	5133	12040
Runoff Pervious Areas (m^3/year)	1496	0	3862	2746	0	0	0	8103
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	17467	17467
Total Runoff (m^3/year)	1496	0	3862	2746	0	0	17467	25570
Total Outputs (m^3/year)	**7835**	**0**	**16426**	**12555**	**0**	**0**	**25110**	**61926**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Development Lands to Perth Long Swamp (West Block)

Land Use	Forest		Pasture					
Soil (HSG)	C	B	C	B				
Soil Characterization	Silt/Clay Loam (250)	Sandy Loam (200)	Silt/Clay Loam (150)	Sandy Loam (100)	Sand (75)	Gravel	Asphalt	Total
Area (m^2)	0	0	0	10290	0	0	24010	34300
Pervious Area (m^2)	0	0	0	10290	0	-	-	10290
Impervious Area (m^2)	-	-	-	-	-	0	24010	24010
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.35	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0.1	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.43	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	712
Net Surplus (mm/year)	377	380	384	391	398	398	850	712
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	232
Infiltration (mm/year)	197	217	162	185	227	88	85	115
Rooftop and Infiltration Basin (mm/year)	0	0	0	0	0	0	108	76
Total Infiltration (mm/year)	197	217	162	185	227	88	193	190
Runoff Pervious Areas	180	163	222	206	171	0	0	942
Runoff Impervious Areas	0	0	0	0	0	310	657	967
Total Runoff (mm/year)	180	163	222	206	171	310	657	522
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	0	0	0	9714	0	0	22665	32379
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	0	0	0	9714	0	0	22665	32379
Outputs (Volume)								
Precipitation Surplus (m^3/year)	0	0	0	4023	0	0	20399	24422
Net Surplus (m^3/year)	0	0	0	4023	0	0	20399	24422
Evapotranspiration (m^3/year)	0	0	0	5690	0	0	2267	7957
Infiltration (m^3/year)	0	0	0	1899	0	0	2040	3939
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	2593	2593
Total Infiltration (m^3/year)	0	0	0	1899	0	0	4633	6532
Runoff Pervious Areas (m^3/year)	0	0	0	2124	0	0	0	2124
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	15766	15766
Total Runoff (m^3/year)	0	0	0	2124	0	0	15766	17890
Total Outputs (m^3/year)	**0**	**0**	**0**	**9714**	**0**	**0**	**22665**	**32379**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Lands to Perth Long Swamp (Central Block)

Land Use	Forest		Pasture					
Soil (HSG)	C	B	C	B				
Soil Characterization	Silt/Clay Loam (250)	Sandy Loam (200)	Silt/Clay Loam (150)	Sandy Loam (100)	Sand (75)	Gravel	Asphalt	Total
Area (m^2)	0	12480	0	3120	0	0	0	15600
Pervious Area (m^2)	0	12480	0	3120	0	-	-	15600
Impervious Area (m^2)	-	-	-	-	-	0	0	0
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.35	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0.1	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.43	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	382
Net Surplus (mm/year)	377	380	384	391	398	398	850	382
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	562
Infiltration (mm/year)	197	217	162	185	227	88	85	211
Rooftop and Infiltration Basin (mm/year)	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	197	217	162	185	227	88	85	211
Runoff Pervious Areas	180	163	222	206	171	0	0	942
Runoff Impervious Areas	0	0	0	0	0	310	765	1075
Total Runoff (mm/year)	180	163	222	206	171	310	765	171
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	0	11781	0	2945	0	0	0	14726
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	0	11781	0	2945	0	0	0	14726
Outputs (Volume)								
Precipitation Surplus (m^3/year)	0	4742	0	1220	0	0	0	5962
Net Surplus (m^3/year)	0	4742	0	1220	0	0	0	5962
Evapotranspiration (m^3/year)	0	7039	0	1725	0	0	0	8764
Infiltration (m^3/year)	0	2713	0	576	0	0	0	3288
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	0	2713	0	576	0	0	0	3288
Runoff Pervious Areas (m^3/year)	0	2030	0	644	0	0	0	2674
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	0	0
Total Runoff (m^3/year)	0	2030	0	644	0	0	0	2674
Total Outputs (m^3/year)	**0**	**11781**	**0**	**2945**	**0**	**0**	**0**	**14726**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Lands to Perth Long Swamp (East Block)

Land Use	Forest		Pasture					
Soil (HSG)	C	B	C	B				
Soil Characterization	Silt/Clay Loam (250)	Sandy Loam (200)	Silt/Clay Loam (150)	Sandy Loam (100)	Sand (75)	Gravel	Asphalt	Total
Area (m^2)	5200	0	1300	0	0	0	0	6500
Pervious Area (m^2)	5200	0	1300	0	0	-	-	6500
Impervious Area (m^2)	-	-	-	-	-	0	0	0
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.35	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0.1	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.43	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	378
Net Surplus (mm/year)	377	380	384	391	398	398	850	378
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	566
Infiltration (mm/year)	197	217	162	185	227	88	85	190
Rooftop and Infiltration Basin (mm/year)	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	197	217	162	185	227	88	85	190
Runoff Pervious Areas	180	163	222	206	171	0	0	942
Runoff Impervious Areas	0	0	0	0	0	310	765	1075
Total Runoff (mm/year)	180	163	222	206	171	310	765	189
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	4909	0	1227	0	0	0	0	6136
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	4909	0	1227	0	0	0	0	6136
Outputs (Volume)								
Precipitation Surplus (m^3/year)	1960	0	499	0	0	0	0	2460
Net Surplus (m^3/year)	1960	0	499	0	0	0	0	2460
Evapotranspiration (m^3/year)	2948	0	728	0	0	0	0	3676
Infiltration (m^3/year)	1023	0	211	0	0	0	0	1234
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	1023	0	211	0	0	0	0	1234
Runoff Pervious Areas (m^3/year)	937	0	289	0	0	0	0	1226
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	0	0
Total Runoff (m^3/year)	937	0	289	0	0	0	0	1226
Total Outputs (m^3/year)	**4909**	**0**	**1227**	**0**	**0**	**0**	**0**	**6136**
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

CCO-13-9668-01 - PERTHMORE SUBDIVISION - WATER BUDGET - SUMMARY

Water Balance / Water Budget Assessment

Development Lands to Perth Long Swamp Pre = Post					
Characteristic	Pre-Development	Post-Development	Change (Pre- to Post)	Post-Development with Mitigation	Change (Pre- to Post-with Mitigation
Inputs (Volumes)					
Precipitation (m^3/year)	115168	115168	0%	115168	0%
Run-on (m^3/year)	0	0	0%	0	0%
Other Inputs m^3/year)	0	0	0%	0	0%
Total Inputs (m^3/year)	115168	115168	0%	115168	0%
Outputs (Volumes)					
Precipitation Surplus (m^3/year)	46927	77733	66%	70455	50%
Net Surplus (m^3/year)	46927	77733	66%	70455	50%
Evapotranspiration (m^3/year)	68241	37435	-45%	44713	-34%
Infiltration (m^3/year)	23051	12320	-47%	17629	-24%
Rooftop infiltration (m^3/year)	0	0	0%	5466	0%
Total Infiltration (m^3/year)	23051	12320	-47%	23095	0%
Runoff Pervious Areas (m^3/year)	23876	11531	-52%	14127	-41%
Runoff Impervious Areas (m^3/year)	0	53882	0%	33233	0%
Total Runoff (m^3/year)	23876	65413	174%	47360	98%
Total Outputs (m^3/year)	115168	115168	0%	115168	0%

ENVIRONMENTAL IMPACT STATEMENT

Perthmore Estates Subdivision Phase 6, Perth, ON

Project No.: PP-13-9668

Prepared for:

Perthmore Enterprises Inc.
80 Dufferin Street, P.O. Box 20054
Perth, ON
K7H 3M6

Prepared by:

McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Road, R.R.3
Carp, Ontario
K0A 1L0

McINTOSH PERRY

ENVIRONMENTAL IMPACT STATEMENT
PERTHMORE ESTATES SUBDIVISION PHASE 6, PERTH, ON

Prepared for:

Perthmore Enterprises Inc.
80 Dufferin Street, P.O. Box 20054
Perth, ON
K7H 3M6

Prepared by:

McINTOSH PERRY

McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Road, R.R.3
Carp, Ontario
K0A 1L0

Version 003
June 22, 2023

Erik Pohanka

____
Written by: Erik Pohanka, B. Sc.
Biologist
McIntosh Perry Consulting Engineers Ltd.

Jeff King

____
Reviewed by: Jeff King, B. Sc., C. Tech., rcji
Senior Biologist
McIntosh Perry Consulting Engineers Ltd.

TABLE OF CONTENTS

Tables

Figures

Appendices

1.0 PROPERTY INFORMATION AND INTRODUCTION

The property for this Environmental Impact Statement (EIS) is a portion of an existing 29.7 hectare (ha) parcel of land located between Highway 7 (Dufferin Street) and North Street (Drummond Concession 2), north and west of Perthmore Street. The property is legally known as: "PART SOUTHWEST 1/2 AND PART NORTHEAST 1/2 LOT 3 CONCESSION 2 DRUMMOND BEING PART 1, 27R7125 AND PART 1, 27R8420 SAVE AND EXCEPT PLAN 88, 27M3, 27M14, 27M16, 27M21, 27M55 AND PARTS 3 & 4, 27R7540 AND PART 6, 27R11177 TOWN OF PERTH." The property is located within the Town of Perth, with 300 metres (m) of frontage on the south side of Highway 7 and 380 m of frontage on the north side of North Street (Drummond Concession 2) (**Figure 1**).

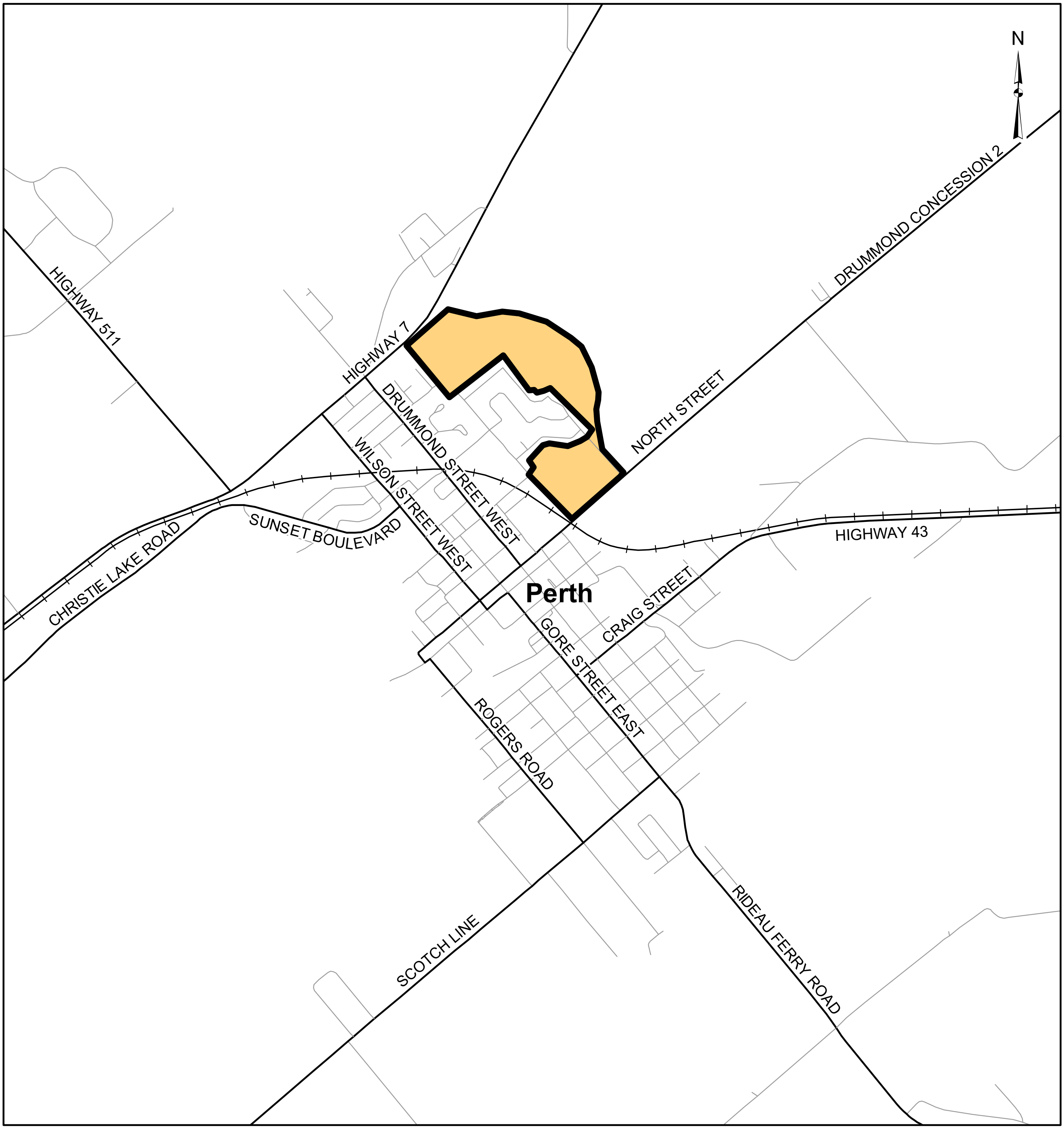
The area of the proposed subdivision, hereinafter referred to as the "subject property" measures approximately 5.5 hectares.

Under the *Town of Perth Official Plan – Land Use Designation* (Tunnock Consulting Ltd., 2015), the subject property is designated as Residential Area, except for two very small areas within the proposed Stormwater Management facility (Block 55 on the proposed Draft Plan of Subdivision) which are designated as Environmental Protection Area (Natural Heritage Feature – NHF / Provincially Significant Wetland – PSW).

The subject property is located within the jurisdiction of the Ministry of Natural Resources and Forestry's (MNRF) - Kemptville District and the Ministry of Environment, Conservation and Park's (MECP) – Ottawa District.

There is confirmed Provincially Significant Wetland (PSW) present within the overall 29.7 hectare holding, and adjacent to the proposed development area. As such, the Town of Perth has required an EIS be completed for the subject property due to the presence of a PSW, as outlined in the *Town of Perth Official Plan* (Town of Perth, 2019). This EIS report assesses the potential impacts that the development of a residential subdivision may have upon the existing woodlands, natural heritage features, including Significant Woodlands and Wetlands and species at risk (SAR), and their habitat.

McIntosh Perry Consulting Engineers Ltd. (McIntosh Perry) was retained by Perthmore Development Co. Ltd. to carry out an EIS to assess the existing natural heritage features. This EIS summarizes the findings of the surveys, outlines potential impacts as a result of the proposed development, and provides recommendations in order to mitigate anticipated impacts on natural heritage features. The information contained in this report represents surveys undertaken in the spring and summer of 2019 and additional field review completed summer of 2022.



1 0.5 0 1
Kilometres

LEGEND

- Subject Property
- Local Road
- Major Road
- Waterbody

CLIENT: PERTHMORE SUBDIVISION

PROJECT: EIS

TITLE: KEY PLAN

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO: PP-13-9668		FIGURE:
Date	Nov., 20, 2019	1
GIS	SK	
Checked By	EP	

REFERENCE

Basedata provided by the Ontario Ministry of Natural Resources and Forestry, 2018.

Document Path: H:\01 Project - Proposals\2013 Jobs\0PP-13-9668 Perthmore Trafic Study\GIS\mxd\PP139668_01_EIS_KeyPlan.mxd

2.0 METHODOLOGY

In order to acquire information on habitat present within and adjacent to the area of the proposed development, field investigations were carried out on May 24, 2019 by E. Pohanka of McIntosh Perry as well as June 8, 17, and 22, 2019 by H. Lunn and July 15, 2022 by J. King (**Table 1**). The field investigations were carried out within the undeveloped and cleared areas of the subject property. The area surveyed will be hereafter referred to in this report as the "study area." The field investigation was conducted to provide an inventory and assessment of the natural heritage features of the study area. The field investigation included the identification of the following features within the study area:

- Existing vegetation communities;
- Significant woody vegetation;
- Areas of critical or significant habitat (i.e., Significant Valleylands, Significant Woodlands, Significant Wildlife Habitat, PSW's, etc.);
- Soil types;
- Areas of groundwater recharge and discharge, drainage patterns, watercourses, wetland habitat, other areas of surface water;
- SAR and their habitat, and
- Resident or migratory birds and other wildlife species.

Table 1 outlines activities carried out within the study area during the field investigations.

Table 1: Summary of Field Investigation Activities

Date	Personnel Involved	Time of Survey	Weather Conditions	Purpose of Visit
May 24, 2019	E. Pohanka	6:45 a.m. to 10:30 a.m.	13 °C, overcast, light drizzle, low wind	Existing environmental conditions survey (including identification of vegetation and wildlife species present (avian included) and determining vegetation community boundaries) and species at risk habitat review.
June 8, 2019	H. Lunn	5:35 a.m. to 6:30 a.m.	9 °C, sunny, no precipitation, no wind	Avian survey and targeted Eastern Meadowlark/Bobolink survey.
June 17, 2019	H. Lunn	7:00 a.m. to 9:00 a.m.	10 °C, sunny, no precipitation, no wind	Avian survey and targeted Eastern Meadowlark/Bobolink survey. Wetland boundary delineation mapping and vegetation community mapping.
June 22, 2019	H. Lunn	5:30 a.m. to 6:45 a.m.	12 °C, sunny, no precipitation, light breeze	Targeted Eastern Meadowlark/Bobolink survey. Butternut health assessment.
July 15, 2022	J. King	9:00 a.m. to 10:00 a.m.	25 °C, sunny, no precipitation,	Updated vegetation mapping, butternut review

Table 1: Summary of Field Investigation Activities				
Date	Personnel Involved	Time of Survey	Weather Conditions	Purpose of Visit
			light breeze	

The vegetation communities observed within the study area were characterized using the Ecological Land Classification (ELC) protocol (Lee et al., 1998), and delineated on an aerial photograph. Significant Woodlands were identified through several criteria including tree species, age class, canopy, density, land area, etc. This was completed per the Natural Heritage Reference Manual (NHRM) and the Perth OP. Areas that represented Significant Woodlands were mapped in the field utilizing GPS coordinates and visual observations. Wetland boundaries associated with the study area were reclassified due to outdated modelling. This was conducted by walking through the study area and delineating the updated wetland boundaries using GPS coordinates and visual observations.

Migratory bird surveys were performed by conducting a walkthrough of the study area. The surveys began no later than 7:00 AM. The surveys included a review of nesting and migratory birds including nesting habitat. Direct nest searches were not undertaken during the surveys as this practice is not condoned by the Canadian Wildlife Service (e.g. the chance of harming the nest by leading predators to the nesting location is high, and the efficiency of detecting all nesting locations in complex habitats such as riparian corridor or mixed vegetation is low). Breeding evidence codes as used during the Ontario Breeding Bird Atlas (OBBA) were used to assign a likelihood of breeding within the study area based on observed behaviours of individual birds. These standardized codes determine whether the species is possibly, probably or confirmed to be breeding within the study area. Characteristics of habitat were also used to help interpret behaviours and breeding evidence. In concurrence with the migratory bird surveys, grassland SAR bird surveys were conducted in the Mixed Meadow (MEM) vegetation communities within the study area. Three (3) grassland SAR bird surveys were conducted no later than 7:00 AM on sunny days with no precipitation and little to no breeze. Visual and audial observations of grassland SAR birds were recorded.

During the field investigations, observations of wildlife species were made through sight, sound, and physical evidence.

Photographs were taken during the field investigations depicting vegetation communities and natural heritage features observed within the study area. This photographic record can be found in **Appendix A** of this report (**Photos 1 – 37**).

Background information on wildlife and plant species, and other significant natural heritage features known to occur within or adjacent to the study area was obtained from the following sources:

- The Natural Heritage Information Centre (NHIC) database accessed via the MNRF's Make a Map: Natural Heritage Areas (MNRF, 2019a). This search tool allows areas to be searched at up to 1 km^2 grid resolution and provides reports concerning rare species tracked by the NHIC. Information for each 1 km^2 square within the study area was reviewed for occurrences of rare species tracked by NHIC;
- The MNRF's Land Information Ontario (LIO) Metadata Management Tool (MNRF, 2019b). This tool contains information (e.g., location of PSW's, SAR element occurrences, etc.) licensed under the Open

Government Licence for Ontario;

- Data from the Ontario Breeding Bird Atlas Database (OBBA) was accessed from the data summaries page of the Atlas of the Breeding Birds of Ontario website (Bird Studies Canada, 2006). Information for each 10 km^2 grid square was reviewed for the study area;
- Ontario Reptile and Amphibian Atlas was accessed for the data summaries (Ontario Nature, 2019). Information for each 10 km^2 grid square was reviewed for the study area;
- Information from the *Tay River Subwatershed Report 2017* by Rideau Valley Conservation Authority (RVCA) (2017);
- Habitat in the study area was evaluated by use of aerial photography accessed through Google Earth aerials and StreetView mapping (Maxar Technologies, 2019), and
- SAR listed in the *Town of Perth Official Plan: Appendix 10 - List of Endangered and Threatened Species* that are potentially found in the Town of Perth (Town of Perth, 2019).

3.0 DESCRIPTION OF THE SITE AND THE NATURAL ENVIRONMENT

3.1 Existing Land Use

At the time of the field investigations, most of the study area was undeveloped with the exception of a cleared areas near the center and west portions (**Photos 1 and 3**). The undeveloped portions of the study area consist of vegetated areas in a range of forest and wetland types. The cleared areas consist of regenerating fields and thickets as well as some piles of fill.

Schedule A: Land Use, of the *Town of Perth Official Plan* (2019), identifies 'Environmental Protection Area' consisting of 'Natural Heritage Features' and 'PSW' towards the very southeast portion of the study area. A 120 m boundary of 'adjacent lands' to the PSW is also present within the study area which also located within the area designated 'Residential Areas'.

A 'Natural Heritage System' is defined by the *Provincial Policy Statement*, 2020 (PPS) as "…a system made up of natural heritage features and areas, linked by natural corridors which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species and ecosystems." Land uses adjacent to the subject property include residential property directly adjacent to the southwest and vacant lands and wetlands northeast, east, and southeast.

3.2 Natural Heritage System Components

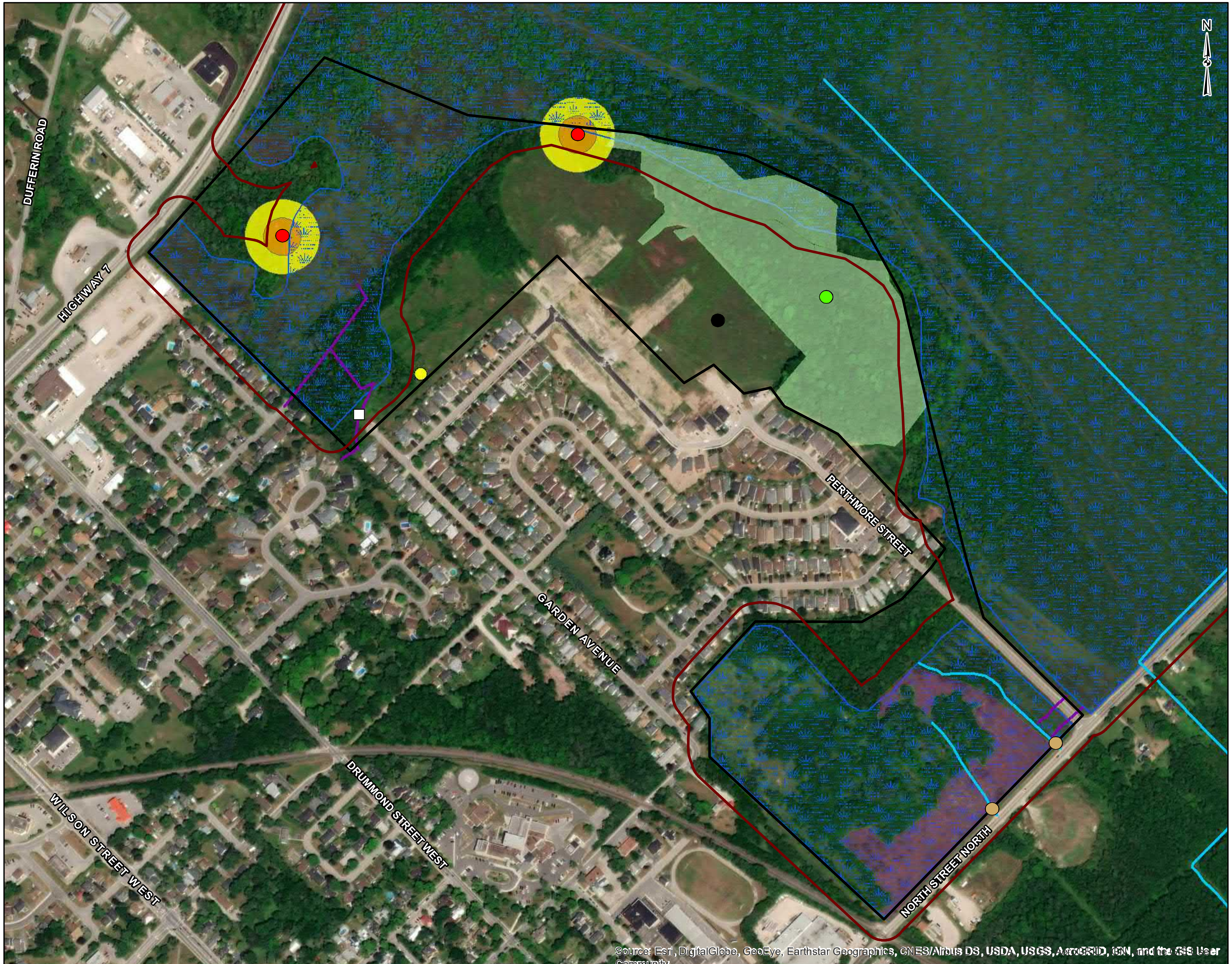
The following background information was collected from various sources (refer to Section 2.0 of this report):

- According to the NHIC mapping reviewed and LIO data, the following natural features have been identified within the vicinity of the study area:
  - A portion of the study area is within/adjacent to the Perth Long Swamp, a PSW;
  - The following additional PSW's are present within 2 km of the study area: Blueberry Marsh, Grant Creek Wetland;
  - The Perth Blueberry Bog (Candidate Life Science ANSI) is within 2 km of the study area, and
  - The following SAR have been recorded within 2 km of the study area: Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), Eastern Meadowlark (*Sturnella magna*), Eastern Musk Turtle (*Sternotherus odoratus*), and Gray Ratsnake (Frontenac Axis population) (*Pantherophis spiloides*).

The PPS defines Significant Wetlands as "…an area identified as provincially significant by the Ontario Ministry of Natural Resources using evaluation procedures established by the Province…" (PPS, 2020). Section 8.6.4(b)(2.) of the *Town of Perth Official Plan* (2019), identifies Provincially Significant wetlands as "…ecosystems which are important as habitat for a variety of plant and animal species, for water quality, flood control and water storage and recharge areas and for their value for passive recreation". The Perth Long Swamp was identified within/adjacent to the study area based on NHIC and LIO data. The boundaries of the wetland complex according to LIO data, shows the wetland occurring southeast of the study area (**Figure 3**). However, this data was determined to be historic (1987) and required updating. H. Lunn conducted a wetland evaluation to map the current boundaries of the PSW within the study area. **Figure 3** outlines the updated boundaries of the Perth Long Swamp within the study area contrasting with the outdated boundaries. The wetland drains southeast through tributaries that cross under North Street. These tributaries drain into Tay River south of the study area. The new boundaries of the wetland do not significantly deviate from the previous boundaries with the exception of expansion of the boundaries southeast of the study area and a reduction towards the northwest.

The PPS defines a Significant Woodland as "…an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area…". Section 8.6.4(e.)(1.) of the *Town of Perth Official Plan* (2019), defines Significant Woodlands as "…areas which serve an important ecological function in the broader landscape because of their location, extent of forest cover, tree age and long-standing forest function, species composition and their potential as wildlife habitat".

Several vegetation communities within and adjacent to the study area (refer to Section 3.5 of this report for information on vegetation communities present within the study area), were considered to be 'Potentially Significant Woodland' based on the *Town of Perth Official Plan* (2019). The forested areas identified as Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4), Ash Mineral Deciduous Swamp (SWD1), and Coniferous Forest (FOC) are within the 'Potentially Significant Woodlands' defined by Appendix 11 of the *Official Plan* (see **Figure 4**).



LEGEND

- Perthmore Boundary
- Beaver Dam
- Ditch
- Watercourse
- Provincially Significant Wetland
- 30m Buffer of PSW (Provincially Significant Wetland)
- Butternut
- 25m Butternut Buffer
- 50m Butternut Buffer
- Common Grackle Nests
- Eastern Meadowlark
- Eastern Wood-pewee
- Eastern Wood-pewee/ Wood Thrush Habitat
- Potential Baitfish Spawning Habitat (Seasonal)
- Potential Northern Pike Spawning Habitat (Seasonal)

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2019.

0 62.5 125 250

Scale 1:5,000 Metres

CLIENT: PERTHMORE SUBDIVISION

PROJECT: EIS

TITLE: NATURAL HERITAGE FEATURES

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:	PP-13-9668
Date	Dec., 16, 2019
GIS	SK
Checked By	EP

FIGURE: 2

LEGEND

- Perthmore Boundary
- Beaver Dam
- Ditch
- Watercourse
- McIntosh Perry Updated PSW Boundary within Study Area Limits
- MNRF PSW Boundary
- MNRF Unevaluated Wetland Boundary

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2019.

0 62.5 125 250
Scale 1:5,000 Metres

CLIENT:
PERTHMORE SUBDIVISION

PROJECT:
EIS

TITLE:
WETLAND RECLASSIFICATION MAPPING

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:	PP-13-9668	FIGURE:
Date	Nov., 20, 2019	3
GIS	SK	
Checked By	EP	

3.3 Landforms, Soils and Geology

The physiography of the study area is within the Great Lakes Basin. The bedrock geology of the study area consists of dolostone and sandstone of the Beekmantown Group (Ontario Geological Survey, 2010). According to the *Soils Map of Lanark County Ontario* (Canada Department of Agriculture, 1966), soils present within the study area include organic muck with very poor drainage in the PSW, and well drained sandy loam till southwest of the PSW.

3.4 Surface Water, Groundwater, Wetlands, and Fish Habitat

The property is located within the Tay River Subwatershed of the Rideau Valley Watershed managed by the Rideau Valley Conservation Authority (RVCA, 2017). Tributaries of the Tay River flow from the southeast end of the study area through culverts under North Street in a southeast direction. The tributaries drain surface water from the Perth Long Swamp PSW within the study area for approximately 990 m into the Tay River (RVCA, 2017). During the May 24, 2019 field investigation, the tributaries were flowing with an approximate depth of 0.5 m. The tributaries within the study area have an unknown thermal regime. Central Mudminnows (*Umbra limi*), bass (*Micropterus* spp.), sunfish (*Lepomis* spp.), and young-of-year (YOY) Northern Pike (*Esox lucius*) were recorded to be present within a connected tributary which crosses North Street east of the study area (personal observations made by J. King of McIntosh Perry). Graminoid vegetation within the study area upstream of the North Street culverts provide suitable spawning habitat for Northern Pike. The inlets of the culverts also provide suitable baitfish spawning habitat within the gravel riffles. These habitats are seasonal as these areas are influenced by fluctuating groundwater conditions.

During the field investigations, the soils were observed to have poor drainage as was evident with the wet soils and wetlands present in the study area. Standing water was present throughout the wetland areas of the study area (**Photos 8, 13, 25, and 35**). Potential groundwater was observed within the wetland due to oil-like films and iron staining on the water surface within the cattail marsh and ash mineral deciduous swamp areas of the wetland (**Photo 26**).

No well records were identified within the study area. A total of 103 wells are located within 500 m of the original study area. The well depths range from 0.4 m to 68.3 m. The well uses range from domestic water supply (46), industrial water supply (3), commercial water supply (17), irrigation (1), livestock (2), public water supply (1), monitoring (2) abandoned (7), and unknown use (24).

A Preliminary Servicing and Stormwater Management Report was prepared by McIntosh Perry in support of Phase 6 of the Perthmore subdivision where further details can be found.

3.5 Vegetation Cover

Spring and summer vegetation surveys were completed on May 24 and June 17, 2019 and confirmed July 15, 2022. Habitat observed during the field investigations included several vegetation communities (**Photos 1, 3, 6, 8, 13, 14, 16, 17, 18, 20, 24, 25, 29, 30, 32, 34, 35, 37**). The following section outlines the existing vegetation communities identified within the study area. For a detailed map of vegetation communities present within the study area, refer to **Figure 4**. Photographs of the vegetation communities can be found in **Appendix A**. A complete listing of vegetation species observed within the study area during the field investigations is found in **Table 2**. SAR vegetation was observed within the study area during the June 17, 2019 field investigation. Two (2) Butternut (*Juglans cinerea*) trees were identified in the north end of the study area. No other nationally, provincially or regionally rare or endangered plant species were observed during the field investigation.

3.5.1 Vegetation Community 1: Mixed Meadow (MEM)

Vegetation Community 1 was classified through ELC as a Mixed Meadow (MEM) (**Photo 1 and 3**). This community lacked significant woody vegetation. It was previously cleared and is considered a disturbed area with herbaceous growth regenerating the area. The dominant species included grass (*Poaceae* spp.) and shrub willows (*Salix* spp.). This community was present in the center of the study area, northwest and northeast of the existing development. Additional MEM habitat was noted during the July 15, 2022 survey through recent vegetation removals. The remainder of Community 1 had recently been mown.

3.5.2 Vegetation Community 2: Green Ash Organic Deciduous Swamp (SWDO1-2)

Vegetation Community 2 was classified through ELC as a Green Ash Organic Deciduous Swamp (SWDO1-2) (**Photo 6 and 8**). This vegetation community is located on the west end of the study area adjacent to the western Mixed Meadow. Drains and ditch lines are present within this vegetation community. The community consisted of wet soils and vegetation dominated by green ash (*Fraxinus pennsylvanica*). The majority of this community is situated within the updated boundaries of the PSW.

3.5.3 Vegetation Community 3: Cattail Organic Shallow Marsh (MASO1-1)

Vegetation Community 3 was classified through ELC as a Cattail Shallow Marsh (MASO1-1) (**Photo 13**). This vegetation community is in the western corner of the study area. It is situated entirely within the updated boundaries of the PSW and there is a small, fragmented section of this community north of the main section. This community contains surface water and is dominated by broad-leaved cattail (*Typha latifolia*). Sparse stands of dead trees and shrubs are also present in this community.

3.5.4 Vegetation Community 4: Coniferous Forest (FOC)

Vegetation Community 4 was classified through ELC as a Coniferous Forest (FOC) (**Photo 14**). This vegetation community is in the western end of the study area. It is excluded from the updated boundaries of the PSW. The community consists of a mix of coniferous trees including white spruce (*Picea glauca*), eastern white-cedar (*Thuja occidentalis*), and balsam fir (*Abies balsamea*) as well as a mix of deciduous trees. This community extends to the southern side of Dufferin Street and fragments the Cattail Organic Shallow Marsh community. This community is designated as ‘Potentially Significant Woodlands’ based on the *Town of Perth Official Plan* (2019).

3.5.5 Vegetation Community 5: Shallow Marsh (MAS)

Vegetation Community 5 was classified through ELC as a Shallow Marsh (MAS) (**Photo 16**). This community is located in the north end of the study area. This vegetation community also exists in the south end of the study area between the existing development and the updated boundaries of the PSW. The features of this community are similar to those of the cattail organic shallow marsh; however, the shrubs are denser within the shallow marsh community. This community is situated entirely within the updated boundaries of the PSW. This vegetation community extends into adjacent lands within the PSW.

3.5.6 Vegetation Community 6: Fresh-Moist Lowland Deciduous Forest (FODM7)

Vegetation Community 6 was classified through ELC as a Fresh-Moist Lowland Deciduous Forest (FODM7) (**Photo 17 and 18**). This community is located between the two Mixed Meadow communities, outside of the updated PSW boundaries. Another portion of this community is present in the southeast end of the study area between the PSW and existing developed subdivision. The canopy of this community consists primarily of green ash with a mix of other deciduous trees. Understory species was dominated by common buckthorn (*Rhamnus cathartica*). A ridge created by a historic stone fence line is present within this community. The southeast portion of this community is designated as 'Potentially Significant Woodlands' based on the *Town of Perth Official Plan* (2019).

3.5.7 Vegetation Community 7: Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4)

Vegetation Community 7 was classified through ELC as a Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) (**Photo 20**). This is a large community (approximately 20 acres) that begins in the north end between the Shallow Marsh and eastern Mixed Meadow communities, outside of the updated PSW boundaries and continues southeast around the Mixed Meadow. The canopy of this community is dominated by a mix of sugar maple (*Acer saccharum*) and ironwood (*Ostrya virginiana*). The stone wall ridge noted in vegetation community 6 continues within this vegetation community and curves eastward. This community contained very little understory and sparse ground cover dominated by broad-leaved toothwort (*Cardamine diphylla*) and Canada mayflower (*Maianthemum canadense*). This community is designated as 'Potentially Significant Woodlands' based on the *Town of Perth Official Plan* (2019).

3.5.8 Vegetation Community 8: Ash Mineral Deciduous Swamp (SWD1)

Vegetation Community 8 was classified through ELC as Ash Mineral Deciduous Swamp (SWD1) (**Photo 24 and 25**). This community is located along the eastern boundary of the study area from the north end to the south east end at Perthmore Road. It is entirely within the updated PSW boundaries. The community is dominated by a mix of green ash and black ash (*Fraxinus nigra*) with surface water creating vernal pools. There is very little understory; however, there is significant ground cover consisting of herbaceous wetland plants growing from the vernal pools and outside of the pools. This vegetation community extends into adjacent lands within the PSW. This community is designated as 'Potentially Significant Woodlands' based on the *Town of Perth Official Plan* (2019).

3.5.9 Vegetation Community 9: Willow Organic Deciduous Thicket Swamp (SWTO2)

Vegetation Community 9 was classified through ELC as a Willow Organic Deciduous Thicket Swamp (SWTO2) (**Photo 29 and 30**). This community is located in large fragments in the southern end of the study area. Areas of this community type exist on the east and west side of Perthmore Road, a small portion in the southwestern end of the study area, and a large portion in the centre of the south end of the study area. These areas consist of wet soils, often with surface water dominated by Bebb's willow (*Salix bebbiana*), peachleaf willow (*Salix amygdaloides*), and red-osier dogwood (*Cornus sericea*). Ground cover consists of marsh horsetail (*Equisetum palustre*) and purple loosestrife (*Lythrum salicaria*). All of these areas are within the updated PSW boundaries.

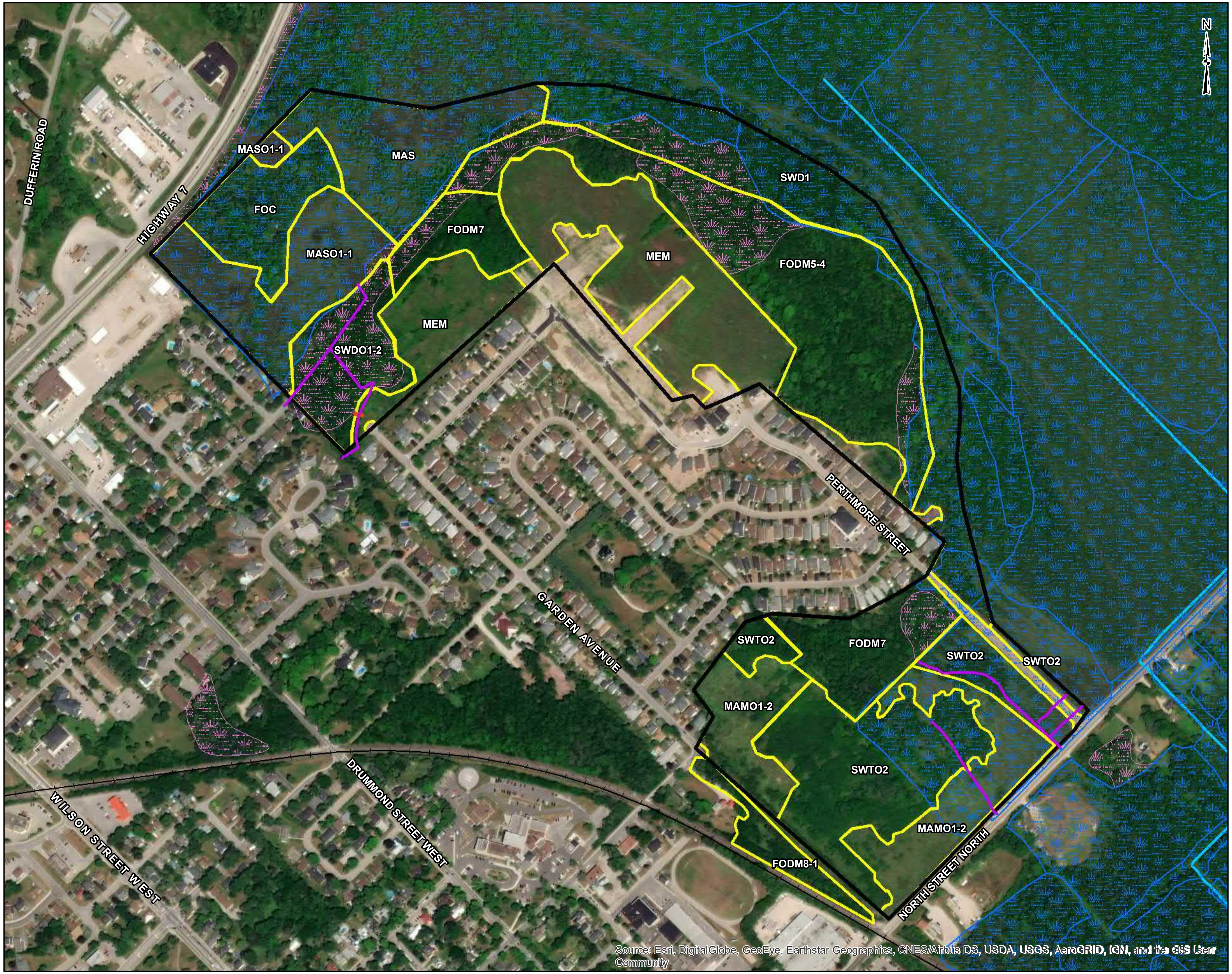
3.5.10 Vegetation Community 10: Cattail Graminoid Organic Meadow Marsh (MAMO1-2)

Vegetation Community 10 was classified through ELC as a Cattail Graminoid Organic Meadow Marsh (MAMO1-2)

(**Photo 34 and 35**). This community is located in on the east and west sides of the large Willow Organic Deciduous Thicket Swamp in the centre of the southern end of the study area. This community consists mainly of broad-leaved cattails, but also contains significant amounts of reed canary grass (*Phalaris arundinacea*). Sparse common buckthorn is also present. The soil in these communities are wet and often have surface water.

3.5.11 Vegetation Community 11: Fresh-Moist Poplar Deciduous Forest (FODM8-1)

Vegetation Community 11 was classified through ELC as a Fresh-Moist Poplar Deciduous Forest (FODM8-1) (**Photo 37**). This community is on the west end of a pathway between North Street and Garden Avenue, adjacent to the south end of the study area. This community is dominated by trembling aspen (*Populus tremuloides*) and balsam poplar (*Populus balsamifera*) as well as a mix of other deciduous tree species. A thick understory is present consisting of common buckthorn, Tatarian honeysuckle (*Lonicera tatarica*), and shrub willows. Refer to **Table 2** for a complete listing of species observed within the study area.



LEGEND

- Perthmore Boundary
- Beaver Dam
- Ditch
- Watercourse
- PSW Wetland
- Wetland_NotEvaluated
- Vegetation Community

FOC	Coniferous Forest
FODM5-4	Dry-Fresh Sugar Maple-Ironwood Deciduous Forest Type
FODM7	Fresh - Moist Lowland Deciduous Forest Ecosite
FODM8-1	Fresh - Moist Poplar Deciduous Forest Type
MAMO1-2	Cattail Graminoid Organic Meadow Marsh Type
MAS	Shallow Marsh
MASO1-1	Cattail Organic Shallow Marsh Type
MEM	Mixed Meadow
SWD1	Ash Mineral Deciduous Swamp Ecosite
SWDO1-2	Green Ash Organic Deciduous Swamp Type
SWTO2	Willow Organic Deciduous Thicket Swamp Ecosite

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2019.

0 62.5 125 250
Scale 1:5,000 Metres

CLIENT: PERTHMORE SUBDIVISION

PROJECT: EIS

TITLE: VEGETATION COMMUNITIES

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO: PP-13-9668		FIGURE:
Date	Nov., 19, 2019	4
GIS	SK	
Checked By	EP	

Table 2: Vegetation Species observed within the Study Area			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Tree Species			
American beech	*Faugus grandifolia*	green ash	*Fraxinus pennsylvanica*
balsam fir	*Abies balsamea*	ironwood	*Ostrya virginiana*
balsam poplar	*Populus balsamifera*	largetooth aspen	*Populus grandidentata*
basswood	*Tilia americana*	Manitoba maple	*Acer negundo*
black ash	*Fraxinus nigra*	paper birch	*Betula papyrifera*
black cherry	*Prunus serotine*	red maple	*Acer rubrum*
black spruce	*Picea mariana*	silver maple	*Acer saccharinum*
black walnut	*Juglans nigra*	sugar maple	*Acer saccharum*
bur oak	*Quercus macrocarpa*	trembling aspen	*Populus tremuloides*
Butternut	*Juglans cinereal*	white elm	*Ulmus americana*
eastern white pine	*Pinus strobus*	white spruce	*Picea glauca*
eastern white cedar	*Thuja occcidentalis*	white willow	*Salix alba*
European white poplar	*Populus alba*		
Shrub Species			
Bebb's willow	*Salix bebbiana*	high-bush cranberry	*Viburnum trilobum*
black currant	*Ribes nigrum*	nannyberry	*Viburnum lentago*
black elderberry	*Sambucus canadensis*	narrow-leaved meadowsweet	*Spiraea alba*
bunchberry	*Cornus canadensis*	peach-leaved willow	*Salix amygdaloides*
choke cherry	*Prunus virginiana*	red-osier dogwood	*Cornus sericea*
common barberry	*Berberis vulgaris*	riverbank grape	*Vitis riparia*
common blackberry	*Rubus allegheniensis*	shrub willow	*Salix* spp.
common buckthorn	*Rhamnus cathartica*	speckled alder	*Alnus incana*
common prickly-ash	*Zanthoxylum americanum*	Tatarian honeysuckle	*Lonicera tatarica*
fragrant sumac	*Rhus aromatica*	Virginia creeper	*Parthenocissus quinquefolia*
glossy buckthorn	*Frangula alnus*	western poison-ivy	*Toxicodendron rydbergii*
hawthorn	*Crataegus* spp.	wild red raspberry	*Rubus strigosus*
Herbaceous Species			

Table 2: Vegetation Species observed within the Study Area			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
bittersweet nightshade	*Solanum dulcamara*	naked bishop's-cap	*Mitella nuda*
bladder campion	*Silene vulgaris*	northern dewberry	*Rubus flagellaris*
bladder sedge	*Carex intumescens*	oak fern	*Gymnocarpium* spp.
Blue-stem goldenrod	*Solidago caesia*	one-sided shinleaf	*Orthilila secunda*
bracken fern	*Pteridium aquilinum*	orange hawkweed	*Pilosella aurantiaca*
broad-leaved cattail	*Typha latifolia*	orchard grass	*Dactylis* spp.
bull thistle	*Cirsium vulgare*	ostrich fern	*Matteuccia struthiopteris*
butter-and-eggs	*Linaria vulgaris*	ox-eye daisy	*Leucanthemum vulgare*
Canada anemone	*Anemone canadensis*	Pennsylvania sedge	*Carex pensylvanica*
Canada lettuce	*Lactuca canadensis*	phragmites	*Phragmites australis australis*
Canada mayflower	*Maianthemum canadense*	purple loosestrife	*Lythrum salicaria*
coltsfoot	*Tussilago farfara*	red baneberry	*Actaea rubra*
common burdock	*Arctium minus*	red clover	*Trifolium pratense*
common dandelion	*Taraxacum officinale*	reed canary grass	*Phalaris arundinacea*
common evening-primrose	*Oenothera biennis*	rough cinquefoil	*Potentilla norvegica*
common helleborine	*Epipactis helleborine*	rough horsetail	*Equisetum hyemale*
common milkweed	*Asclepias syriaca*	sensitive fern	*Onoclea sensibilis*
common yarrow	*Achillea millefolium*	skunk-cabbage	*Symplocarpus foetidus*
cow vetch	*Vicia cracca*	spinulose woodfern	*Dryopteris carthusiana*
curled dock	*Rumex crispus*	spotted jewelweed	*Impatiens capensis*
Dame's-rocket	*Hesperis matronalis*	spotted Joe-pye-weed	*Eutrochium maculatum*
dwarf raspberry	*Rubus pubescens*	spreading dogbane	*Apocynum androsaemifolium*
early meadow-rue	*Thalictrum dioicum*	stinging nettle	*Urtica dioica*
enchanter's nightshade	*Circaea lutetiana*	tall buttercup	*Ranunculus acris*
false Solomon's-seal	*Maianthemum racemosum*	Timothy grass	*Phleum pretense*
field forget-me-not	*Myosotis arvensis*	trout-lily	*Erythronium americanum*
field horsetail	*Equisetum arvense*	two-leaved toothwort	*Cardamine dyphilla*
field pennycress	*Thlaspi arvense*	viper's bugloss	*Echium vulgare*

Table 2: Vegetation Species observed within the Study Area			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
garlic mustard	*Allaria petiolate*	watercress	*Nasturtium officinale*
goat's-beard	*Tragopogon dubius*	white avens	*Geum canadense*
goldenrod	*Solidago* spp.	white baneberry	*Actaea pachypoda*
ground-ivy	*Glechoma hederacea*	whorled chickweed	*Mollugo verticillate*
herb-Robert	*Geranium robertianum*	wild parsnip	*Pastinaca sativa*
Jack-in-the-pulpit	*Tussilago farfara*	wild strawberry	*Fragaria virginiana*
king-devil	*Pilosella caespitosa*	woolly blue violet	*Viola sororia*
lily-of-the-valley	*Conallaria majalis*	wormseed mustard	*Erysimum cheiranthoides*
marsh horsetail	*Equisetum pratense*	yellow violet	*Viola pubescens*
marsh marigold	*Caltha palustris*		

3.6 Habitat for Species at Risk & Significant Wildlife Habitat

Background information obtained from the sources listed in Section 2.0 of this report, indicated that SAR and their habitat were potentially present within the study area. These species have been listed in **Table 3**. Based on habitat observed during the field investigations and direct observation of SAR, a determination was made as to whether these species had the potential to be or were present within the study area (**Table 3**).

Table 3: Species at Risk Potentially or Confirmed to be Present within the Study Area

*Common Name	Scientific Name	Provincial Status (ESA, 2007)	Federal Status (SARA Schedule 1)	Potential/Unconfirmed or Confirmed Habitat Present within Property Boundaries
Plants				
Butternut[5]	*Juglans cinerea*	Endangered	Endangered	Confirmed present in the study area
Insects				
Monarch[5]	*Danaus plexippus*	Special Concern	Special Concern	No habitat
Amphibians				
Western Chorus Frog[2]	*Pseudacris triseriata*	No Status	Threatened	Potential/Unconfirmed
Turtles				
Blanding's Turtle[2, 5]	*Emydoidea blandingii*	Threatened	Threatened	Potential/Unconfirmed
Common Snapping Turtle[2, 5]	*Chelydra serpentina*	Special Concern	Special Concern	Potential/Unconfirmed
Eastern Musk Turtle[2, 5]	*Sternotherus odoratus*	Special Concern	Special Concern	No habitat
Snakes and Lizards				
Eastern Milksnake[2, 5]	*Lampropeltis triangulum triangulum*	No Status	Special Concern	Potential/Unconfirmed
Eastern Ribbonsnake[2, 5]	*Thamnophis sauritus sauritus*	Special Concern	Threatened	Potential/Unconfirmed
Gray Ratsnake[2]	*Pantherophis spiloides*	Endangered	Threatened	No habitat
Birds				
Barn Swallow[3, 4]	*Hirundo rustica*	Threatened	Threatened	No habitat
Black Tern[5]	*Chlidonias niger*	Special Concern	N/A	No habitat
Bobolink[3, 5]	*Dolichonyx*	Threatened	Threatened	Marginal habitat only

Table 3: Species at Risk Potentially or Confirmed to be Present within the Study Area				
***Common Name**	**Scientific Name**	**Provincial Status (ESA, 2007)**	**Federal Status (SARA Schedule 1)**	**Potential/Unconfirmed or Confirmed Habitat Present within Property Boundaries**
	oryzivorus			
Canada Warbler[5]	*Cardellina Canadensis*	Special Concern	Threatened	No habitat
Chimney Swift[3, 5]	*Chaetura pelagica*	Threatened	Threatened	No habitat
Common Nighthawk[3, 5]	*Chordeiles minor*	Special Concern	Threatened	No habitat
Eastern Meadowlark[3, 5]	*Sturnella magna*	Threatened	Threatened	Marginal habitat only
Eastern Whip-poor-will[5]	*Antrostomus vociferous*	Threatened	Threatened	No habitat
Eastern Wood-pewee[3, 5]	*Contopus virens*	Special Concern	Special Concern	Confirmed present within the study area
Evening Grosbeak[5]	*Coccothraustes vespertinus*	Special Concern	No Status	No habitat
Golden-winged Warbler[5]	*Vermivora chrysoptera*	Special Concern	Threatened	No habitat
Grasshopper Sparrow[3, 5]	*Ammodramus savannarum*	Special Concern	Special Concern	Marginal habitat only
Least Bittern[5]	*Ixobrychus exilis*	Threatened	Threatened	Potential/Unconfirmed
Rusty Blackbird[5]	*Euphagus carolinus*	Special Concern	Special Concern	No habitat
Short-eared Owl[5]	*Asio flammeus*	Special Concern	Special Concern	No habitat
Wood Thrush[3]	*Hylocichla mustelina*	Special Concern	Threatened	Confirmed present within the study area
Mammals				
Eastern Small-footed Myotis[5]	*Myotis leibii*	Endangered	N/A	No habitat
Little Brown Myotis[5]	*Myotis lucifugus*	Endangered	Endangered	No habitat
Northern Myotis[5]	*Myotis septentrionalis*	Endangered	Endangered	No habitat
Tri-coloured Bat[5]	*Perimyotis subflavus*	Endangered	Endangered	No habitat

*This table was assembled from various sources of background information. The following information sources were consulted to compile background information: 1 – LIO geodatabase (MNDMNRF, 2019b); 2 – Ontario Reptile and Amphibian Atlas (Ontario Nature, 2019); 3 – Atlas of the Breeding Birds of Ontario (Bird Studies Canada et al., 2006); 4 – NHIC data (MNDMNRF, 2019a); 5 – General range

Of the SAR identified by background information as potentially present within the vicinity of the study area, habitat observed during the field investigation within the study area does not appear to be suitable for the life processes of the following SAR: Monarch, Western Chorus Frog, Eastern Musk Turtle, Gray Ratsnake, Barn Swallow, Black Tern, Bobolink, Canada Warbler, Chimney Swift, Common Nighthawk, Eastern Meadowlark, Eastern Whip-poor-will, Evening Grosbeak, Golden-winged Warbler, Grasshopper Sparrow, Rusty Blackbird, Short-eared Owl, Eastern Small-footed Myotis, Little Brown Myotis, Northern, and Tri-colored Bat. In addition, although habitat was observed to be suitable for the Eastern Milksnake and Eastern Ribbonsnake, these species were not observed to be present within the study area, or within 50 m of the study area. These species utilize a variety of habitats and are not likely to rely directly on the study area for significant life processes.

An Eastern Meadowlark was heard calling in an agitated behaviour within the Mixed Meadow (MEM) in the centre of the study area during the June 8, 2019 field investigation. Subsequent targeted surveys were conducted during appropriate times of day and during the breeding period to determine if this species was utilizing the Mixed Meadow for breeding habitat. No other observation of this species or other grassland SAR birds were recorded during the field investigations. The individual Eastern Meadowlark observed on June 8, 2019 was likely in the process of searching for appropriate breeding habitat within the study area and vacated the area without establishing territory. It was determined that no suitable habitat for grassland SAR birds is present within or adjacent to the study area.

Areas of the Ash Mineral Deciduous Swamp (SWD1) provide potential habitat for Western Chorus Frog where there are seasonal standing pools of water. Although targeted surveys were not completed for this species, no observation or calls were recorded of this species during any field investigation.

Suitable habitat for the following species was deemed to be potentially present within the study area, during the 2019 field investigations: Butternut, Common Snapping Turtle, Blanding's Turtle, Least Bittern, Wood Thrush and Eastern Wood-pewee.

The Butternut is listed as 'Endangered' under the *Endangered Species Act* (2007) (ESA) and the *Species at Risk Act* (2002) (SARA). Habitat for this species and individuals of this species are afforded protection. Habitat is available within the study area due to the wide range of habitat preferences for Butternuts in which to grow. Butternuts are shade intolerant and prefer open areas but often become crowded out by other pioneer species (i.e. regenerating areas). Two (2) Butternuts were identified and located within the study area (however outside of the area to be disturbed for Phase 6) during the June 8, 2019 field investigation. Both individuals were mature trees (**Photos 15 and 23**). One of the Butternuts was identified within the Coniferous Forest (FOC) in the northwest end of the study area and the other was identified within the Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) in the north end of the study area. No new butternut were observed during the 2022 field review. Under the ESA, individuals must be assessed by a qualified Butternut Health Inspector to determine the general health and viability of the individual to resist the butternut canker (*Sirococcus clavigignenti-juglandacearum*) and produce immune offspring.

Suitable habitat for Common Snapping Turtle and Blanding's Turtle is available in the study area within the PSW. The Common Snapping Turtle is listed as 'Special Concern' under the ESA and SARA and does not receive habitat protection. The Blanding's Turtle is listed as 'Threatened' under the ESA and SARA and receives habitat protection.

Several of the vegetation communities in the study area as parts of the PSW (i.e. MASO1-1, MAS, SWTO2, SWD1, and MAMO1-2) provide suitable foraging and migration habitat for these species. No distinct areas of open water marsh with depth were noted during the field reviews as suitable overwintering habitat. Potential nesting habitat for these species was observed within the study area in the form of gravel road shoulders along Perthmore Road as well as adjacent to the study area on North Street and Dufferin Street. However, no nests, evidence of nesting, or individual Common Snapping Turtles or Blanding's Turtles were observed during the 2019 field investigations. No records of Blanding's Turtles were found within 2 km of the study area.

Potential breeding habitat for the Least Bittern is also available in the open wetland areas of the PSW within the study area which contain narrow leaved emergent herbaceous vegetation (MAS and MASO1-1). This species is listed as 'Threatened' under the ESA and SARA and receives habitat protection. This species was not observed or heard calling during any of the field investigations. Targeted studies in Long Swamp in 2020 for Least Bittern along Highway 7 did not yield any sightings. No records were found of this species breeding within or adjacent to the study area.

The Eastern Wood-pewee is listed as 'Special Concern' under the ESA and SARA. The Wood Thrush is listed as 'Special Concern' under the ESA and 'Threatened' under the SARA. The habitat for these species is not afforded protection under the ESA or SARA. However, individuals of these species, their eggs, nest and fledglings are protected under the *Migratory Birds Convention Act* (1994) (MBCA). The Eastern Wood-pewee is a habitat generalist which will utilize a variety of habitats for nesting and foraging, however it prefers edge habitat near water. The Wood Thrush breeds in deciduous and mixed forests containing ironwood and oaks where the trees are over 15 m tall with a moderate understory and open floor consisting of moist soils, decaying leaf litter, and water nearby. During the June 8 and June 22, 2019 field investigations, an Eastern Wood-pewee and Wood Thrush were observed within the Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) vegetation community in the centre of the study area. The individuals were displaying territorial behaviour (singing males) within suitable habitat during the breeding season of these species. Suitable habitat for these species is present within the Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) vegetation community of the study area.

3.7 Wildlife

The study area is in the Smiths Falls Ecodistrict (6E-11) of the Lake Simcoe-Rideau Ecoregion (6E) within the Mixedwood Plains Ecozone (Ecological Stratification Working Group, 1996). Characteristic wildlife present within this Ecoregion include: northern raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), white-tailed deer (*Odocoileus virginianus*), groundhog (*Marmota monax*), waterfowl, turtles, snakes, and various bird species (Crins, et al., 2009).

The following section outlines the existing wildlife observations from the field investigations conducted within the study area. **Table 4** lists the species observed during the 2019 field investigations. Habitat present within the study area represented appropriate breeding/nesting/foraging habitat for all wildlife species observed with the exception of the Canada Goose (*Branta canadensis*) and Ring-billed Gull (*Larus delawarensis*).

Table 4: Wildlife Species Observed within the Study Area			
Common Name	**Scientific Name**	**Resident/Seasonally**	**Evidence**
Snakes & Lizards			
Eastern Gartersnake	*Thamnophis sirtalis sirtalis*	Resident	Visual observation
Birds			
Alder Flycatcher	*Empidonax alnorum*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
American Bittern	*Botaurus lentiginosus*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
American Crow	*Corvus brachyrhynchos*	Resident	Visual observation, within appropriate breeding habitat, during appropriate breeding season
American Goldfinch	*Spinus tristis*	Seasonally	Visual observation, within appropriate breeding habitat, during appropriate breeding season
American Robin	*Turdus migratorius*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Baltimore Oriole	*Icterus galbula*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Black-and-white Warbler	*Mniotilta varia*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Black-billed Cuckoo	*Coccyzus erythropthalmus*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Black-capped Chickadee	*Poecile atricapilla*	Resident	Visual observation, within appropriate breeding habitat, during appropriate breeding season
Black-throated Green Warbler	*Setophaga virens*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Blue Jay	*Cyanocitta cristata*	Resident	Visual observation, within appropriate breeding habitat, during appropriate breeding season

Table 4: Wildlife Species Observed within the Study Area			
Common Name	**Scientific Name**	**Resident/Seasonally**	**Evidence**
Canada Goose	*Branta canadensis*	Seasonally	Flyover
Chestnut-sided Warbler	*Setophaga pensylvanica*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Chipping Sparrow	*Spizella passerine*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Common Grackle	*Quiscalus quiscula*	Seasonally	Visual observation, within appropriate breeding habitat, during appropriate breeding season
Common Yellowthroat	*Geothlypis trichas*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Downy Woodpecker	*Dryobates pubescens*	Resident	Visual observation, within appropriate breeding habitat, during appropriate breeding season
Eastern Meadowlark	*Sturnella magna*	Seasonally	Agitated calls/behaviour of an adult
Eastern Phoebe	*Sayornis phoebe*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Eastern Towhee	*Pipilo erythrophthalmus*	Seasonally	Visual observation, within appropriate breeding habitat, during appropriate breeding season
Eastern Wood-pewee	*Contopus virens*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
European Starling	*Sturnus vulgaris*	Resident	Visual observation, within appropriate breeding habitat, during appropriate breeding season
Great Crested Flycatcher	*Myiarchus crinitus*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Mourning Dove	*Zenaida macroura*	Resident	Singing male, within appropriate breeding habitat, during appropriate breeding season
Northern Cardinal	*Cardinalis cardinalis*	Resident	Singing male, within appropriate breeding habitat, during appropriate breeding season

Table 4: Wildlife Species Observed within the Study Area			
Common Name	**Scientific Name**	**Resident/Seasonally**	**Evidence**
Northern Flicker	*Colaptes auratus*	Resident	Visual observation, within appropriate breeding habitat, during appropriate breeding season
Pileated Woodpecker	*Dryocopus pileatus*	Resident	Nest holes observed
Purple Finch	*Haemorhous purpureus*	Resident	Singing male, within appropriate breeding habitat, during appropriate breeding season
Red-eyed Vireo	*Vireo olivaceus*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Red-winged Blackbird	*Agelaius phoeniceus*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Ring-billed Gull	*Larus delawarensis*	Resident	Flyover
Rock Pigeon	*Columba livia*	Resident	Visual observation, within appropriate breeding habitat, during appropriate breeding season
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Savannah Sparrow	*Passerculus sandwichensis*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Song Sparrow	*Melospiza melodia*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Sora	*Porzana Carolina*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Swainson's Thrush	*Catharus ustulatus*	Seasonally	Visual observation, within appropriate breeding habitat, during appropriate breeding season
Swamp Sparrow	*Melospiza georgiana*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Tree Swallow	*Tachycineta bicolor*	Seasonally	Visual observation, within appropriate breeding habitat, during appropriate breeding season

Table 4: Wildlife Species Observed within the Study Area			
Common Name	**Scientific Name**	**Resident/Seasonally**	**Evidence**
Veery	*Catharus fuscescens*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Warbling Vireo	*Vireo gilvus*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
White-breasted Nuthatch	*Sitta carolinensis*	Resident	Singing male, within appropriate breeding habitat, during appropriate breeding season
Wild Turkey	*Meleagris gallopavo*	Resident	Visual observation, within appropriate breeding habitat, during appropriate breeding season
Wilson’s Snipe	*Gallinago gallinago*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Winter Wren	*Troglodytes hiemalis*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Wood Thrush	*Hylocichla mustelina*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Yellow Warbler	*Setophaga petechia*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Seasonally	Singing male, within appropriate breeding habitat, during appropriate breeding season
Mammals			
eastern chipmunk	*Tamias striatus*	Resident	Visual observation
eastern cottontail	*Sylvilagus floridanus*	Resident	Visual observation, scat observed
eastern gray squirrel	*Sciurus carolinensis*	Resident	Visual observation
groundhog	*Marmota monax*	Resident	Dens
North American beaver	*Castor canadensis*	Resident	Chewed branches observed, small beaver dam in ditch line
red squirrel	*Tamiasciurus hudsonicus*	Resident	Visual observation
white-tailed deer	*Odocoileus virginianus*	Resident	Tracks

For those observations of male birds singing and visual observations of males, within appropriate breeding habitat, during the appropriate breeding season, this quality of breeding evidence represents "possible breeder," under the Ontario Breeding Bird Atlas' *Breeding Evidence Codes* (Bird Studies Canada, 2019). The Alder Flycatcher, American Bittern, American Goldfinch, American Robin, Baltimore Oriole, Black-and-white Warbler, Black-billed Cuckoo, Black-capped Chickadee, Black-throated Green Warbler, Canada Goose, Chestnut-sided Warbler, Chipping Sparrow, Common Yellowthroat, Downy Woodpecker, Eastern Meadowlark, Eastern Phoebe, Eastern Towhee, Eastern Wood-pewee, Great Crested Flycatcher, Mourning Dove, Northern Cardinal, Northern Flicker, Purple Finch, Red-eyed Vireo, Ring-billed Gull, Rose-breasted Grosbeak, Savannah Sparrow, Song Sparrow, Sora, Swainson's Thrush, Swamp Sparrow, Tree Swallow, Veery, Warbling Vireo, White-breasted Nuthatch, Wilson's Snipe, Winter Wren, Wood Thrush, Yellow Warbler, Yellow-bellied Sapsucker, their nests, and eggs are protected under the MBCA. The Canada Goose and Ring-billed Gull were observed as flyovers and are not considered to be resident breeders within the study area. The Blue Jay and Wild Turkey are afforded protection under the *Fish and Wildlife Conservation Act* (1997) (FWCA). The American Crow, Common Grackle, European Starling, Red-winged Blackbird, and Rock Pigeon are not afforded protection under the MBCA or FWCA. Two (2) Common Grackle nests were observed within compost piles located in the western end of the mixed meadow (MEM) in the northern end of the study area during the May 24, 2019 field investigation. One nest contained five (5) unhatched eggs. The other nest contained a fledgling mortality.

A review of NHIC data identified a deer yard present within the Perth Long Swamp PSW (Town of Perth, 2017) not on the subject property. White-tailed deer tracks were observed throughout the study area during the field investigations.

4.0 DESCRIPTION OF THE PROPOSED PROJECT

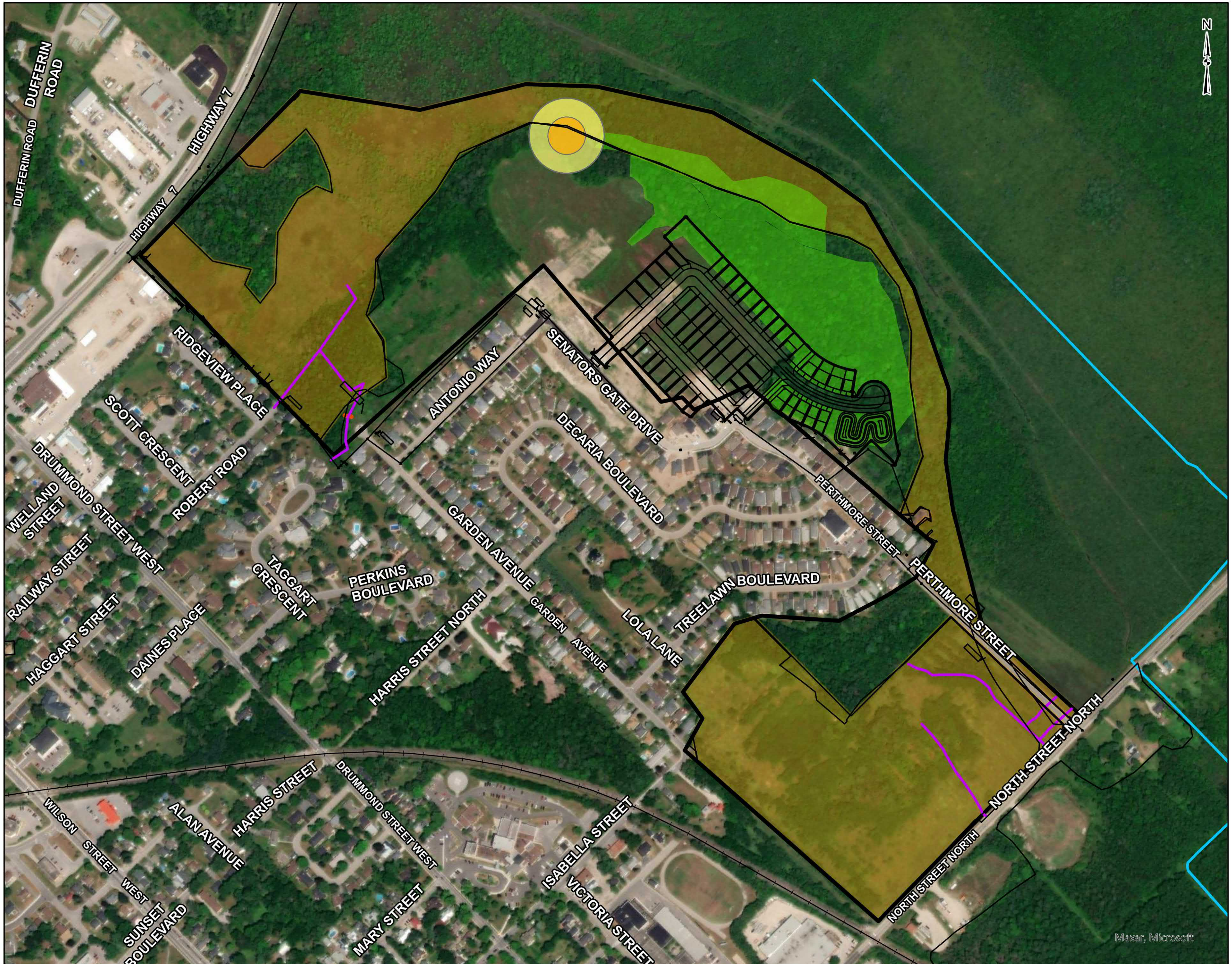
The Phase 6 development within the study area is subject to a Draft Plan of Subdivision application. The proposed work for Phase 6 includes:

- Clearing of the majority of the subdivision area;
- Construction of residential roads within the cleared area, and
- Development within the cleared area.

Refer to **Figure 5** for the Draft Plan of Subdivision for the proposed development area. The development will include clearing most of the vegetation within the Phase 6 limits as seen on Figure 5 with the exception of retention of the majority of forested habitat at the rear of lots 34-48. This will occur adjacent to a 30 m buffer around the PSW. Residential roads will be constructed within the area to be cleared which will serve as access to potential development of single-detached dwellings and semi-detached dwellings.

The proposed project also includes a number of mitigation measures detailed within Section 6.0 herein, including but not limited to:

- Vegetation planting within the 30 m wetland buffer and associated with the stormwater pond habitat;
- Retention of trees at the rear of lots 34-48 including protection measures during construction; and
- Educational materials for residents outlining the natural heritage features and the importance of conservation



LEGEND

- Perthmore Boundary
- Beaver Dam
- Ditch
- Watercourse
- McIntosh Perry Updated PSW Boundary within Study Area Limits
- Significant Wildlife Habitat
- 25 m Butternut Buffer
- 50m Butternut Buffer

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2023.

0 62.5 125 250
Scale 1:5,000 Metres

CLIENT: PERTHMORE SUBDIVISION

PROJECT: EIS

TITLE: WETLAND RECLASSIFICATION MAPPING

McINTOSH PERRY	PROJECT NO: PP-13-9668		FIGURE:
115 Walgreen Road, RR3, Carp, ON K0A1L0 Tel: 613-836-2184 Fax: 613-836-3742 www.mcintoshperry.com	Date	Jun., 22, 2023	5
	GIS	MG	
	Checked By	JK	

5.0 IMPACT ASSESSMENT

The following sections outline and assess any potential impacts that are expected as a result of the proposed development. Recommendations for mitigation measures to avoid these impacts are outlined in Section 6.0 of this report.

5.1 Natural Heritage System Components, Landforms, Soils, and Geology

The proposed work of Phase 6 will include clearing and development of the Mixed Meadow (MEM) in the center of the study area. No significant landforms, soils or geology are present or adjacent to this area. The FODM5-4, SWD1, and FOC vegetation communities (Figure 4) are considered to be 'Potentially Significant Woodlands' according to the *Town of Perth Official Plan* (Town of Perth, 2017). The proposed project is anticipated to remove approximately 1 hectare of FODM5-4 which is a Dry-fresh Sugar Maple, Ironwood Deciduous Forest.

'Significant Wildlife Habitat' was identified within the Perth Long Swamp PSW and potentially in FODM5-4 based on the presence of species of special concern observed during field reviews. No valleylands were identified within the study area.

Official Plan section 8.6.4(e) addresses Significant Woodlands and Potentially Significant Woodlands, and generally establishes that an EIS is required before development can proceed within/adjacent to these areas. Official Plan policy 8.6.4(e)(3) reads as follows:

> *Where a potentially Significant Woodland feature corresponds to an area within the Environmental Protection designation on Schedule 'A' of this Plan then development or site alteration shall not be permitted unless an EIS is completed and demonstrates either that the identified feature is not a significant woodland or, where a Woodland is confirmed as significant, there will be no negative impacts to natural features or their ecological functions.*

Only small portions of the stormwater management block are designated Environmental Protection on Schedule 'A' of the Official Plan, and this EIS is provided to address impact to natural features and their ecological functions.

5.2 Surface Water, Groundwater, Wetlands, and Fish Habitat

5.2.1 Wetlands

A significant portion of the study area (approximately 52 %) is comprised of the Perth Long Swamp PSW. The boundaries of this PSW were reclassified due to outdated modelling of the wetland boundaries. Approximately 0.61 ha of the previous boundary was removed from the study area. Approximately 9.28 ha were added to the study area. Most of the expansion occurred in the southeast end of the study area (**Figure 3**). Due to the presence of a PSW within the study area, a 30 m setback from the boundaries of the PSW is proposed to be established in which no clearing or development are to take place (see **Figure 5**). This setback was chosen based on recommendations in the Natural Heritage Reference Manual (MNRF, 2010) as well as observations during the field investigation in which non-sensitive vegetation communities and habitats were recorded adjacent to the PSW. It is anticipated that the 30 m forested buffer will remove a large amount of potential nutrient run-off. A stormwater pond is proposed and surface water will be directed to this pond which will significantly reduce the risk of sedimentation to the wetland. Based on a review of the hydrological impacts that the subdivision will have it is understood that peak flows will not change as a result of the subdivision. Due to the development of the currently vacant lands, wetland volumes have the potential to increase up to 0.4 mm if flows are uncontrolled. Mitigation measures within the subdivision plan will reduce this and there will be no impacts to the Perth Long Swamp.

Although the PSW does provide valuable wildlife function, it is not anticipated that any species at risk critical habitat is found adjacent to the subdivision area. No significant natural areas such as waterfowl staging areas or significant amphibian breeding ponds are found immediately adjacent the subdivision. The wetland itself is likely to provide function for SAR and breeding amphibians and will continue to provide this function. Breeding bird surveys were completed and there were no waterfowl nesting areas noted. Based on personal experience the wetland is likely to provide wintering habitat for wildlife species such as the Bobcat, however this function should not be affected by the proposed works.

The proposed vegetation clearing and Phase 6 development will occur in all of the upland areas including MEM, FODM5-4 and FODM7 vegetation communities. Based on Google Earth satellite imagery (Maxar Technologies, 2019), the MEM community was cleared prior to 2005 and regenerated with meadow conditions. Ecological functions of this area are limited due to the disturbance and cultural impacts of previous clearing. The adjacent woodlands (FODM5-4, FODM7) are at a higher elevation than the Mixed Meadow to the southwest and the deciduous swamp (SWD1) (as part of the PSW) to the northeast. No negative impacts to the PSW are anticipated as part of the clearing and development of the scheduled Phase 6 development plan. A stormwater management pond (proposed Block 55) will be incorporated as part of the subdivision and is proposed outside of the 30 m setback. As such, removal/alteration of these habitats will include upland habitat/vegetation removal a minimum of 30 m from the PSW. Drainage is proposed to be directed towards the Stormwater Management pond, following which it will outlet in a controlled manner farther southeast. As discussed above changes of hydrology within the wetland are not expected.

As such, it is recommended that no future lot-lines should extend within 30 m of the PSW on the property to prevent impacts to the wetland. At this location no vegetation removal should occur within the full 30 m buffer and where vegetation is currently disturbed and a planting plan should be prepared to provide appropriate protection and improvement to habitat. An exception to disturbance in this area could include a modest recreational pathway.

Per Section 8.6.4(b)(2) of the Town of Perth Official Plan, "Development and site alteration shall not be permitted in the Perth Long Swamp, the Blue Berry Creek Wetland, and the Grant's Creek Wetland. Development and site alteration shall not be permitted on adjacent lands to these significant wetlands unless it has been demonstrated, through the preparation of an Environmental Impact Study (EIS) as required in Section 8.5.4 e. EIS of this Plan, that there will be no negative impacts on the natural features or on the ecological functions for which a specific wetland area is identified. This shall include impacts on the wildlife habitat which exists in these wetlands."

As written in Section 5.1 above, this EIS is provided to address impact to natural features and their ecological functions.

Considering the existing landscape, the development of Phase 6 of this subdivision meets the no development within a provincially significant wetland requirements of the Perth OP and provincial documents. It can be determined that there would be no significant impacts to the PSW based on the current plan provided a 30 m buffer is maintained and where a buffer does not exist one is planted.

In the northern portion of the property, there is commonly a 30 m or less treed buffer between the wetland and the open MEM habitat. Retention of this forested portion and enhancing it along this northern portion of the lands within 30 m would provide a sufficient buffer and would be a positive impact to the Long Swamp PSW at this location.

5.2.2 Fish Habitat

The tributaries associated with the southeast end of the study area provide suitable spawning habitat for sport fish (i.e. Northern Pike) and baitfish. These habitats are seasonal as the water conditions fluctuate. The tributaries are within the PSW in the study. The proposed development is situated more than 30 m from the tributaries. It is not anticipated that the proposed development will have impacts on fish or fish habitat.

5.3 Vegetation Cover

5.3.1 Vegetation Communities

Vegetation removal is proposed to occur for a portion of Phase 6 of the study area. The MEM vegetation community will be fully cleared where previous clearing has occurred (prior to 2005) and regeneration of pioneer graminoid species (i.e. grass) and non-native herbaceous species typical of roadsides (i.e. cow vetch, red clover, etc.) have established. Portions of the Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) are anticipated to be impacted by vegetation clearing and subsequent development of the property. FODM7 is not expected to be significantly impacted at this time by clearing activities. Approximately 1 hectare of forested community is anticipated for removal as part of Phase 6. Due to the historical disturbance of the Mixed Meadow and the low diversity of native plants, it is not anticipated that significant negative impacts will occur to vegetation within this community. As mentioned above approximately 1 hectare of Community FODM5-4 is anticipated to be removed as a result of the proposed Phase 6 works. This removal is anticipated to be primarily edge habitat. A parkland block is included in the plans for Phase 6 and it has been assumed that this area will remain as wildlife habitat.

Given the location of the development, in close proximity to the Perth Long Swamp, educational signage is recommended as a feature within the park to educate the public about the significant habitats within and adjacent to the Town of Perth and their importance to the ecosystem.

Vegetation communities of this type are not rare within the landscape in Lanark County and it is not anticipated that the removal of this vegetation will impact this type of vegetation community in the broader landscape. It is proposed to off-set the loss of vegetation by planting within any under-vegetated areas within the proposed 30m-buffer adjacent to the Perth Long Swamp and within non-functional areas of the Stormwater Pond block as wildlife habitat where access is not required. Enhancing the wetland buffers and creating habitat associated with the stormwater pond is expected to off-set the loss of primarily fringe habitat proposed for removal.

5.3.2 SAR Vegetation

Two (2) Butternut trees were identified within the Coniferous Forest (FOC) and Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) of the PSW in the study area. The *Butternut Recovery Strategy* (MNRF, 2013) recommends a 25 m buffer around 'retainable' trees do avoid damage to root zones and prevent shading due to the species' intolerance to shade. An additional 25 m buffer is also recommended to preserve habitat around any 'retainable' for potential establishment of seedlings (**Figure 2**). At least 30 days prior to any vegetation clearing, these individuals must be assessed by a qualified Butternut Health Assessor into Categories 1, 2 or 3 as part of the requirements under Section 23.7 of Ontario Regulation (O. Reg.) 242/08 – *General* of the ESA. One of the butternuts has been assessed, however depending on the potential impact date, the tree and area should be cleared again if it is more than 3 years from the original assessment/area review. The following are definitions of the Butternut Categories during a health assessment under O. Reg. 242/08:

- Category 1 tree – "*the butternut tree is affected by butternut canker to such an advanced degree that retaining the tree would not support the protection or recovery of butternut trees in the area in which the tree is located*";
- Category 2 tree – "*the butternut is not affected by butternut canker, or the butternut tree is affected by butternut canker, but the degree to which it is affected is not too advanced and retaining the tree could support the protection or recovery of butternut trees in the area in which the tree is located*", and
- Category 3 tree – "the butternut tree may be useful in determining sources of resistance to butternut canker".

A *Butternut Health Assessment Report* (**Appendix C**) was prepared by a qualified Butternut Health Assessor (BHA) which assessed the conditions of the Butternut tree found in the Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) in the east end of the study area. The tree was deemed as Category 2 (retainable). The assessment was conducted on June 22, 2019 and the report was submitted to the MECP on August 30, 2019. As of the timing of this EIS, the mandatory 30-day period has finished. Development adjacent to the assessed Butternut should occur outside of the 50 m buffer around the individual. It is not anticipated that impacts will occur to the Butternut present within the study area due to the limits of the proposed development.

The Butternut tree in the Coniferous Forest (FOC) in the west end of the study area has not been assessed as of the timing of this EIS. No other at-risk vegetation was observed within the study area. It is not anticipated that the Butternuts present within the study area will be harmed or removed as part of the proposed works.

Butternut can spread to open areas and therefore additional trees can grow as Phase 6 of the subdivision develops. As such, it is recommended that a butternut survey be completed prior to development of Phase 6 of the development.

5.4 Habitat for Species at Risk & Significant Wildlife Habitat

Due to their status of 'Special Concern,' habitat for the Eastern Wood-pewee and Wood Thrush is considered Significant Wildlife Habitat in accordance with the Natural Heritage Reference Manual. Approximately 1 hectare of vegetation clearing is proposed within their habitat identified in **Figure 2**. Although there will be the direct loss of usable breeding habitat for both species, there is no shortage of suitable habitat within Lanark County, including within the immediate vicinity, and it is not anticipated that either species will be negatively impacted within the County as part of the loss of habitat in the proposed Phase 6 development. This area represented one potential nesting pair of each species in 2019. The function of this woodland will be partially impaired, however the individuals represented will continue to find habitat available in the remaining upland habitat and/or easily find suitable habitat throughout the area. Eastern Wood-pewee and Wood Thrush nests and eggs are afforded protection under the MBCA and cannot be harmed, harassed, or killed as a result of development activities, and these requirements are reflected in the Sections 6.5 and 6.6 of this EIS. This includes retention of forested habitat at the rear of lots 34-48. Drainage plans for the subdivision plan has been altered to retain this vegetation.

Policy 8.6.4(b)(2) of the Official Plan states in part that “Development and site alteration shall not be permitted in significant wildlife habitat,” and that “Development and site alteration shall not be permitted on adjacent lands to these natural heritage features unless it has been demonstrated through the preparation of an EIS as required in Section 8.5.4 e.~ EIS of this Plan, that there will be no negative impacts on the natural features or on their ecological functions.”

According to the Natural Heritage Reference Manual (NHRM) (2005) ‘Development and site alteration shall not be permitted in: d) significant wildlife habitat; unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions.

The proposed development includes some development and alteration of significant wildlife habitat, but in an area that is almost entirely separate from the designated Environmental Protection Area - Natural Heritage Features on Schedule “A” of the Official Plan. Accordingly, when considering mitigation measures proposed, the intent of the Official Plan policy is adhered to.

As previously discussed, there is a large amount of this type of forest and forest habitat in general that remains and will remain that these two species are able to use. Neither of these species is rare within the broader study area as they are observed throughout the County based on our extensive knowledge of the area. Additionally, the proposed/future Perth by-pass road, if or when it is constructed, is expected to fragment this forested area and isolate the habitat between the subdivision and by-pass roadway. Accordingly, it is anticipated that the by-pass road is likely to eliminate the use of the habitat by the Wood Thrush. The Eastern Wood-pewee may continue to find habitat within the remaining forested after the by-pass is installed as they are adapted to smaller forested areas, however their continued use can’t be certain. The Town of Perth is a designated settlement area, the large majority of the subject lands are designated under the Official Plan for residential development, and further to Section 1.1.3 of the PPS, settlement areas shall be the focus of growth and development. Section 1.1.3 also provides that land use patterns within settlement areas shall be based on densities and a mix of land uses which efficiently use land and resources. Given the policy support for development within settlement areas, it is our opinion that the proposal (including the recommendations of the EIS) satisfies the intent of all applicable policies, including those intending to protect significant wildlife habitat and associated SAR and other species. The enhancements discussed above in Section 5.3 are anticipated to off-set significant wildlife habitat impacts by buffering the PSW with upland vegetation and an increased buffer from the wetland in the vicinity of the stormwater pond, constructed in such a way as to enhance habitat.

5.5 Wildlife

A total of 38 species of migratory birds and seven (7) non-migratory birds were observed to be possible breeders within the study area during the 2019 field investigations (**Table 4**). Therefore, if construction (including any vegetation removal) is proposed from April 15 to September 15 (Hussel and Lepage, 2015), of any year, the area where clearing is proposed to occur, must be screened by an avian specialist prior to construction activity. This is recommended in order to prevent negative impacts to migratory birds and other bird species (especially those that are known to nest within recently cleared areas, such as the Killdeer), their nests and eggs, which are protected under the MBCA or the FWCA.

The white-tailed deer is a highly mobile species which travels for extended periods of time in search of food. There were no deer yards observed within the study area (however, deer tracks were observed) which suggests that this species does not rely significantly on the area proposed for clearing. No development is proposed to occur within the Perth Long Swamp PSW where a deer yard has been identified. The North American beaver is an amphibious species which spends most of its life in water. A small beaver dam was observed in a ditch line in the north west end of the study area. Impacts to the ditch lines and dam within the study area are not anticipated as part of the Phase 6 development as they are not located within the proposed area for clearing. Significant negative impacts are not anticipated to wildlife habitat as a result of the proposed development.

5.6 Significant Woodlands

Schedule 11 to the Perth OP identifies areas of potentially significant woodlands. This includes Community FODM5-4 and SWD-1 within the vicinity of Phase 6 of the proposed plan. The Town of Perth Official Plan (2019), defines Significant Woodlands as "…areas which serve an important ecological function in the broader landscape because of their location, extent of forest cover, tree age and long-standing forest function, species composition and their potential as wildlife habitat". Using the criteria in the NHRM (2005) SWD-1 does not classify as a woodland as it is primarily a shrub swamp with some younger water tolerant trees around the periphery adjacent to FODM5-4. Community FODM5-4 generally does not meet the criteria of a significant woodland within the broader study area as it does not meet size thresholds, does not meet interior forest cover size, does not provide a significant link, and is a common vegetation community throughout the landscape that does not have significant vegetation species. McIntosh Perry is unaware of any economic and social values of the woodland. The trees within the forest could be considered mature, however this does not imply woodland significance within the area. However, the proximity of the woodland to a significant feature (within 30m of Perth Long Swamp) would classify it as a significant woodland. The Perth OP also includes potential as wildlife habitat as a contributor to significant woodlands. The woodland is considered significant wildlife habitat which was addressed in Section 5.4.

According to policy Section 8.6.4(e) of the Official Plan, no development is generally to be permitted within significant woodlands "….unless and EIS is completed and demonstrates either that the identified feature is not a significant woodland or, where a Woodland is confirmed as significant, there will be no negative impacts to natural features or their ecological functions."

As explored within Section 5.5 above, the proposed development (including the recommendations of the EIS) satisfies the intent of applicable Official Plan policies, including those intending to protect significant woodlands.

The development currently is planned to remove approximately 1 hectare of the potentially significant woodland.

The loss of woodland habitat for Phase 6 will primarily be edge habitat allowing the significant woodland to remain and wildlife to continue to utilize it in the same function as before. It will also continue to function for the reason it was determined to be significant woodlands which is buffering the Perth Long Swamp. The main reason for it being categorized as Significant Woodland (within 30 m of a significant feature) will potentially be impacted in the future based on plans for an arterial bypass, however this is not being considered as part of this assessment. Therefore, as part of this assessment, the woodland will continue to meet the significant woodland criteria for being adjacent to a significant natural feature. Any water contributions from the woodland to the PSW will be mitigated in the design of the subdivision. As discussed above peak flows will not change and the wetland volume will not decrease. It is expected that without any controls in place the conservative increase in water levels is 0.4mm. However mitigation controls will be in place to alleviate even this small increase.

5.7 Wildland Fire Risk Assessment

According to Section 3.1.8 of the *Provincial Policy Statement*, 2014, "Development shall generally be directed to areas outside of lands that are unsafe for development due to the presence of hazardous forest types for wildland fire. Development may, however, be permitted in lands with hazardous forest types for wildland fire where the risk is mitigated in accordance with wildland fire assessment and mitigation standards."

Wildland fire assessment is necessary to determine the presence or absence of forest types associated with the risk of high to extreme wildland fire. Recommended mitigation techniques are designed to disrupt that principle of combustion by eliminating one or more of the three necessary elements of fire (heat, oxygen and fuel). They do so by minimizing the opportunity for ignition of new fires from embers; reducing the potential for direct flame contact from approaching wildland fires; and reducing the effects of radiant heat from an approaching wildland fire by reducing the opportunity for crown fire potential (MNDMNRF, 2016).

The woody species composition (refer to Section 3.5), condition (i.e. very few coniferous trees on the restricted to the northwest end of the study area adjacent to the PSW, scattered eastern white-cedars in low-lying wet areas, etc.), and health (i.e. low occurrence of insect or diseased trees), within 100 m of the proposed development, characterizes the adjacent wooded area as not a hazardous forest type. Therefore, further risk assessment and mitigation measures are not required.

6.0 RECOMMENDED MITIGATION MEASURES

To minimize or eliminate environmental impacts and to help achieve ecological and environmental improvements from the proposed construction and development, the following mitigation measures are recommended.

6.1 Natural Heritage System Components

- No development or vegetation clearing shall occur within 30 m of the Perth Long Swamp PSW, significant woodlands or significant wildlife habitat as part of the Phase 6 proposed development unless identified as part of the subdivision plan for Phase 6.
- Educational signs and other materials are to be provided for the future park lands (Block 58) which are within and adjacent to natural features.

6.2 Surface Water, Groundwater, Wetlands, and Fish Habitat

- During construction, the Contractor should have a spill kit on-hand at all times, in case of spills, and
- No development shall occur within the undisturbed Perth Long Swamp PSW (and subsequent tributaries of Tay River).

6.3 Vegetation Communities

- It is recommended that only locally appropriate native species be used for landscaping within the subject property. This would contribute to re-establishing native plants within the wider landscape and potentially have a positive impact for biodiversity (i.e., using native species for pollinators such as bees);
- Vegetation found at the rear of lots 34-48 will be primarily retained;
- Where vegetation is not currently present within 30 m of the Perth Long Swamp a plan should be prepared to enhance this buffer. This should occur primarily at the north end of the developable lands.
- The proposed stormwater pond (Block 55) is to be vegetated to allow the habitat to be utilized by wildlife from adjacent communities. Details are to be confirmed at the detailed design phase of approvals.
- To prevent the introduction and spread of invasive plant species into the site, equipment utilized during construction should be inspected and cleaned in accordance with the *Clean Equipment Protocol for Industry* (**Appendix B**);
- As part of the proposed works, the following mitigation measures should be implemented to prevent harm to trees adjacent to the area of proposed development:
  - Protect trees and their roots (within the buffer limits) from damage, compaction, and compensation resulting from construction;
  - Do not place material or equipment on bare roots of the protected trees;
  - Do not attach any signs or notices to protected trees to prevent mechanical damage to the tree;
  - Do not damage the root system, trunk or branches of any protected trees, and
  - Ensure that exhaust fumes from all equipment are not directed towards the canopy of the protected trees.

6.4 SAR Vegetation

- If the Butternut tree assessed as a Category 2 Butternut in the east end of the study area is proposed to be harmed or removed or if development is to occur within the 50 m buffer around the tree, the following steps must be followed under the Ontario Regulation (O. Reg.) 242/08 – *General* to comply with the ESA:
  - "*4. If the butternut health assessor's report indicates that one or more of the butternut trees are category 2 trees, the person must satisfy the following additional conditions with respect to those trees after the 30-day period described in paragraph 3 has elapsed:*
    - *i. before killing, harming or taking the category 2 trees, the person must give the Minister notice of the activity by submitting a notice of butternut impact form available on the Registry to the Minister through the Registry,*
    - *ii. the person must ensure that the notice of butternut impact form includes,*
      - *A. the number of category 2 trees that the person proposes to kill, harm or take,*
      - *B. whether the category 2 trees will be killed, harmed or taken,*
      - *C. the location of each category 2 tree and the diameter of each tree at breast height, and*
      - *D. the date and report number of the butternut health assessor's report prepared in respect of the butternut trees in question,*
    - *iii. the person must follow the requirements of subsections (7) and (8) with respect to the completion of the notice of butternut impact form, the keeping of records relating to the notice of butternut impact form and the updating of the information on the Registry, and*
    - *iv. the person must comply with the requirements set out in subsection (10) for planting seedlings to replace butternut trees that are killed, harmed or taken and for monitoring and tending to those seedlings, and keeping records in relation to the seedlings. O. Reg. 176/13, s. 14*";
  - *(7) Before submitting a notice of butternut impact form to the Minister, the person must ensure that,*
    - *(a) all mandatory information requested on the form, including the person's contact information, has been provided; and*
    - *(b) the information provided on the form is complete and accurate. O. Reg. 176/13, s. 14.*
  - *(8) After submitting a notice of butternut impact form to the Minister, the person must,*
    - *(a) promptly upon obtaining from the Ministry confirmation that a notice of butternut impact form submitted through the Registry has been received by the Minister, make a record of the confirmation;*
    - *(b) for as long as the activity is being carried out,*
      - *(i) keep the record of the confirmation and, if applicable, ensure that a copy of the record is kept at the site where the activity is being carried out, and*
      - *(ii) make the record of the confirmation available to the Ministry upon receiving a request for it; and*
    - *(c) if there is a change in the contact information for the person who submitted the notice of butternut impact form, update the information on the Registry within 10 business days of the change. O. Reg. 176/13, s. 14.*
  - *(10) A person who kills, harms or takes one or more butternut trees that are category 2 trees and who, pursuant to subsection (4), is exempt from clause 9 (1) (a) of the Act shall comply with the following*

requirements:

- *1. For each tree that is killed or taken, the person shall plant butternut seedlings in accordance with the following rules:*
  - *i. at least two butternut seedlings, if the tree that is killed or taken is described in the butternut health assessor's report as shorter than breast height or less than three centimetres in diameter at breast height,*
  - *ii. at least five butternut seedlings, if the tree that is killed or taken is described in the butternut health assessor's report as at least three centimetres but less than 15 centimetres in diameter at breast height, and*
  - *iii. at least 20 butternut seedlings, if the tree that is killed or taken is described in the butternut health assessor's report as 15 centimetres or greater in diameter at breast height.*
- *2. For each tree that is harmed, the person shall plant butternut seedlings in accordance with the following rules:*
  - *i. at least one butternut seedling, if the tree that is harmed is described in the butternut health assessor's report as shorter than breast height or less than three centimetres in diameter at breast height,*
  - *ii. at least three butternut seedlings, if the tree that is harmed is described in the butternut health assessor's report as at least three centimetres but less than 15 centimetres in diameter at breast height, and*
  - *iii. at least 10 butternut seedlings, if the tree that is harmed is described in the butternut health assessor's report as 15 centimetres or greater in diameter at breast height.*
- *3. Every butternut seedling that is planted must have been grown from seed that originated from the seed zone in which it is planted.*
- *4. All butternut seedlings must be planted within three years of the person submitting the relevant notice of butternut impact form under subparagraph 4 i of subsection (4).*
- *5. Butternut seedlings must be planted in an area with the following characteristics:*
  - *i. the soil must be greater than one metre deep, moist but well-drained and have a fine to medium texture with a recognizable organic layer and with a pH ranging from 6.8 to 7.2, and*
  - *ii. the area must provide full sunlight conditions to the butternut seedlings.*
- *6. In order to avoid a monoculture of butternut, the person shall plant deciduous trees and shrubs that are not butternut seedlings and that are native to the area in which the seedlings are planted in such numbers to ensure that there are an equal number of butternut trees and other native Ontario species in the area.*
- *7. Every butternut seedling and companion tree or shrub referred to in paragraph 6 must be planted either between March 1 and May 15 or between September 20 and October 30 of any year, except for a butternut seedling or companion tree or shrub that was grown in a container which may be planted between May 16 and May 25 of any year.*
- *8. No more than 200 butternut seedlings shall be planted in a hectare.*
- *9. Butternut seedlings must be planted at least,*
  - *i. three metres from other planted butternut seedlings,*
  - *ii. two metres from other trees or shrubs that are likely to be the same height or shorter than*

the butternut tree at full growth,

- *iii. four metres from other trees or shrubs that are likely to be taller than the butternut tree at full growth,*
- *iv. five metres from the canopy drip line of trees that are greater than four metres in heights at the time of planting, and*
- *v. 100 metres from a highway consisting of two or more lanes in either direction.*

▪ *10. Every butternut seedling that is planted under this subsection must be monitored once annually between May 15 and September 20 for two years after it is planted to assess the health of the tree and its habitat conditions.*

▪ *11. In order to ensure the good growth and health of the butternut tree, every butternut seedling that is planted under this subsection must be tended to in accordance with the following rules:*
  - *i. tending activities shall take place once a week from May 15 to September 20 during the first growing season after the butternut seedling is planted,*
  - *ii. tending activities during the first growing season after the butternut seedling is planted will include,*
    - *A. maintenance of tree guards to protect the lower stem from rodents,*
    - *B. vegetation control 60 centimetres around the base of the tree until the tree is above the herbaceous vegetation, and*
    - *C. watering during drought or low rainfall periods, and*
  - *iii. tending activities shall take place during the second growing season after the butternut seedling is planted as required to ensure that,*
    - *A. vegetation is controlled 60 centimetres around the base of the tree until the tree is above the herbaceous vegetation, and*
    - *B. the tree is watered during drought or low rainfall periods.*

▪ *12. The person must plant a butternut seedling to replace any butternut seedling planted under this subsection that dies within two years of the planting of the seedling and must do so in accordance with the planting requirements of this subsection.*

▪ *13. For each butternut seedling planted under this subsection, the person must maintain a record of the planting, monitoring and tending activities required under this subsection, which record shall include,*
  - *i. the date the butternut seedling was planted,*
  - *ii. the date of each time a person attended to monitor or tend to the butternut tree,*
  - *iii. a description of every monitoring and tending activity,*
  - *iv. an assessment of the health status of the butternut seedling every time it is monitored or tended to to indicate if its health is good, poor or whether it is dead, and*
  - *v. whether the butternut tree shows evidence of butternut canker and, if so, a description of the extent to which the tree is affected by butternut canker.*

▪ *14. Within 14 days of receiving a request from the Ministry, the person shall provide the record maintained under paragraph 13. O. Reg. 176/13, s. 14; O. Reg. 323/13, s. 4.*

- Due to the Butternut tree identified in the west end of the study area, a Butternut Health Assessment must be conducted by a qualified Butternut Health Assessor if any works are proposed to occur within

50 m of the tree. The assessment must be conducted, and a report submitted to MECP at least 30 days prior to any vegetation clearing that would impact the Butternut. The assessment must follow the steps outlined in Section 23.7 of O. Reg. 242/08.

6.5 Habitat for Species at Risk and Significant Wildlife Habitat

- Eastern Wood-pewee and Wood Thrush (SAR) were observed in the forest within the study area. The clearing of this habitat should be done so at an appropriate time of year to not disturb these species;
- Butternut habitat has been defined as a 50 m radius around each individual tree in which no development or work activities shall occur without further communication with MECP or approval from a Butternut Health Assessor. Mitigation measures listed in Section 6.3 may also apply to Butternuts however it is not anticipated to have any impact for Phase 6 of the project; and
- Should any SAR be discovered during construction, a management biologist at MECP – Kemptville District should be contacted immediately, and operations modified to avoid any negative impacts to SAR or their habitat until further direction is provided by MECP.

6.6 Wildlife

- To prevent harming, harassing or killing migratory birds, no clearing or other construction should occur from April 15 to September 15, unless a qualified biologist has determined that no nesting is occurring within 5 days prior to the clearing. Note: these dates are based upon breeding bird nesting data for eastern Ontario, provided by Environment Canada. The nests and eggs of many bird species are protected under federal and/or provincial legislation (i.e. MBCA, FWCA), and
- Thickets or woodlands should not be removed during sensitive times of year (i.e. March through mid-August for the breeding season, Mid-October through March for overwintering wildlife). The *Canadian Wildlife Service does not support relying on inspections for migratory bird nests in such habitats due to the difficulty of locating all nests and risk to birds*.

7.0 SUMMARY

This EIS has been prepared to review the development area proposed for Phase 6 on Perthmore Road, "Part Lots 3 and 4, Concession 2, Geographic Township of Drummond."

This EIS has assessed the existing land use and determined the potential impacts to the natural heritage features (i.e. PSW, Significant Woodland, unevaluated wetland, Significant Wildlife Habitat, etc.), as well as SAR and SAR habitat as a result of the proposed development. Although the development does impact natural heritage features, adherence to the proposed recommendations and mitigation measures provided in Sections 5.0 and 6.0 of this report will ensure that the intent of applicable natural heritage policies are satisfied.

On a larger landscape scale, the proposed alterations are generally not anticipated to have a significant impact on the ecological function within all habitat types. A Provincially Significant Wetland setback reduction from 120 m to 30 m is proposed, as it has been determined that there will be no significant impacts to the function of the Perth Long Swamp provided that the 30 m setback is either left natural/forested, or and where there is no significant vegetation within 30 m of wetland habitat, that this area be vegetated with native species pursuant to a future planting plan. Subsequent phases and access points to the subdivision should adhere to these setbacks. Future development phases considered require the removal of limited vegetation and are not expected to significantly impact significant features (wildlife, woodland habitats) within the study area provided mitigation measures including setbacks are adhered to.

The Town of Perth is a designated settlement area, and the large majority of the subject lands are designated for development under the Perth Official Plan. Further to Sections 1.1.3 of the PPS, settlement areas shall be the focus of growth and development and land use patterns within settlement areas shall be based on densities and a mix of land uses which efficiently use land and resources. It is our opinion that the proposal satisfies the intent of applicable policy.

8.0 LIMITATIONS

The investigations undertaken by McIntosh Perry with respect to this report and any conclusions or recommendations made in this report reflect McIntosh Perry's judgment based on the site conditions observed at the time of the site inspection(s) on the date(s) set out in this report and on information available at the time of the preparation of this report.

This report has been prepared for specific application to this site, and it is based, in part, upon visual observation of the site and terrestrial investigations at various locations during a specific time interval, as described in this report. Unless otherwise stated, the findings cannot be extended to previous or future site conditions, or portions of the site which were unavailable for direct investigation.

If site conditions or applicable standards change or if any additional information becomes available at a future date, modifications to the findings, conclusions, and recommendations in this report may be necessary.

If you have any question, comments, or concerns, please do not hesitate to contact the undersigned at McIntosh Perry at 613-903-6147.

Sincerely,
McIntosh Perry Consulting Engineers Ltd.

Erik Pohanka

Erik Pohanka, B. Sc.
Biologist

9.0 REFERENCES

Bird Studies Canada, Environment Canada's Canadian Wildlife Service, Ontario Nature, Ontario Field Ornithologists, and Ontario Ministry of Natural Resources (OBBA). 2019. *Breeding Evidence Codes*. Ontario Breeding Bird Atlas Website. https://www.bsc-eoc.org/dataentry/codes.jsp?page=breeding. Accessed 06 November 2019.

Bird Studies Canada, Environment Canada's Canadian Wildlife Service, Ontario Nature, Ontario Field Ornithologists, and Ontario Ministry of Natural Resources (OBBA). 2006. *Atlas Data Summary*. Ontario Breeding Bird Atlas Website. 31 January 2008. http://www.birdsontario.org/atlas/index.jsp. Accessed 06 November 2019.

Canada Department of Agriculture. 1966. *Soils Map of Lanark County Ontario*. Soil Report No. 40. South Sheet. Map Reproduction Centre, Reproduction and Distribution Division, Department of Energy, Mines and Resources, Ottawa. http://sis.agr.gc.ca/cansis/publications/surveys/on/on40/index.html. Accessed 06 November 2019.

Crins, W.J., P.A. Gray, P.W.C. Uhlig, and M.C. Wester. 2009. *The Ecosystems of Ontario, Part 1: Ecozones and Ecoregions*. Inventory, Monitoring and Assessment Section. Science and Information Branch. Ontario Ministry of Natural Resources. Ontario, Canada: Queen's Printer for Ontario. 87p.

Ecological Stratification Working Group. 1996. *A National Ecological Framework for Canada*. Agriculture and Agri-Food Canada, Research Branch, Centre for Land and Biological Resources Research, and Environment Canada. State of the Environment Directorate; Ecozone Analysis Branch, Ottawa/Hull.

Endangered Species Act. 2007. S.O. 2007, c. 6. Current version 01 July 2019.

Fish and Wildlife Conservation Act. 1997. S.O. 1997, c. 41. Current version 26 March 2019.

Hussell, J. and D. Lepage. 2015. *Bird Nesting Calendar Query Tool. Project NestWatch*. Bird Studies Canada. http://www.birdscanada.org/volunteer/pnw/rnest/warning.jsp?lang=en. Accessed 06 November 2019.

Lee, HT, WD Bakowsky, J Riley, J Bowles, M Puddister, P Uhlig and S McMurray. 1998. *Ecological Land Classification for Southern Ontario: First Approximation and its Application*. Ontario Ministry of Natural Resources, South Central Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.

Maxar Technologies. 2019. *Google Earth Image*. Google Earth Pro. http://www.earth.google.com. Accessed 06 November 2019.

Migratory Birds Convention Act. 1994. S.C. 1994, c. 22. Current version 28 August 2019.

Ministry of Municipal Affairs and Housing. 2014. *Provincial Policy Statement*. Queen's Printer of Ontario. 50 p.

Ministry of Natural Resources and Forestry (MNRF). March 2010. *Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005. Second Edition*. Toronto: Queen's Printer for Ontario. 248 p.

Ministry of Natural Resources and Forestry (MNRF). 2013. Butternut Recovery Strategy. Queen's Printer of

Ontario. 55 p.

Ministry of Natural Resources and Forestry (MNRF). 2018. *Land Information Ontario metadata tool*. https://www.ontario.ca/page/land-information-ontario. Queen's Printer of Ontario. Accessed 06 November 2019.

Ministry of Natural Resources and Forestry (MNRF). 2019a. *Make A Map: Natural Heritage Areas*. Ministry of Natural Resources and Forestry. http://www.gisapplication.lrc.gov.on.ca/mamnh/Index.html?site=MNR_NHLUPS_NaturalHeritage&viewer=NaturalHeritage&locale=en-US. Queen's Printer for Ontario. Accessed 06 November 2019.

Ministry of Natural Resources and Forestry (MNDMNRF). 2019b. *Land Information Ontario* (LIO). Queen's Printer for Ontario. https://geohub.lio.gov.on.ca/. Accessed 06 November 2019.

Ministry of Natural Resources and Forestry. 2016. *Wildland Fire Risk Assessment and Mitigation: A Guidebook in Support of the Provincial Policy Statement, 2014 – Draft*. Ministry of Natural Resources and Forestry. 78 p.

Ontario Geological Survey. 2010. *Surficial geology of Southern Ontario*. Ontario Geological Survey. http://www.geologyontario.mndm.gov.on.ca/mndmaccess/mndm_dir.asp?type=pub&id=MRD128-REV. Accessed 06 November 2019.

Ontario Nature. 2019. *Ontario Reptile and Amphibian Atlas: A citizen science project to map the distribution of Ontario's reptiles and amphibians*. Ontario Nature. http://www.ontarionature.org/atlas. Accessed 06 November 2019.

Rideau Valley Conservation Authority (RVCA). 2017. *Tay River Subwatershed Report 2017*. Rideau Valley Conservation Authority. https://watersheds.rvca.ca/subwatersheds/tay-river/subwatershed-report-tay-river. Accessed 06 November 2019.

Species at Risk Act. 2002. S.C. 2002, c. 29. Current version 28 August 2019.

Town of Perth. 2019. *Town of Perth Official Plan*. Town of Perth.

Tunnock Consulting Ltd. 2015. *Town of Perth Official Plan – Schedule A Land Use Designations and Overlays per Comprehensive Update Amendment No. 14*. Town of Perth. https://www.perth.ca/uploads/1169/Doc_636373547346580773.pdf?ts=637086360115268633. Accessed 06 November 2019.

APPENDIX A: SITE PHOTOGRAPHS

Photo 1: Mixed Meadow (MEM) vegetation community in the centre of the study area. 17 June 2019.

Photo 2: American Robin (*Turdus migratorius*) observed within the Mixed Meadow (MEM) vegetation community in the centre of the study area. 24 May 2019.

Photo 3: Mixed Meadow (MEM) vegetation community in the west end of the study area. 17 June 2019.

Photo 4: Common Grackle (*Quiscalus quiscula*) nest in compost pile in Mixed Meadow (MEM) vegetation community in the west end of the study area. 24 May 2019.

Photo 5: MEM Community extended into the forested area based on site visit on 15 July 2022.

Photo 6: Ditch line along the Mixed Meadow (MEM) and Green Ash Organic Deciduous Swamp (SWDO1-2) in the west end of the study area. 24 May 2019.

Photo 7: Small beaver dam observed in the ditch lines in the west end of the study area. 24 May 2019.

Photo 8: Green Ash Organic Deciduous Swamp (SWDO1-2) vegetation community within the west end of the study area in the PSW boundaries. 22 June 2019.

Photo 9: Beaver chew observed within the Green Ash Organic Deciduous Swamp (SWDO1-2) in the west end of the study area. 24 May 2019.

Photo 10: White-tailed deer (*Odocoileus virginianus*) tracks observed within the Green Ash Organic Deciduous Swamp (SWDO1-2) in the west end of the study area. 24 May 2019.

Photo 11: Eastern gray squirrel (*Sciurus carolinensis*) observed within the Green Ash Organic Deciduous Swamp (SWDO1-2) in the west end of the study area. 24 May 2019.

Photo 12: Eastern cottontail (*Sylvilagus floridanus*) observed within the Green Ash Organic Deciduous Swamp (SWDO1-2) in the west end of the study area. 24 May 2019.

Photo 13: Cattail Shallow Marsh (MASO1-1) vegetation community within the southeast end of the study area in the PSW boundaries. 08 June 2019.

Photo 14: Coniferous Forest (FOC) vegetation community within the northwest end of the study area. 17 June 2019.

Photo 15: Butternut (*Juglans cinerea*) observed within Coniferous Forest (FOC) vegetation community in the northwest end of the study area. 22 June 2019.

Photo 16: Shallow Marsh (MAS) vegetation community within the northwest end of the study area in the PSW boundaries. 17 June 2019.

Photo 17: Fresh-Moist Lowland Deciduous Forest (FODM7) vegetation community within the northwest end of the study area. 24 May 2019.

Photo 18: Fresh-Moist Lowland Deciduous Forest (FODM7) vegetation community within the southeast end of the study area. 24 May 2019.

Photo 19: Groundhog (*Marmota monax*) dens observed in the slopes of Perthmore Street. 24 May 2019.

Photo 20: Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) vegetation community within the east end of the study area. 24 May 2019.

Photo 21: Great Crested Flycatcher (*Myiarchus crinitus*) observed within the Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) vegetation community within the east end of the study area. 24 May 2019.

Photo 22: Eastern chipmunk (*Tamias striatus*) observed within the Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) vegetation community within the east end of the study area. 24 May 2019.

Photo 23: Butternut (*Juglans cinerea*) observed within the Dry-Fresh Sugar Maple-Ironwood Deciduous Forest (FODM5-4) vegetation community in the east end of the study area. 17 June 2019.

Photo 24: Ash Mineral Deciduous Swamp (SWD1) vegetation community within the east end of the study area. 17 June 2019.

Photo 25: Ash Mineral Deciduous Swamp (SWD1) vegetation community within the east end of the study area in the PSW. 24 May 2019.

Photo 26: Groundwater upwelling observed within the Ash Mineral Deciduous Swamp (SWD1) vegetation community in the east end of the study area. 24 May 2019.

Photo 27: Watercress (*Nasturtium officinale*) observed within the Ash Mineral Deciduous Swamp (SWD1) vegetation community in the east end of the study area. 24 May 2019.

Photo 28: Veery (*Catharus fuscescens*) observed within the Ash Mineral Deciduous Swamp (SWD1) vegetation community in the east end of the study area. 24 May 2019.

Photo 29: Willow Organic Deciduous Thicket Swamp (SWTO2) vegetation community within the southeast end of the study area. 17 June 2019.

Photo 30: Culvert outlet on Perthmore Street within the Willow Organic Deciduous Thicket Swamp (SWTO2) vegetation community in the southeast end of the study area. 24 May 2019.

Photo 31: Pileated Woodpecker (*Dryocopus pileatus*) observed within the Willow Organic Deciduous Thicket Swamp (SWTO2) vegetation community in the southeast end of the study area. 24 May 2019.

Photo 32: Willow Organic Deciduous Thicket Swamp (SWTO2) vegetation community within the southeast end of the study area. 17 June 2019.

Photo 33: Common Yellowthroat (*Geothlypis trichas*) observed within the Willow Organic Deciduous Thicket Swamp (SWTO2) vegetation community in the southeast end of the study area. 24 May 2019.

Photo 34: Cattail Graminoid Organic Meadow Marsh (MAMO1-2) vegetation community within the southeast end of the study area. 17 June 2019.

Photo 35: Culvert inlet on North Street conveying a tributary of Tay River within the Cattail Graminoid Organic Meadow Marsh (MAMO1-2) vegetation community in the southeast end of the study area. 24 May 2019.

Photo 36: Song Sparrow (*Melospiza melodia*) observed within the Cattail Graminoid Organic Meadow Marsh (MAMO1-2) vegetation community in the southeast end of the study area. 24 May 2019.

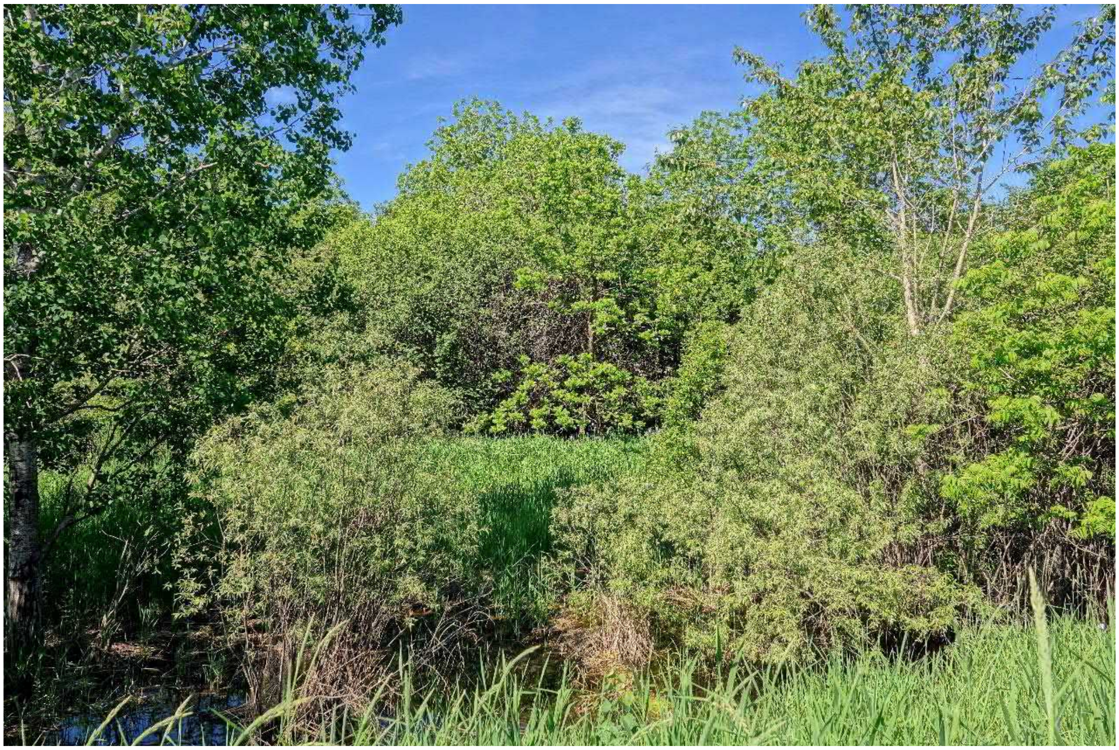


Photo 37: Fresh-Moist Poplar Deciduous Forest (FODM8-1) vegetation community adjacent to the southwest end of the study area. 17 June 2019.

APPENDIX B: CLEAN EQUIPMENT PROTOCOL FOR INDUSTRY

Clean Equipment Protocol for Industry

Inspecting and cleaning equipment for the purposes of invasive species prevention

Invasive Species Centre

Catalyst for research and response

Ontario

Peterborough County Stewardship

Ontario Invasive Plant Council

Publication Information

Halloran, Joe, Anderson, Hayley and Tassie, Danielle. 2013. Clean Equipment Protocol for Industry. Peterborough Stewardship Council and Ontario Invasive Plant Council. Peterborough, ON.

Printed April 2013
Peterborough, Ontario

ISBN: (to be confirmed)

This document was prepared for the Canada-Ontario Invasive Species Centre and the Ontario Ministry of Natural Resources by the Peterborough Stewardship Council and the Ontario Invasive Plant Council.

Inquiries regarding this document can be directed to the Ontario Invasive Plant Council
PO Box 2800, 4601 Guthrie Drive
Peterborough, ON
K9J 8L5

Phone: (705) 748-6324
Email: info@ontarioinvasiveplants.ca

For more information on invasive plants in Ontario, visit www.ontario.ca/invasivespecies, www.ontarioinvasiveplants.ca, www.invadingspecies.com or www.invasivespeciescentre.ca

Table Of Contents

Introduction

Why Invasive Plants are a Problem

Invasive alien species are "a growing environmental and economic threat to Ontario. Alien species are plants, animals and microorganisms that have been accidentally or deliberately introduced into areas beyond their normal range. Invasive species are defined as harmful alien species whose introduction or spread threatens the environment, the economy, or society, including human health (Government of Canada 2004)." (Ontario Invasive Species Strategic Plan, 2012). The great majority of plant invasions occur in habitats that have been disturbed either naturally or by humans (Rejma´nek 1989; Hobbs and Huenneke 1992; Hobbs 2000).

The ecological effects of invasive species are often irreversible and, once established, they are extremely difficult and costly to control or eradicate. According to Pimental et al. (1999), invasive species in the U.S. cause economic and environmental damages totalling over $138 billion per year, with agricultural weed control and crop losses totalling approximately $34 billion per year. Exact figures for the total economic and environmental damages are not available for Canada. In Ontario however, the costs of dealing with just one invasive species is astonishing; Zebra Mussels cost Ontario power producers who draw water from the lake $6.4 million per year in increased control/operating costs and about $1 million per year in research costs (Colautti et al. 2006).

Invasive species can spread to new areas when contaminated mud, gravel, water, soil and plant material are unknowingly moved by equipment used on different sites. This method of spread is called an unintentional introduction, and is one of the four major pathways for invasive species introduction into a new area of Ontario (Ontario Invasive Species Strategic Plan, 2012).

Buckthorn removal, Lynde Shores Conservation Area.
Photo by: Central Lake Ontario Conservation Authority

Invasive plant seed and propagules (plant material, i.e. rhizomes) have the ability to travel sight unseen in mud attached to or lodged in various parts and spaces between parts of vehicles, machinery and other mechanical equipment. A recent study at Montana State University found that most seeds (99% on paved roads and 96% on unpaved roads) stayed attached to the vehicle after traveling 160 miles (257 km) under dry conditions.

Invasive plant species are commonly transported on or in vehicles and construction equipment when they are moved to new locations. Those vehicles include four-wheel drives, excavators, tractors, loaders, water trucks and all-terrain vehicles. Failure to properly clean vehicles and machinery of soils, mud, and contaminated water that may contain invasive species seed and propagules can result in permanent, irreversible environmental impacts. These impacts can mean substantial cost to the landowner, land manager and/or the user. Businesses may also face liability issues for activities and operations that result in the introduction of invasive species.

Some of the invasive species in Ontario which have been known to spread through equipment transfer include:

- **Common Buckthorn** *(Rhamnus cathartica)*
- **Dog-strangling Vine** *(Cynanchum rossicum)*
- **Garlic Mustard** *(Alliaria petiolata)*
- **Giant Hogweed** *(Heracleum mantegazzianum)*
- **Glossy Buckthorn** *(Frangula alnus)*
- **Japanese Knotweed** *(Polygonum cuspidatum)*
- **Miscanthus or Chinese Silver Grass** *(Miscanthus sinensis)*
- **Phragmites or Common Reed** *(Phragmites australis subsp. australis)*
- **Reed Canary Grass** *(Phalaris arundinacea)*
- **Wild Parsnip** *(Pastinaca sativa)*
- **Wild Chervil** *(Anthriscus sylvestri)*

Dog-strangling vine
(Cynachum rossicum)
Photo by: Hayley Anderson

Garlic Mustard
(Alliaria petiolata)
Photo by: Ken Towle

Phragmites
(Phragmites australis subsp. Australis)
Photo by: Michael Irvine

These plants impact biodiversity by out-competing native species for space, sunlight, and nutrients. They can also have impacts on road and driver safety by physically blocking intersection sightlines, and in the case of Phragmites and Miscanthus, may fuel intense grass fires if ignited, which can damage utility stations and hydro lines.

The harmful effects of invasive species include:

- Physical and structural damage to infrastructure
- Human health hazards (i.e. Giant Hogweed and Wild Parsnip exposure)
- Delays and increased cost in construction activities
- Environmental damage (i.e. erosion)
- Aesthetic degradation
- Loss of biodiversity
- Reduced property values
- Loss of productivity in woodlots and agriculture

Why Cleaning Vehicles and Equipment is Important

Passenger and recreational vehicles as well as heavy machinery are major vectors for spreading terrestrial invasive species into new areas.

It is much more costly to control invasive species after their establishment and spread than it is to prevent their spread. The spread of invasive species through unintentional introduction can be minimized significantly by the diligent cleaning of vehicles and equipment when leaving one site and moving to the next. In the case of large properties, cleaning before moving to a new site is recommended, even if it is within the same property.

This guide has been developed for the construction, agriculture, forestry and other land management industries, to provide equipment operators and practitioners with tools and techniques to identify and prevent the unintentional introduction of invasive species. It establishes a standard for cleaning vehicles and equipment and provides a guide where current codes of practice, industry standards or other environmental management plans are not already in place.

Passenger and recreational vehicles include:

- 2WD and 4WD cars
- 2WD and 4WD trucks
- All Terrain Vehicles (ATV's)
- Motorbikes
- Snowmobiles

Heavy machinery includes:

- Trucks
- Tractors
- Mowers
- Slashers
- Trailers
- Backhoes
- Graders
- Dozers
- Excavators
- Skidders
- Loaders
- Water Tankers and Trucks

Dog-strangling Vine plants attached to ATV.
Photo by: Francine Macdonald

Plant material attached to bobcat.
Photo by: TH9 Outdoor Services

Impacts of Invasive Species on Industry

Construction

In the UK, Japanese Knotweed (*Polygonum cuspidatum* or *Fallopia japonica*) is classified as a hazardous material. When construction occurs in established Japanese Knotweed stands workers sift the soil to remove root fragments and institute treatment plans to ensure that the Knotweed does not re-sprout, as it can damage housing foundations by growing through concrete and asphalt. The contractors must also thoroughly clean their equipment, and dispose of the contaminated soil at biohazard waste sites. While we do not have these requirements in Ontario, Japanese Knotweed is present here.

Invasive plant species can also increase site preparation and weed control costs, and reduce property values. For example, in Vermont the presence of the aquatic invasive plant Eurasian Watermilfoil (*Myriophyllum spicatum*) depressed shoreline residence property value by as much as 16.4% (Zhang and Boyle, 2010).

Forestry/Agriculture

Invasive plant species which become established in forests will out-compete native species and prevent forest re-generation after logging or natural disturbance. Dog-strangling Vine (*Cynanchum rossicum*) is of particular concern in conifer plantations. This species thrives in the filtered light and open soils of mature plantations, and suppresses seedling establishment of native hardwoods. If its invasion continues, very few juvenile trees will survive to fill the shrinking canopy of over-mature pines. Reforestation sites are also susceptible; the thick mats of vegetation and aggressive competition from Dog-strangling Vine decrease available planting space and increase costs as more mature vegetation needs to be planted in order to ensure the new vegetation can outcompete the invasive plant. As a result, expensive control programs are often required.

Land Management (Trail Use/Maintenance)

Recreational trail use and the maintenance of trails can facilitate the transport of invasive plant material and seeds, and create open and disturbed sites that are prime locations for the establishment of invasive species. Studies have proven that trails act as corridors which assist in the spread of invasive plant species. Humans, their pets, and vehicles such as ATV's can be vectors of invasion along trails because seeds and plant pieces can be carried on equipment and clothing. In addition, frequent trampling along trails alters soil properties, limits the growth of some native species, and creates conditions that may favour the growth of non-native species (Kuss et al. 1985; Marion et al. 1985; Yorks et al. 1997).

Roadsides/Utilities

Invasive species can increase the cost of roadside and utility maintenance by requiring additional maintenance and control efforts. The presence of invasive species can also provide a safety hazard. In the case of Phragmites and Miscanthus (invasive grass species), along with interrupting sight lines, the dead stalks which remain standing each autumn also provide combustible material. Fires in these stands burn intensely, and can damage utilities and hydro lines. Phragmites along roadsides is generally assumed to be spread through the transport and burial of rhizome fragments through ditching, ploughing, and other human activities that transport rhizomes on machinery. Studies have shown that vehicles and road-fill operations can transport invasive plant seeds into uninfested areas, and road construction and maintenance operations provide optimal disturbed sites for seed germination and seedling establishment (Schmidt 1989; Lonsdale & Lane 1994; Greenberg et al. 1997; Trombulak & Frissell 2000).

Steps to Prevent the Unintentional Introduction of Invasive Species from Equipment

Inspection and cleaning of all machinery and equipment should be performed in accordance with the procedures, checklists and diagrams provided in this protocol.

When visiting more than one site, always schedule work in the sites that are the least disturbed and free of known invasive species first, and visit sites with known invasive species infestations last. This will greatly reduce the risk of transferring plants to new locations.

When to Inspect

Inspection should be done before:

- Moving vehicles out of a local area of operation
- Moving machinery between properties or sites within the same property where invasive species may be present in one area, and not in another
- Using machinery along roadsides, in ditches, and along watercourses
- Vehicles using unformed dirt roads, trails or off road conditions
- Using machinery to transport soil and quarry materials
- Visiting remote areas where access by vehicles is limited

Inspection should be done after:

- Operating in areas known to have terrestrial invasive plants or are in high risk areas (i.e. recently disturbed areas near known invaded areas)
- Transporting material (i.e. soil) that is known to contain, or has the potential to contain, invasive species
- Operating in an area or transporting material that you are uncertain contain invasive species
- In the event of rain. If mud contains seeds, they can travel indefinitely until it rains or the road surface is wet, allowing for long distance transport. This may result in transporting seeds to areas where those species did not previously exist

How to Inspect

- Inspect the vehicle thoroughly inside and out for where dirt, plant material and seeds may be lodged or adhering to interior and exterior surfaces.
- Remove any guards, covers or plates that are easy to remove.
- Attention should be paid to the underside of the vehicle, radiators, spare tires, foot wells and bumper bars.

If clods of dirt, seed or other plant material are found, removal should take place immediately, using the techniques outlined below.

When to Clean

Vehicles and heavy equipment that stay on formed and sealed roads have a low risk of spreading invasive species. Cleaning is only required when inspection identifies visible dirt clods and plant material or when moving from one area to another.

Depending on the invasive species present, vehicles may need to be cleaned even when deep snow is present. Phragmites, for example, can still be spread, even in packed snow because the seed heads are usually above the surface of the snow. Other plants, such as Dog-strangling vine, will be contained beneath deep snow.

**Regular inspection of vehicles and machinery will identify if any soil or plant material has been collected on or in vehicles and machinery.*

Where to Clean

Clean the vehicle/equipment in an area where contamination and seed spread is not possible (or limited). The site should be:

- Ideally, mud free, gravel covered or a hard surface. If this option is not available, choose a well maintained (i.e. regularly mowed) grassy area.
- Gently sloping to assist in draining water and material away from the vehicle or equipment. Care should be taken to ensure that localized erosion will not be created, and that water runs back into the area where contamination occurred.
- At least 30m away from any watercourse, water body and natural vegetation.
- Large enough to allow for adequate movement of larger vehicles and equipment.

**Safely locate the vehicle and equipment away from any hazards. If mechanized, ensure engine is off and the vehicle or equipment is immobilized.*

How to Clean Inside

Clean the interior of the vehicle by sweeping, vacuuming or using a compressed air device. Particular attention should be paid to the floor, foot wells, pedals, seats and under the seats.

How to Clean Outside

Knock off all large clods of dirt. Use a pry bar or other device if necessary.

Identify areas that may require cleaning with compressed air rather than water such as radiators and grills. Clean these areas first prior to using water.

Clean the vehicle with a high pressure hose in combination with a stiff brush and/or pry bar to further assist the removal of dirt clods.

Start cleaning from the top of the vehicle and work down to the bottom.

Emphasis should be placed on the undersides, wheels, wheel arches, guards, chassis, engine bays, radiator, grills and other attachments.

When the cleaning is finished avoid driving through the waste water when removing the vehicle or equipment from the cleaning site.

For equipment such as water trucks that may be exposed to aquatic invasive species, trucks should be disinfected with bleach solution before conducting work in a new area. For further information please refer to the Invading Species Awareness Program's Technical Guidelines listed under Contacts and Resources.

Hosing down a vehicle in Queensland Australia
Photo by: TH9 Outdoor Services

Final Inspection Checklist

Conduct a final inspection to ensure the following general clean standard has been achieved:

- No clods of dirt should be visible after wash down.
- Radiators, grills and the interiors of vehicles should be free of accumulations of seed, soil, mud and plant material parts including seeds, roots, flowers, fruit and or stems.

Diagrams have been provided to assist in quickly identifying key areas to inspect and clean on a variety of vehicles associated with the targeted industries. These can be used in combination with vehicle checklists to ensure all areas of the vehicles have been inspected and cleaned.

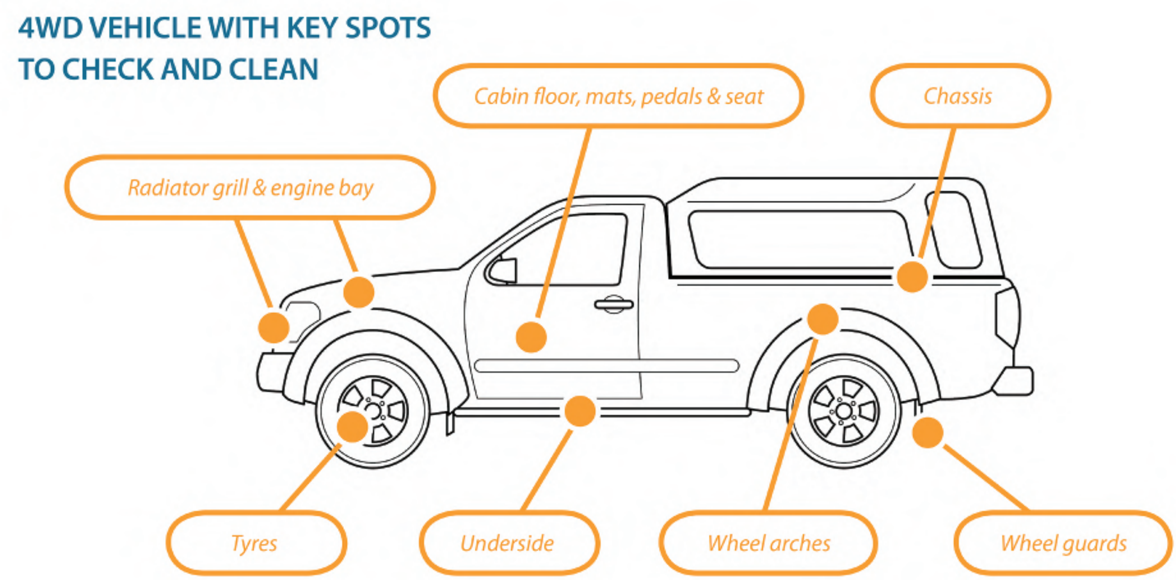
Equipment Required

- A pump and high pressure hose OR High pressure water unit
- Minimum water pressure for vehicle cleaning should be at least 90 pounds per square inch. Water can be supplied as high volume/low pressure or low volume/high pressure (NOAA Fisheries Service).
- Air compressor and blower OR Vacuum
- Shovel
- Pry bar
- Stiff brush or broom

Cleaning station at construction site.
Photo by: Mark Heaton, OMNR

Inspection and Cleaning Diagrams and Checklists

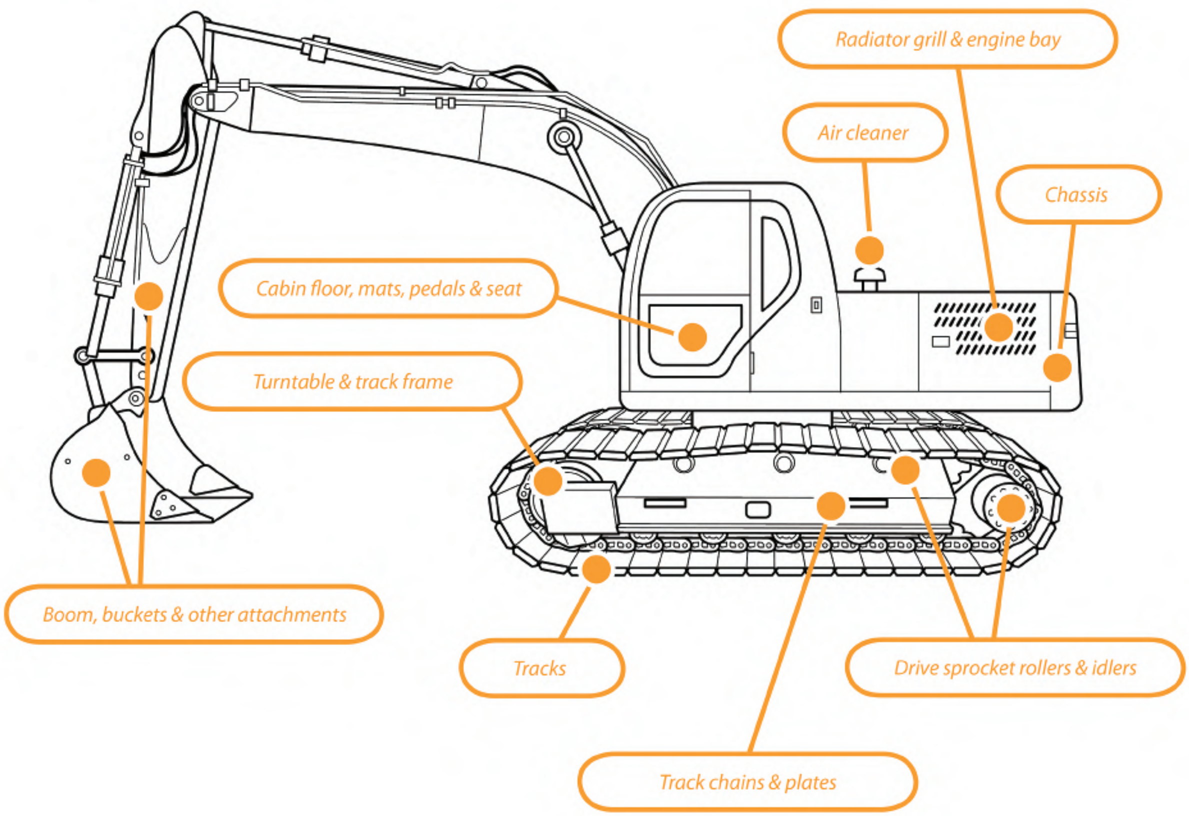
2WD and 4WD Vehicles



		✓
Cabin	Floor, mats, pedals, seats	
Engine	Radiators, engine bay, grill	
Body	Underside, chassis, crevices, ledges, bumper bars	
Wheels	All wheels (including spare), wheel arches, guards	
Tray	Floor, canopy (if included)	

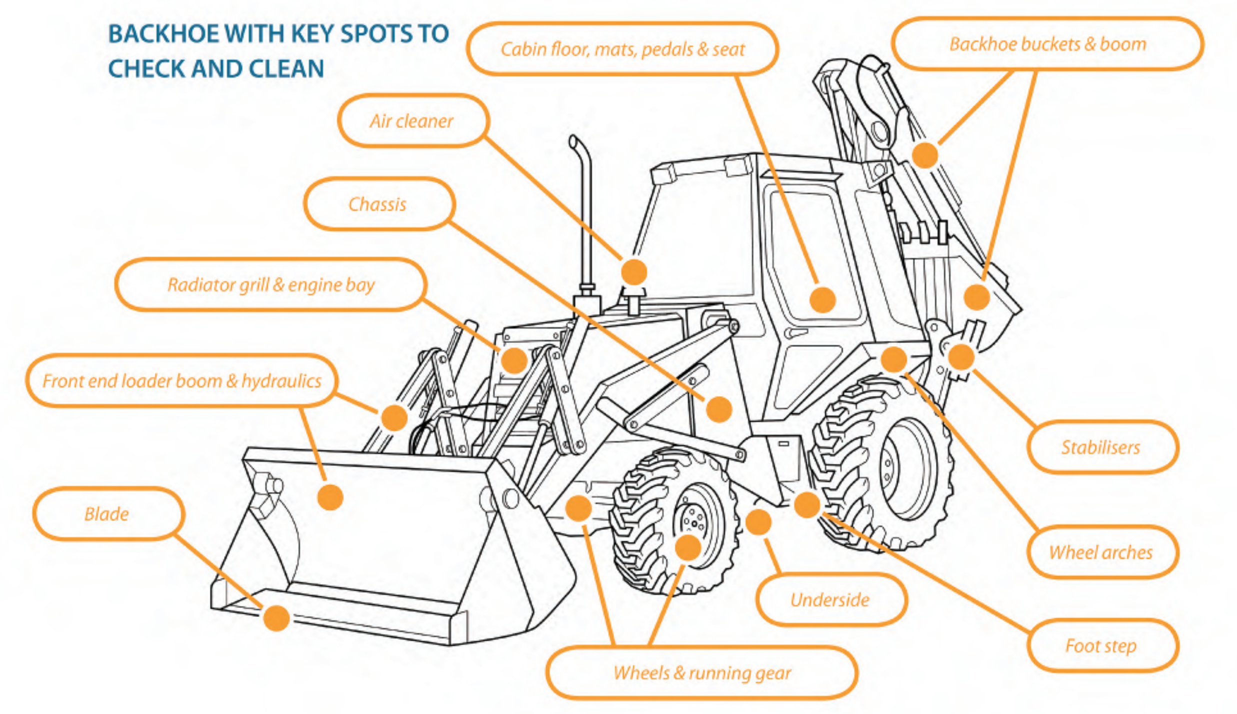
Excavator

EXCAVATOR WITH KEY SPOTS TO CHECK AND CLEAN



		✓
Cabin	Floor, mats, pedals, seats	
Engine	Radiators, engine bay, grill, air cleaner	
Tracks	Tracks, track frame, drive sprocket rollers, idlers	
Body Plates	Plates of cabin	
Body	Ledges, channels	
Bucket		
Booms		
Turret Pivot		

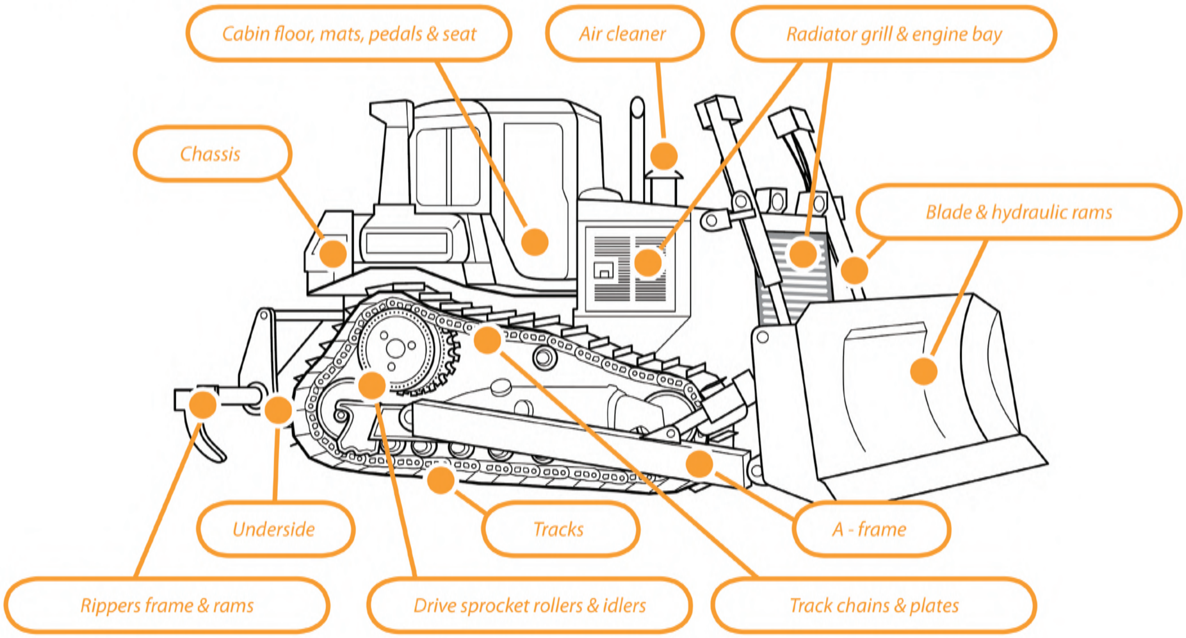
Backhoe



		✓
Cabin	Floor, mats, pedals, seats, foot step	
Engine	Radiators, engine bay, grill, air cleaner	
Wheels	All wheels (including spare), wheel arches, guards	
Front end loader	Blade, hydraulics, booms	
Backhoe	Buckets, boom, hydraulics, stabilizers	

Bulldozer

BULLDOZER WITH KEY SPOTS TO CHECK AND CLEAN



		✓
Cabin	Floor, mats, pedals, seats	
Engine	Radiators, engine bay, grill, air cleaner	
Tracks	Tracks, track frame, drive sprocket rollers, idlers	
Body Plates	Belly plates and rear plates	
Body	Ledges, channels	
Blade	Pivot points, hydraulic rams, a-frame	
Ripper	Ripper frame, ripper points	

Contacts and Resources

Ontario Invasive Species Strategic Plan 2012. Government of Ontario. Online, accessed May 8, 2012.
http://www.mnr.gov.on.ca/stdprodconsume/groups/lr/@mnr/@biodiversity/documents/document/stdprod_097634.pdf

Invasive Species Management for Infrastructure Managers and the Construction Industry 2008. Wade, M. Booy, O. and White, V. Online, accessed April 27, 2012
http://www.ciria.org/service/Web_Site/AM/ContentManagerNet/ContentDisplay.aspx?Section=Web_Site&ContentID=9001

T.I.P.S (Targeted Invasive Plant Solutions) Highway Operations. British Columbia Invasive Species Council. Online, accessed May 8, 2012
http://www.bcinvasiveplants.com/iscbc/publications/TIPS/Highways_Operations_TIPS.pdf

Invading Species Awareness Program Workshop Manual: Aquatic Invasive Species: An Introduction to Identification, Collection and Reporting of Aquatic Invasive Species in Ontario Waters (includes information on decontaminating equipment).
http://www.invadingspecies.com/download/publications/manuals/WorkshopManual.pdf

Reporting Invasive Species

To report invasive species, or view maps of existing records, visit the Invading Species Awareness Program website **www.invadingspecies.com/report/** or **www.eddmaps.org/Ontario.**

Or call the OFAH/MNR Invading Species Awareness Program Hotline at **1-800-563-7711**

Acknowledgements

We gratefully acknowledge NRM South (Tasmania, Australia) for allowing the use of their artwork and text from their "Keeping it Clean – A Tasmanian Field Hygiene Manual to Prevent the Spread of Freshwater Pests and Pathogens".

We also sincerely thank the Clean Equipment Protocol Working Group and the Ontario Invasive Plant Council Committees and Board of Directors for their ongoing support and valuable input into this document, and the Canada-Ontario Invasive Species Centre and Ontario Ministry of Natural Resources for the support in creating this protocol.

Clean Equipment Protocol Working Group:

Diana Shermet, Central Lake Ontario Conservation Authority; Paula Berketo, Ontario Ministry of Transportation; Travis Cameron, Ontario Ministry of Natural Resources; Jennifer Hoare, Ontario Parks; Michael Irvine, Ontario Ministry of Natural Resources; Alison Kirkpatrick, OFAH/MNR Invading Species Awareness Program; Erika Weisz, Ontario Ministry of Natural Resources; Amanda Chad, Ontario Power Generation; Nancy Vidler, Lambton Shores Phragmites Community Group; Nigel Buffone, Du Pont Canada Company; Ewa Bednarczuk, Lower Trent Conservation Authority

We also gratefully acknowledge the input and direction from Francine MacDonald, James Rockwood, Anne-Marie Roussy, Stephen Smith, Caroline Mach, Patricia Lowe, John Bowen, Karen Hartley, and the Southern Ontario Community Forest Managers group.

More Information:

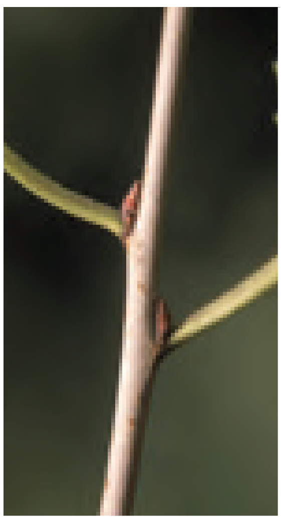
Ontario Invasive Plant Council: **www.ontarioinvasiveplants.ca**

Appendix A: Identification of Invasive Plants found in Ontario

- **Common Buckthorn** (*Rhamnus cathartica*) and **Glossy Buckthorn** (*Frangula alnus*)
- **Dog-strangling Vine** (*Cynanchum rossicum*)
- **Garlic Mustard** (*Alliaria petiolata*)
- **Japanese Knotweed** (*Polygonum cuspidatum*)
- **Phragmites or Common Reed** (*Phragmites australis subsp. australis*)
- **Giant Hogweed** (*Heracleum mantegazzianum*)

common & glossy buckthorn

(Rhamnus cathartica & R. frangula)



Plant type: Shrub/small tree

Arrangement: Common buckthorn are sub-opposite (almost opposite). Glossy buckthorn are alternate.

Leaf: The common buckthorn leaf is egg shaped, edge of the leaf is "pebbled" (small rounded teeth). Veins converging toward leaf top. The glossy buckthorn leaf is more slender (tear drop shaped) and smooth margined.

Bark: Smooth, young bark with prominent raised patches or lenticels; rough texture and peeling bark when mature.

Seed/Flowers: Flowers are green-yellowish, small and inconspicuous. Green berries becoming purplish/black in late summer, berry > 1 cm in diameter.

Buds/Twigs: Common buckthorn has thorn-like tip on many twigs. Glossy buckthorn buds have no bud scales and lack thorny tips to twigs.

Habitat: Various - forest, thickets, meadows, dry to moist soils.

Similar native species: Native dogwoods, which lack the thorny "tip". Native dogwoods are truly opposite in arrangement of twigs; only alternate leaved (pagoda) dogwood has alternate branching.

dog-strangling vine

(Cynanchum rossicum & C. nigrum)

Plant type: Herb, twining vine

Arrangement: Opposite

Leaf: Lance shaped, smooth margin (edge)

Bark: n/a

Seed/Flowers: Bean shaped seed pod with seeds attached to downy 'umbrellas'. Flowers - pink (C. rossicum) or purple (C. nigrum) with five petals.

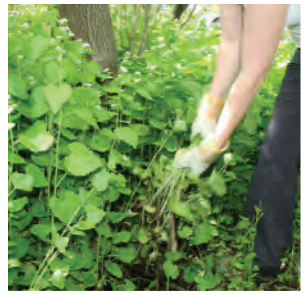
Buds/Twigs: n/a

Habitat: Dry to moist soils; more dominant in meadows and woodland edges.

Similar native species: Swamp milkweed (Asclepias incarnata spp.), is an upright plant, typically found in wetland habitats.

garlic mustard

(Alliaria petiolata)



Plant type: Herb

Arrangement: Alternate

Leaf: Saw tooth like edge, elongated heart shape. Garlic/onion smell when crushed. Leaves are kidney shaped with prominent veins.

Bark: n/a

Seed/Flowers: Cluster of small white flowers with four petals. Small black < 1 mm rounded seed found in elongated 'tube-like' seed pods (similar to a bean pod).

Buds/Twigs: n/a

Habitat: Various – dry to moist soils, in all habitat types, less often in meadows.

Similar native species: n/a

japanese knotweed

(Polygonum cuspidatum)



Plant type: Herb, 2 - 4 m in height.

Arrangement: Alternate

Leaf: Tear drop shaped, sharp pointed, dark green, flattened at base.

Bark: n/a

Seed/Flowers: Flowering stalk of many small greenish-white flowers.

Buds/Twigs: Large plant with a ‘bamboo-like’ stem. Stem light green maturing to tan colour.

Habitat: Moist to wet soils found in wetlands, water-courses and roadside ditches.

Similar native species: None.

common reed

(Phragmites australis)



Plant type: Grass

Arrangement: Alternate

Leaf: Broad leaf > 1 cm wide.

Bark: n/a

Seed/Flowers: Dense cascading ‘broom-like’ flower head. ‘Cottony’ in appearance when mature.

Buds/Twigs: Stems rough and ridged, ligule a densely hairy band. Mature plants > 3 m tall.

Habitat: Moist to wet soils. Found in wetlands, water- courses and road side ditches.

Similar native species: Species of mannagrass (Glyceria sp) including tall northern, eastern and rattlesnake grass. A native common reed exists but has a smooth stem and the ligule is not hairy. It is also quite rare.

giant hogweed

(Heracleum mantegazzianum)

Plant type: Herb. Mature plants can be over 3m tall.

Arrangement: Alternate

Leaf: Lobed leaf 1-2 m wide, lobes sharp-pointed.

Bark: n/a

Seed/Flowers: Small, white flowers in a large umbrella-shaped cluster, .75 m wide.

Buds/Twigs: Hairy stem with purple spots.

Habitat: Fresh to wet soils in forests, swamps, meadows, marshes.

Similar native species: Cow parsnip *(Heracleum maximum)* – has smaller flowers, no purple spots on stems.Angelica (Angelica atropurpurea) has a rounded-topped flower cluster and leaves divided into many leaflets.

Do not touch this plant because it is poisonous. If you do, wash your skin immediately in cool soapy water and do not expose the area to sunlight.

Seek professional advice before removing.

Identification of Invasive Plants found in Ontario Photos by:

Credit Valley Conservation, Greg Bales, Ken Towle, Patrick Hodge,

Ontario Federation of Anglers and Hunters, Francine Macdonald, Matt Smith

Ontario
Invasive Plant Council

APPENDIX C: BUTTERNUT HEALTH ASSESSMENT REPORT

Enclosures:

1. Information from the Ministry of Natural Resources and Forestry about Butternut and the *Endangered Species Act, 2007*
2. Butternut Health Assessor's Report
3. Original data forms
4. Electronic and printed copies of the Excel data spreadsheet (BHA Tree Analysis)

species at risk

Butternut Trees on Your Property

INTRODUCTION

The Ministry of Natural Resources is streamlining and automating its approvals processes for natural resource-related activities – with the goal of providing individuals and businesses with faster and more efficient service delivery.

This fact sheet provides information about regulatory provisions under the Endangered Species Act (ESA) for activities that may impact butternut trees.

The ESA provides protection for endangered or threatened species in Ontario. Some activities that would otherwise contravene the ESA may be eligible to proceed without a permit from the Ministry of Natural Resources provided that regulatory conditions for the ongoing protection of species at risk and their habitats are met.

ACTIVITIES THAT MAY AFFECT BUTTERNUT

Anyone intending to cut down or harm butternut trees may be able to follow the rules set out in the regulation, depending on the health of the trees as determined by a qualified butternut health assessor and the number of trees impacted. In some cases, this will include a requirement for the person to register with the Ministry of Natural Resources. A permit under the ESA is not required if the rules in regulation are followed for all eligible activities.

What is a "qualified butternut health assessor?"

A butternut health assessor is a person designated by the Ministry of Natural Resources for the purpose of assessing whether, and the extent to which, butternut trees are affected by a disease called butternut canker.

What are the categories for butternut trees?

A qualified butternut health assessor must inspect and report on the tree, and then assign it to one of three categories, based on the tree's condition or value as a genetic resource. The categories are:

- Category 1: the tree is in an advanced state of disease from butternut canker and is considered "non-retainable."
- Category 2: the tree does not have butternut canker, or the disease is not as advanced and the tree is considered "retainable."
- Category 3: the tree may be useful in determining sources of resistance to butternut canker and is considered "archivable." This regulation does not apply to Category 3 trees.

species at risk

What activities are eligible?

This section may apply to anyone who is proposing an activity the may have an impact on a butternut tree. The butternut must be assessed by a qualified butternut health assessor, and the regulation may apply depending on the number of trees proposed to be affected, and the category of the tree.

A person may be eligible if the activity affects Category 1 trees or 10 or fewer Category 2 trees.

A person is not eligible for the regulation and must obtain an ESA authorization if the activity affects a Category 3 tree, or more than 10 Category 2 trees.

What activities are not eligible?

- A person cannot affect more than 10 Category 2 trees identified in the butternut health assessors report.
- The regulation does not apply if a person has been previously exempted to remove 10 butternut trees, identified by a butternut health assessor as Category 2 trees and the location of the trees are in the same area or close proximity, the person is proposing to have an impact on additional butternut trees for the same or similar reasons.

What are the rules in regulation?

At least 30 days before any butternut is killed, harmed or taken:

- A designated butternut health assessor must;
- complete an assessment for each butternut tree in accordance with the "Butternut Assessment Guidelines: Assessment of Butternut Tree Health for the Purposes of the Endangered Species Act, 2007" published by the Ministry of Natural Resources and designate it as Category 1, 2, or 3;
- provide a written report of the assessment in accordance with those guidelines.
- The person proposing to carry out the activity must send the report of the butternut health assessor to the appropriate MNR District Manager and allow MNR staff to access the site during that time, if requested.

After the 30 day period has passed, the person may carry out activities on any Category 1 trees identified in the report.

If 10 or fewer Category 2 trees are affected (and the activity is not otherwise ineligible), the person carrying out the activity must:

- Register using the Notice of Butternut Impact form on the Registry.
- Follow the rules in regulation including:
  - Plant replacement trees to benefit butternut using best management practices outlined in the regulation.
  - Conduct monitoring and tending of the seedlings that are planted.
  - Keep required records.

Please refer to **Legal/Technical Background** below for a summary of these conditions.

species at risk

LEGAL/TECHNICAL BACKGROUND

The following is a summary of the conditions in the regulation that must be fulfilled to allow eligible activities, and is for information purposes only. Please refer to O.Reg. 242/08 section 23.7 at e-laws.gov.on.ca for the full legal text.

Summary of Conditions

Actions to Benefit Butternut:

The person must provide a benefit for butternut by carrying out these activities:

- follow planting ratios as described in the regulation for replacing the trees, based on the size of the tree(s) and whether the tree is being killed and taken or harmed;
- follow the rules in regulation regarding seed origin, timing of planting, soil characteristics, companion trees plantings and spacing requirements; and,
- replace planted butternut that die within two years of planting the seedling.

Monitoring and Tending:

The person must monitor and tend the planted butternut trees by following requirements described in the regulation:

- monitor planted trees once annually for two years between May 15 and September 20 to assess the health of each tree;
- tend each butternut tree planted once a week during the first growing season (May 15 – September 20) which includes maintenance of tree guards, vegetation control and watering; and,
- tend each butternut tree planted in the second growing season as required by completing vegetation control and watering.

Records:

The person must maintain a record of planting, monitoring and tending activities for every planted butternut tree and provide this record to MNR should it be requested. This record must include planting dates, dates and description of monitoring and tending activities and the health status of each tree, including any signs of butternut canker.

IMPORTANT LINKS

For more information about Ontario's species at risk, visit **ontario.ca/speciesatrisk.**

FOR MORE INFORMATION

1-855-613-4256
Email: mnr.rasc@ontario.ca

Ministry of Natural Resources and Forestry

Species At Risk
P.O. Box 7000, 300 Water Street
Peterborough ON K9J 8M5

Ministère des Richesses naturelles et des Forêts

Espèces en péril
C.P. 7000, 300, rue Water
Peterborough ON K9J 8M5

The enclosed Butternut Health Assessor's Report documents the results of the Butternut health assessment that was conducted by the designated Butternut Health Assessor (BHA) identified in the top section of the report. If there are other Butternut trees (of any size or age) at the site that may be affected by the activity and they are not identified in the enclosed BHA Report, they too must be assessed by a designated BHA.

Butternut is listed as an endangered species on the Species at Risk in Ontario List, and as such, it is protected under the *Endangered Species Act, 2007* (ESA) from being killed, harmed, or removed. If you are planning to undertake an activity that may affect Butternut, you may be eligible to follow the requirements set out in section 23.7 of Ontario Regulation 242/08 under the ESA, or you may need to seek an authorization under the ESA (e.g., a permit).

Please visit e-laws at the link provided below for the legal requirements of eligible activities under section 23.7 of Ontario Regulation 242/08 and conditions that must be fulfilled. Information about Butternut is also available at: http://www.ontario.ca/environment-and-energy/butternut-trees-your-property.

If you are eligible to kill, harm or take Butternut under section 23.7 of the regulation, your first step is to submit the BHA Report and the original data forms enclosed in this package to the local Ministry of Natural Resources and Forestry (MNRF) District Manager. Note that MNRF cannot accept photocopies or scanned electronic copies of the data forms.

Note regarding changes:

If the enclosed BHA Report does not identify which Butternut tree(s) are proposed to be killed, harmed, or taken in Table 1 (i.e., if "unknown" is indicated in the second last column of Table 1), or, if the information in the last two columns of Table 1 has changed since the date this BHA Report was produced, **do not make any edits to the BHA Report**. Instead, please attach a cover letter that identifies which Butternut tree(s) are proposed to be killed, harmed, or taken (by referencing the tree identification numbers) when you submit the enclosed BHA Report to the local MNRF District Manager.

The BHA Report must be submitted at least 30 days prior to registering an eligible activity to kill, harm, or remove a Butternut tree. During this 30 day period, no Butternut trees (of any category) may be killed, harmed, or removed, and MNRF may contact you for an opportunity to examine the trees. If MNRF chooses to examine the trees, a representative of MNRF will contact you using the information you supplied when you submitted the BHA Report.

If you are eligible to follow the rules in regulation under section 23.7, you may register your activity using the "Notice of Butternut Impact" form on the MNRF Registry **after the 30 day period has elapsed**.

If you are **not** eligible to follow the rules in regulation under section 23.7, please contact the local MNRF district office to determine whether you will need to seek an authorization (e.g., a permit). A link to the directory of MNRF offices is provided below.

Note that municipal by-laws and legislation other than the ESA may also be applicable to the removal or harming of trees.

Please retain this information and a copy of the BHA Report (including copies of all data forms) for your records, along with any other documentation you may receive from MNRF should an examination of the trees occur. If you have any questions, please contact your local MNRF district office.

Links:

Endangered Species Act, 2007:
http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_07e06_e.htm

Ontario Regulation 242/08 (refer to section 23.7):
http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080242_e.htm

MNRF Office Locations:
https://www.ontario.ca/government/ministry-natural-resources-and-forestry-regional-and-district-offices

Butternut Health Assessor's Report Number: 289-006

Heather Lunn BHA #289
1909 Sixth Line Road
Dunrobin, Ontario
K0A 1T0
343-262-4769
heather.lunn@gmail.com

Maurice DeCaria
Perthmore Development Co. Ltd.
80 Dufferin St.
P.O. Box 20054
Perth, ON
K7H 3M6
(416) 697-3804
Maurice@perthmore.com

Site location: Lot 03 Concession 02 Geographic Township of Drummond, Town of Perth

Date(s) of Butternut health assessment: June 22, 2019
Date BHA Report prepared: August 30, 2019

Map datum used: NAD83 WGS84

Total number of trees assessed in this BHA Report: 1

The assessed trees were numbered on site using white flagging tape and numbered on the flagging tape with a black marker. The numbers at the site correspond to the tree numbers referenced in this report.

This BHA Report includes the following tables:

- Table 1: Butternut Trees Assessed
- Table 2: Trees Determined by BHA to be Butternut Hybrids
- Table 3: Summary of Assessment Results

Table 1: Butternut Trees Assessed

Tree #	UTM coordinates	Category *(1, 2, or 3)*	dbh (cm)	Cultivated? *(Y/N)*	Proposed to be: *(enter one: unknown, killed, harmed or taken)*	If tree is proposed to be killed, harmed, or taken, indicate reason tree is proposed to be killed, harmed or taken:
1	18T 401236 4974211	2	62	N	Unknown	N/A

Table 2: Trees Determined by BHA to be Butternut Hybrids

Tree #	UTM coordinates	Method used (genetic testing or field identification):

Table 3: Summary of Assessment Results

Result:	Total #:	Important information for persons planning activities that may affect Butternut:
Category 1	0	• A Category 1 tree is one that is affected by butternut canker to such an advanced degree that retaining the tree would not support the protection or recovery of butternut in the area in which the tree is located; and is considered "non-retainable". • During the 30 day period that follows your submission of this BHA Report to the MNRF District Manager, no Butternut trees (of Category 1, 2, or 3) may be killed, harmed, or taken, and MNRF may contact you for an opportunity to examine the trees. • Category 1 trees may be killed, harmed or taken **after** the 30 day period that follows submission of this BHA Report to the MNRF District Manager, unless the results of an MNRF examination indicate that the assessment has not been conducted in accordance with the document entitled "Butternut Assessment Guidelines: Assessment of Butternut Tree Health for the Purposes of the *Endangered Species Act, 2007*".
Category 2	1	• A Category 2 tree is one that is not affected by Butternut Canker, or is affected by Butternut Canker but the degree to which it is affected is not too advanced and retaining the tree could support the protection or recovery of butternut in the area in which the tree is located, and is considered "retainable". • During the 30 day period that follows your submission of this BHA Report to the MNRF District Manager, no Butternut trees (of Category 1, 2, or 3) may be killed, harmed, or taken, and MNRF may contact you for an opportunity to examine the trees. • Activities that may kill, harm or take up to a **maximum of ten (10)** Category 2 trees may be eligible to follow the rules in section 23.7 of Ontario Regulation 242/08, in accordance with the conditions and requirements set out in the regulation. • Refer to e-Laws for the legal requirements of eligible activities under section 23.7 of Ontario Regulation 242/08 and conditions that must be fulfilled: http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080242_e.htm • Activities that may kill, harm or take more than ten (10) Category 2 trees are not eligible to follow the rules in section 23.7 of Ontario Regulation 242/08. Contact the local MNRF district office for information on how to seek an ESA authorization (e.g., a permit) or consider an alternative that would be eligible for the regulation.
Category 3	0	• A Category 3 tree is one that may be useful in determining sources of resistance to Butternut Canker, and is considered "archivable". • Category 3 trees are not eligible to be killed, harmed or taken under section 23.7 of Ontario Regulation 242/08. • Contact the local MNRF district office for information on how to seek an ESA authorization, or consider an alternative that will avoid killing, harming or taking any Category 3 trees.
Cultivated	0	• An activity that involves killing, harming, or taking a cultivated Butternut tree that was not required to be planted to fulfill a condition of an ESA permit or a condition of a regulation, may be eligible for the exemption provided by subsection 23.7 (11) of O. Reg. 242/08. • Prior to undertaking the activity, the owner or occupier of the land on which the Butternut is located (or person acting on their behalf) will need to determine whether the exemption for cultivated trees is applicable by determining whether or not the tree was cultivated as a result of the requirements for an exemption under O. Reg. 242/08 or a condition of a permit issued under the ESA. This information can be accessed by contacting the local MNRF district office. • The owner or occupier of the land on which the Butternut is located (or person acting on their behalf) is encouraged to append the details regarding whether the tree was planted to satisfy a requirement (e.g., the permit number or registration number) to this BHA Report for their records.
Hybrid	0	• Hybrid Butternut trees are not protected under the ESA, but their removal may be subject to municipal by-laws and other legislation.

Butternut Health Assessor's Comments:

This concludes the summary of the BHA Report. A complete BHA Report must also include:

1. All original (hard copy) data forms (i.e., all completed sets of Form 1 and Form 2), and
2. Electronic and printed copies of the Excel data analysis spreadsheet.

0cm 3cm 15cm

Butternut Data Collection Form 1 - 2010 Edition

Surveyor ID or BHA # 289

(PLEASE USE BLOCK LETTERS)

Date (dd/mm/yyyy) 12-06-2019

Shaded fields are mandatory for Butternut Health Assessments

Surveyor Contact

First HEATHER Last CUNN

Email HEATHER@ALHG.CA

Telephone (343)262-4769 Telephone Other ( ) - x

Property Owner (check if same as surveyor) ☐

First MAURICE Last DECARIA

or Company

Email MAURICE@PERTHMORE.COM

Telephone (613)466-0589 Telephone Other ( ) - x

Property Owner's Mailing address

Address 80 DUFFERIN STREET 20054 Postal Code K7H3M6 Prov. ON

City PERTH

Tree Location (if different from mailing address)

Address/(911#)

Township DRUMMOND Lot 03 Con 02

City PERTH

Directions

☐ Yes ☒ No Can Share Location Information with other Butternut Recovery Organizations?

☒ Yes ☐ No Site visits OK? (prior arrangments will always be made for a site vist)

> (Greater than)
< (Less than)

Butternut Trees Tally by Diameter Class

(Do a dot tally in blank space; write total# in box for each)

Tree Condition	< 3 cm	3-15 cm	16-30cm	>30 cm
Vigorous: > 50% Live Crown Minor or no cankers				01
Poor Vigor: <50% Live Crown or >50% Live Crown + heavily cankered stem				
Dead				

Historically, do some trees produce seeds? ☐ Y ☐ N ☒ Unkown

Estimated area containing butternut for properties > 1 acre (0.4 hectares): 50 ☐ Acres ☒ Hectares

Overall Property Description (area(s) containing Butternut)

☐ Rolling Upland ☒ Bottomland
☐ Valley Slope ☐ Variable
☐ Tableland ☐ Unknown

Vegetation Community/ies

☐ Open ☐ Fencerow
☐ Shrubland ☐ Roadside
☒ DeciduousForest ☐ Quary
☐ ConiferForest ☐ UrbanYard
☐ MixedForest ☐ UrbanPark

Other

Soil Drainage

☐ Well Drained
☒ Moderately Drained
☐ Poorly Drained
☐ Unknown

Soil Depth

☐ > 1metre
☐ 30 - 99cm
☐ < 30cm
☐ Variable
☒ Unknown

Soil Texture

☐ Clay ☐ Sand
☒ Clay Loam ☐ Variable
☐ Loam ☐ Unknown
☐ Loamy Sand

Please enter matching numerical page link code on forms 1 and 2

Page Link 006

(Contact Information follows all applicable privacy policies and guidelines)

Please return forms to:
Forest Gene Conservation Association
Suite 233, 266 Charlotte St.
Peterborough, ON, K9J 2V4
www.fgca.net

49731

Butternut Data Collection FORM 2 (2010 Edition) (PLEASE USE BLOCK LETTERS)

Shaded fields are mandatory for Butternut Health Assessments

Fill when Form 1 indicates canker is well established. The information opn Form 2 must be filled out for all trees when doing a Butternut Health Assessment.

001 Site Code(A,B,...Z, AA...) Surveyor ID or BHA # 289

Date (dd/mm/yyyy) 22-06-2019

Surveyor Last Name LUNN

Tree ID Numbering: 1,2,3,...Starting from 1 for each site

Tree # 001 Zone 18 Easting 401236 Northing 4974211

Crown Class [ ] Live Crown % 75 Main Stem Length(m) Below crown 04

- [x] Twig Dieback
- [x] Branch Dieback
- [x] Defoliation
- [ ] Discolouration

#Stems 1 DBH(cm) 62

Butternut Origin: [x] Natural [ ] Planted [ ] Unknown

Seed Signs: [ ] Male Flowers [ ] Female Flowers [ ] Seed Set [x] None

Assess below live crown: #Epic-Live 00 #Epic-Dead 00 Bark Type [ ] # Callused Wounds [ ]

	#Open	#Sooty
Root	02	00
=<2m	00	00
>2m	01	00

Metres from badly cankered tree: [ ] < 40 [ ] > 40 [x] None Found

Competing Species: FRAXAME, QUERMAC, TILIAME

Tree # Zone 1 Easting Northing

Crown Class Live Crown % Main Stem Length(m) Below crown

- [ ] Twig Dieback
- [ ] Branch Dieback
- [ ] Defoliation
- [ ] Discolouration

#Stems DBH(cm)

Butternut Origin: [ ] Natural [ ] Planted [ ] Unknown

Seed Signs: [ ] Male Flowers [ ] Female Flowers [ ] Seed Set [ ] None

Assess below live crown: #Epic-Live #Epic-Dead Bark Type # Callused Wounds

	#Open	#Sooty
Root		
=<2m		
>2m		

Metres from badly cankered tree: [ ] < 40 [ ] > 40 [ ] None Found

Competing Species

Tree # Zone 1 Easting Northing

Crown Class Live Crown % Main Stem Length(m) Below crown

- [ ] Twig Dieback
- [ ] Branch Dieback
- [ ] Defoliation
- [ ] Discolouration

#Stems DBH(cm)

Butternut Origin: [ ] Natural [ ] Planted [ ] Unknown

Seed Signs: [ ] Male Flowers [ ] Female Flowers [ ] Seed Set [ ] None

Assess below live crown: #Epic-Live #Epic-Dead Bark Type # Callused Wounds

	#Open	#Sooty
Root		
=<2m		
>2m		

Metres from badly cankered tree: [ ] < 40 [ ] > 40 [ ] None Found

Competing Species

Tree # Zone 1 Easting Northing

Crown Class Live Crown % Main Stem Length(m) Below crown

- [ ] Twig Dieback
- [ ] Branch Dieback
- [ ] Defoliation
- [ ] Discolouration

#Stems DBH(cm)

Butternut Origin: [ ] Natural [ ] Planted [ ] Unknown

Seed Signs: [ ] Male Flowers [ ] Female Flowers [ ] Seed Set [ ] None

Assess below live crown: #Epic-Live #Epic-Dead Bark Type # Callused Wounds

	#Open	#Sooty
Root		
=<2m		
>2m		

Metres from badly cankered tree: [ ] < 40 [ ] > 40 [ ] None Found

Competing Species

Tree # Zone 1 Easting Northing

Crown Class Live Crown % Main Stem Length(m) Below crown

- [ ] Twig Dieback
- [ ] Branch Dieback
- [ ] Defoliation
- [ ] Discolouration

#Stems DBH(cm)

Butternut Origin: [ ] Natural [ ] Planted [ ] Unknown

Seed Signs: [ ] Male Flowers [ ] Female Flowers [ ] Seed Set [ ] None

Assess below live crown: #Epic-Live #Epic-Dead Bark Type # Callused Wounds

	#Open	#Sooty
Root		
=<2m		
>2m		

Metres from badly cankered tree: [ ] < 40 [ ] > 40 [ ] None Found

Competing Species

Please enter matching page link code on forms 1 and 2

Page Link 006

(Contact Information follows all applicable privacy policies and guidelines)

Please return forms to:
Forest Gene Conservation Association
Suite 233, 266 Charlotte St.
Peterborough, ON, K9J 2V4
www.fgca.net

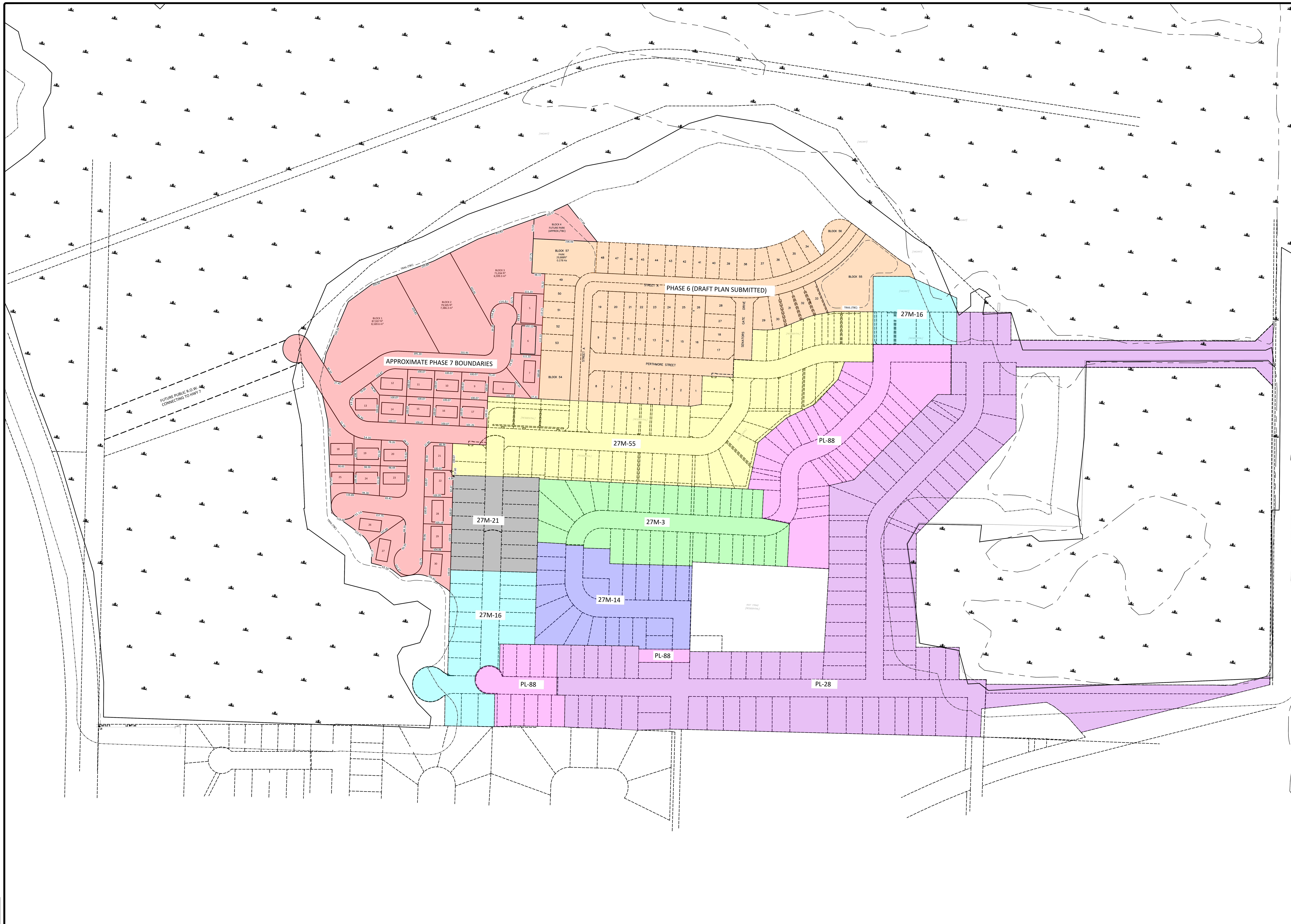
49731

BHA Tree Analysis (version: December 2013)

This table is to be completed by a designated Butternut Health Assessor (BHA).

BHA Report #	6	Assessment Date(s)	June 22, 2019	Total # Butternut Trees in BHA Report	1
BHA ID #	289	BHA Name	Heather Lunn		
Landowner / Client Name			Maurice Decaria		
Property Location	Lot 03 Concession 02 Drummond Geographic Township, Town of Perth				

input field data										automatic calculations from field data						Categories: 1: non-retainable, 2: retainable, 3: archivable				
			# bole cankers																	
			sooty (S) (will be assigned 2.5 cm per canker)		open (O) (will be assigned 5 cm per canker)		# root flare (RF) cankers			Circ. (cm) = Pi x dbh	total bole canker width (sooty x 2.5 + open x 5)	total RF canker width (sooty x 2.5 + open x 5)	bole canker % of circ.	RF canker % of circ.	total bole & root canker % of 2xCirc					
Tree #	Live Crown %	Tree dbh (cm)	S <2 m	S >2 m	O <2 m	O >2 m	RF S	RF O	<40 m from cankered tree? (Y or N)	Circ (cm)	BC (cm)	RC (cm)	BC%	RC%	BRC%	LC% >/= 50 & BC% = 0	LC% >70 & BRC% <20	LC % >70 & BC % <20	ary	FINAL TREE CALL a Cat 2, dbh>20cm <40m from a Cat 1
1	75	62	0	0	0	0	0	2		194.68	0.0	10.0	0.0	5.1	2.6	2	2	2	2	2
2										0	0.0	0.0								
3										0	0.0	0.0								
4										0	0.0	0.0								
5										0	0.0	0.0								
6										0	0.0	0.0								
7										0	0.0	0.0								
8										0	0.0	0.0								
9										0	0.0	0.0								
10										0	0.0	0.0								
11										0	0.0	0.0								
12										0	0.0	0.0								
13										0	0.0	0.0								
14										0	0.0	0.0								
15										0	0.0	0.0								
16										0	0.0	0.0								
17										0	0.0	0.0								



LEGEND

- EXISTING LEGAL FABRIC
- WETLAND 30m SETBACK
- FLOODPLAIN BOUNDARY
- CONCEPTUAL LINEWORK
- MNRF PROVINCIALLY SIGNIFICANT WETLAND
- APPROXIMATE BOUNDARIES OF REGISTERED PLAN 27M-21
- APPROXIMATE BOUNDARIES OF REGISTERED PLAN 27M-55
- APPROXIMATE BOUNDARIES OF REGISTERED PLAN 27M-3
- APPROXIMATE BOUNDARIES OF PHASE 6 DRAFT PLAN
- APPROXIMATE BOUNDARIES OF REGISTERED PLAN PL-28
- APPROXIMATE BOUNDARIES OF REGISTERED PLAN PL-88
- APPROXIMATE BOUNDARIES OF REGISTERED PLAN 27M-16
- APPROXIMATE BOUNDARIES OF REGISTERED PLAN 27M-14
- CONCEPTUAL PATHWAY

DISCLAIMER:

BOUNDARIES SHOWN ON THIS SITE PLAN ARE COMPILED FROM EXISTING PLANS, FOR THE PURPOSES OF CREATING A CONCEPTUAL SUBDIVISION LAYOUT ONLY . MCINTOSH PERRY DOES NOT CERTIFY THAT THE BOUNDARIES OF THE PROPERTY SHOWN ON THIS PLAN ARE ACCURATE WITHIN THE MEANING OF THE SURVEYS ACT. PROPER LEGAL SURVEY RE-ESTABLISHMENT OF ANY BOUNDARY LOCATIONS OF PROPERTIES ON THIS PLAN MUST BE COMPLETED BY AN ONTARIO LAND SURVEYOR WORKING WITHIN THE SURVEYS ACT, SURVEYOR'S ACT, AND LAND TITLES OR REGISTRY ACT AND REGULATIONS MADE THEREUNDER.

BUILDING ENVELOPES

LOTS 7-30 = 80' x 42'2"
LOTS 5 & 6 = 103'4"x 54'

NOTE: LOT DIMENSIONS DISPLAYED IN FEET

SCALE 1 : 2000
0 50 100 150 200 Metres

NORTH:

STAMP:

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revision/Issue	Date

McINTOSH PERRY
3240 Drummond Conc. 5A, R.R. #7
Perth, ON K7H 3C9
Tel: 613-267-6524 Fax: 613-267-7992
www.mcintoshperry.com

Designed by:	RP
Drawn by:	
Checked By:	BC
Scale:	1:2000

Client: PERTHMORE DEVLOPMENT CO. LTD

Project: PERTHMORE ESTATES - PHASE 7

Drawing Title: SUBDIVISION PLAN

Check and verify all dimensions before proceeding with the work

Do not scale drawings

Date: MAR.2023

Project Number: PP-13-9668-03

Drawing Number: CON1

DRAFT PLAN OF SUBDIVISION

OF
PART OF THE NORTHEAST HALF LOT 3
CONCESSION 2
GEOGRAPHIC TOWNSHIP OF DRUMMOND
NOW IN THE TOWN OF PERTH
COUNTY OF LANARK

TO BE SUBDIVIDED INTO:

LOTS 1,3,4,6,8,9,11,12,14,16,17,18,19,21,22,24,26,27,28,29,30,31,32,33,34,37,38
40,41,43,45,46,48,49 FOR SINGLE DETACHED RESIDENTIAL DWELLINGS

LOTS 2,5,7,10,13,15,20,23,25,35,36,39,42,44,47,50,51,52,53
FOR SEMI-DETACHED RESIDENTIAL DWELLINGS

BLOCK 54 FOR MEDIUM DENSITY
BLOCK 55 FOR STORMWATER MANAGEMENT
BLOCK 56 FOR STREET A CUL-DE-SAC
BLOCK 57 FOR PARKLAND

STREET A - 20 METRES WIDE
PERTHMORE STREET - 20 METRES WIDE
SENATORS GATE DRIVE - 20 METRES WIDE

APPLICANT AND PROPERTY OWNER

PERTHMORE ENTERPRISES INC.
C/O MAURICE DeCARIA
P.O. BOX 20054
PERTH, ON, K7H 3M6

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE THE PREPARATION AND SUBMISSION OF THIS PLAN TO THE COUNCIL OF THE COUNTY OF LANARK.

DATE

MAURICE DeCARIA
PERTHMORE ENTERPRISES INC.
I HAVE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE

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

DATE

JOHN GAUTHIER, O.L.S.

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT

A. AS SHOWN ON THE DRAFT PLAN
B. AS SHOWN ON THE DRAFT PLAN
C. AS SHOWN ON THE DRAFT PLAN
D. AS DESCRIBED ON THE TITLE BLOCK
E. AS SHOWN ON THE DRAFT PLAN
F. AS SHOWN ON THE DRAFT PLAN
G. AS SHOWN ON THE DRAFT PLAN
H. PIPED MUNICIPAL WATER SUPPLY IS AVAILABLE TO SERVICE THE PROPERTY
I. GENERALLY SANDY/SILTY SOILS, WITH GRAVEL AND SHALLOW BEDROCK
J. AS SHOWN ON THE DRAFT PLAN
K. PIPED MUNICIPAL WATER AND WASTEWATER SERVICES ARE AVAILABLE TO SERVICE THE PROPERTY
L. NO RESTRICTIONS APPLY

SCHEDULE OF AREAS

LOT/BLOCK	AREA (m^2)	TYPE
1	468	SINGLE DETACHED
2	674	SEMI-DETACHED
3	481	SINGLE DETACHED
4	472	SINGLE DETACHED
5	673	SEMI-DETACHED
6	429	SINGLE DETACHED
7	665	SEMI-DETACHED
8	587	SINGLE DETACHED
9	589	SINGLE DETACHED
10	649	SEMI-DETACHED
11	482	SINGLE DETACHED
12	430	SINGLE DETACHED
13	675	SEMI-DETACHED
14	430	SINGLE DETACHED
15	675	SEMI-DETACHED
16	522	SINGLE DETACHED
17	674	SINGLE DETACHED
18	528	SINGLE DETACHED
19	589	SINGLE DETACHED
20	649	SEMI-DETACHED
21	482	SINGLE DETACHED
22	430	SINGLE DETACHED
23	675	SEMI-DETACHED
24	430	SINGLE DETACHED
25	675	SEMI-DETACHED
26	522	SINGLE DETACHED
27	524	SINGLE DETACHED
28	657	SINGLE DETACHED
29	703	SINGLE DETACHED
30	515	SINGLE DETACHED
31	596	SINGLE DETACHED
32	514	SINGLE DETACHED
33	547	SINGLE DETACHED
34	483	SINGLE DETACHED
35	682	SEMI-DETACHED
36	682	SEMI-DETACHED
37	603	SINGLE DETACHED
38	702	SINGLE DETACHED
39	685	SEMI-DETACHED
40	535	SINGLE DETACHED
41	522	SINGLE DETACHED
42	675	SEMI-DETACHED
43	430	SINGLE DETACHED
44	675	SEMI-DETACHED
45	430	SINGLE DETACHED
46	482	SINGLE DETACHED
47	649	SEMI-DETACHED
48	482	SINGLE DETACHED
49	456	SINGLE DETACHED
50	649	SEMI-DETACHED
51	649	SEMI-DETACHED
52	649	SEMI-DETACHED
53	649	SEMI-DETACHED
BLOCK 54	1,928	MEDIUM DENSITY
BLOCK 55	4,809	STORMWATER MANAGEMENT
BLOCK 56	701	STREET A CUL-DE-SAC
BLOCK 57	2,776	PARKLAND
TOTAL LOT/BLOCK AREA (m^2)		**40,590**

STREET	AREA (m^2)	LENGTH (m)
STREET A	9,997	500
PERTHMORE STREET	3,310	163
SENATORS GATE DRIVE	1,436	70
TOTAL SUBDIVISION AREA (m^2)		**55,333.41**

BEARINGS & ELEVATIONS

BEARINGS ARE GRID BEARINGS DERIVED FROM REAL TIME NETWORK OBSERVATIONS, AND ARE REFERRED TO THE CENTRAL MERIDIAN OF MTM ZONE 9 (76° 30' WEST LONGITUDE) NAD 83 (CSRS) (1197.0).

ELEVATIONS AND TOPOGRAPHIC FEATURES SHOWN ON THIS PLAN HAVE BEEN DERIVED FROM DIGITAL IMAGERY FILES RECEIVED FROM THE ONTARIO MINISTRY OF NATURAL RESOURCES AND FORESTRY (MNRF) DATED 2019.

SCALE 1 : 500

0 10 20 30 40 50 Metres

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

REVISIONS

No.	DESCRIPTION	DATE	BY

TABLE OF P.I.N.'S

NUMBER	BLOCK 05165-
P1	0760(LT)
P2	0694(LT)
P3	0693(LT)
P4	0692(LT)
P5	0691(LT)
P6	0690(LT)
P7	0689(LT)
P8	0688(LT)
P9	0687(LT)
P10	0685(LT)
P11	0684(LT)
P12	0683(LT)
P13	0682(LT)
P14	0681(LT)
P15	0680(LT)
P16	0679(LT)
P17	0678(LT)
P18	0743(LT)
P19	0744(LT)
P20	0745(LT)
P21	0746(LT)
P22	0741(LT)
P23	0740(LT)
P24	0739(LT)
P25	0738(LT)
P26	0729(LT)
P27	0737(LT)

LEGEND AND NOTES
(IF APPLICABLE)

□	DENOTES	MONUMENT PLANTED
■	DENOTES	MONUMENT FOUND
IB	DENOTES	IRON BAR
SIB	DENOTES	STANDARD IRON BAR
SSIB	DENOTES	SHORT STANDARD IRON BAR
RPL	DENOTES	ROCK PLUG
RIB	DENOTES	ROUND IRON BAR
WIT	DENOTES	WITNESS
ACC.	DENOTES	ACCEPTED
(1352)	DENOTES	B.W. KERR, OLS
(MPS)	DENOTES	McINTOSH PERRY SURVEYING INC.
(OU)	DENOTES	UNKNOWN ORIGIN
(S/T)	DENOTES	SUBJECT TO
BF	DENOTES	BOARD FENCE
CLF	DENOTES	CHAIN LINK FENCE
PWF	DENOTES	POST AND WIRE FENCE
RF	DENOTES	RAIL FENCE
N,S,E,W	DENOTES	NORTH, SOUTH, EAST, WEST
R.P.	DENOTES	REGISTERED PLAN
	DENOTES	EXISTING LEGAL FABRIC
	DENOTES	PROPOSED LOT/BLOCK BOUNDARY
18.50	DENOTES	PROPOSED LOT/BLOCK DIMENSION
133.75	DENOTES	ORIGINAL GROUND CONTOUR (MNRF MAPPING)
	DENOTES	MNRF PROVINCIALLY SIGNIFICANT WETLAND
	DENOTES	30m SETBACK FROM MNRF PSW
	DENOTES	100yr FLOODPLAIN (FROM RVCA)

McINTOSH PERRY
SURVEYING INC.
3240 Drummond Con. 5A, R.R. #7, Perth, ON K7H 3C9
Tel: 613-267-6524 Fax: 613-267-7992
www.mcintoshperry.com

PROJECT				DRAWN: SH
PERTHMORE DEVELOPMENT				CHECKED: JG
DATE: MAY 10, 2023	PAPER SIZE: 36" x 54"	SCALE: 1:500	PROJECT No.: 19-4081	DWG. No.: 01

U:\PERTH\MPSI CORRESPONDENCE\2019 JOBS\19-4081 MPCE _PERTHMORE_BOUNDARY PLAN\DRAFT PLAN\CAD\DRAWINGS\UPDATED (MAY.2023)\D19-4081 DRAFT PLAN_REV-3_WORKING (MAY.10.2023).DWG
May 10, 2023 1:52:23 PM

LEGEND

ENVIRONMENTAL PROTECTION AREA	EP
RESIDENTIAL FIRST DENSITY HOLDING	R1h
RESIDENTIAL THIRD DENSITY	R3
OPEN SPACE	OS
RESIDENTIAL FOURTH DENSITY	R4

NORTH:

STAMP:

No.	Revision/Issue	Date

McINTOSH PERRY
3240 Drummond Cons 5A, R.R. #7, Perth, ON K7H 3C9
Tel: 613-267-6524 Fax: 613-267-7992
www.mcintoshperry.com

Designed by:
Drawn by: SH
Checked By: BC
Scale: 1:500

Client: PERTHMORE DEVLOPMENT CO. LTD
Project: PERTHMORE ESTATES - PHASE 6

Drawing Title:
ZONING BYLAW AMENDMENT SKETCH

Check and verify all dimensions before proceeding with the work
Do not scale drawings

Date: MAY.18.2023
Project Number: PP-13-9668
Drawing Number: 01

PRELIMINARY SERVICING AND STORMWATER MANAGEMENT REPORT
PERTHMORE SUBDIVISION - PHASE 6

Project No.: 0PP-13-9668-01
October 2023 (Rev. 04)

Prepared for:

Perthmore Development Co.
P.O. Box 20054
80 Dufferin Street
Perth, ON K7H 0B5

Prepared by:

McIntosh Perry Consulting Engineers Ltd.
115 Walgreen Road
Carp, Ontario K0A 1L0

MCINTOSH PERRY

TABLE OF CONTENTS

LIST OF TABLES

APPENDICES

1.0 PROJECT DESCRIPTION

1.1 Purpose

McIntosh Perry (MP) has been retained by Perthmore Developments Co. to prepare this Preliminary Servicing and Stormwater Management Report in support of the Draft Plan of Subdivision Application for Phase 6 of the Perthmore Subdivision in Perth, Ontario.

The main purpose of this report is to present preliminary servicing options for the development in accordance with the recommendations and guidelines provided by the Ministry of the Environment, Conservation and Parks (MECP), Rideau Valley Conservation Authority (RVCA) and the Town of Perth (Town). This report will address the servicing for the entire development so that an overall servicing scheme can be presented, ensuring that existing and available services will adequately service the proposed development.

1.2 Site Description

The subject property is generally located within the northeastern quadrant of the Town of Perth and south of Provincial Highway 7. The property is legally described as Part of the northeast and southwest halves of Lot 3 and the southwest half of Lot 4, Concession 2, within the geographic Township of Drummond now in the Town of Perth and part of Block 15 registered plan 27M-21. This phase of development encompasses approximately 5.40 hectares and is bound by vacant land to the north and east, and by the existing phases of the subdivision immediately to the south and west. Refer to the Draft Plan of Subdivision in Appendix 'A' for more details.

The topography of the site varies with a ridge generally bisecting the property near the western limit and splitting the drainage in easterly and westerly directions. The elevation generally slopes off near the eastern limit at the proposed cul-de-sac of Street A. The land is generally overgrown with a variety of grass, shrubs and bush along with some trees located at the northeast portion of the site. At the time of writing of this report, portions of the property have been cleared or are in the process of being cleared.

Phase 6 is made up of 53 lots with 34 single family homes, 38 semi-detached units (18 lots) and 1 apartment block with 14 units. There is also approximately 725 meters of associated municipal roadway and municipal services. The Town and the RVCA will be reviewing and approving this report as part of the Draft Plan of Subdivision Application.

2.0 BACKGROUND INFORMATION

Background studies that have been completed for the site include review of as-built drawings, a topographical survey of the site, along with servicing and stormwater reports from previous phases of the development.

Various as-built drawings, design drawings and design calculations for the existing subdivision services were reviewed in order to determine proper servicing schemes for the site.

A topographic survey of the site was completed by MPSI dated August 2020 and was used to identify the existing drainage characteristics and to delineate catchment areas.

The following reports have previously been completed and are available under separate cover:

- Drainage Design Report – Perthmore Subdivision Phase 3 prepared by McIntosh Hill dated March 1998.
- Sanitary Sewer Report – Perthmore Subdivision Phase 3 prepared by McIntosh Hill dated February 1998.
- Stormwater Management Report – Perthmore Subdivision Phase 4 prepared by McIntosh Perry dated September 12, 2002
- Preliminary Stormwater Management Report – Perthmore Subdivision Phase 5 prepared by McIntosh Perry dated February 17, 2004

3.0 EXISTING SERVICES

Phase 6 of the Perthmore Subdivision will be serviced partially via existing services and infrastructure within the existing phases of the development. The majority of the proposed development will be serviced by the newly proposed storm sewers and an associated stormwater management facility.

Existing services within Senators Gate Drive include a 200mm sanitary sewer, a 200mm watermain and a 450mm storm sewer. Existing services within Perthmore Street include a 200mm sanitary sewer, a 300mm watermain and a 525mm storm sewer. Stubs have been left at the intersection of Senators Gate Drive and Perthmore Street. There are stubs extending in both the northeast and northwest directions. Stubs have also been left at the intersection of Senators Gate Drive and Street B. The storm sewer at this intersection is a 300mm and the sanitary and water are both 200mm in diameter.

A newly proposed stormwater management pond will be constructed to service Phase 6. Previous discussions of reconstructing the Phase 5 pond have been eliminated due to sizing constraints that push the pond too close to the existing wetland. The proposed facility is located outside of the wetland setback.

Gas, hydro, cable and telephone utilities are available nearby and locations will be confirmed from respective utility companies during detailed design process.

4.0 SERVICING PLAN

4.1 Proposed Servicing Overview

The overall servicing of Phase 6 of the subdivision will be accomplished through multiple connections to the existing stubs as detailed below. See below for more details pertaining to each specific service.

4.2 Watermain Design

Water servicing for the proposed development will be accomplished through connections at three locations: to the existing 200mm stub at the intersection of Senators Gate Drive and Street A and to the existing 300mm and 200mm stubs at the intersection of Senators Gate Drive and Perthmore Street. The watermain will be 200mm in diameter throughout Phase 6. Flow control valves will be installed as required. See *Drawing 100 – General Plan of Services* for details pertaining to the layout of the watermain.

Fire hydrants will be located on-site as required. The fire hydrants will be spaced 90m to 180m apart in order to meet municipal firefighting requirements. The fire hydrants will be owned and operated by the Town. Individual water services will be installed and will be Pex conforming to AWWA C904. Curb stops will be installed on all water services on the property line, away from driveways and any aboveground utilities. All watermains and associated structures will be designed and constructed per the design criteria detailed in the Design Guidelines for Drinking-Water Systems 2008 by the MECP and constructed per the Ontario Provincial Standard Details (OPSD’s).

The watermain is designed to have a minimum of 2.4m cover and when crossing over or under utilities the watermain will have a minimum 0.3m clearance. A minimum horizontal separation of 2.5m (from pipe wall to pipe wall) will be maintained between the proposed watermain and storm/sanitary mains.

Water demands have been calculated per MECP Design Guidelines for Drinking-Water Systems 2008. The population for Phase 6 is calculated as 243.4 people creating the following demands:

- Average Day Flow = 47.33 L/min
- Max. Day Flow = 130.15 L/min
- Peak Hourly Flow = 195.46 L/min

Water demands which account for the anticipated population from the future development areas have also been completed using a population of 570.4 people creating the following demands:

- Average Day Flow = 110.91 L/min
- Max. Day Flow = 305.01 L/min
- Peak Hourly Flow = 458.06 L/min

See *Water Demands Sheets 1 and 2* in Appendix ‘B’ of this report for more details.

Prior to connecting to the municipal water distribution system, it is essential to determine whether the system has adequate capacity and that the overall impact to the existing system is minimal. A WaterCAD model will be generated at the detailed design stage to confirm the capacity, pressure and size of pipes required to service the proposed site.

4.3 Sanitary Sewer Design

The sanitary sewers for the proposed development will flow by gravity to the existing sanitary sewers. Sanitary connections will be made to the stubs at the intersection of Senators Gate Drive and Perthmore Street. See *Drawing 100 – General Plan of Services* for details pertaining to the layout of the sanitary sewers.

The sanitary sewers within the new phase of development are 200mm diameter will be installed throughout with a minimum full flow target velocity (cleansing velocity) of 0.6 m/s and a full flow velocity of not more than 3.0 m/s. All sewers and associated structures will be designed and constructed per the design criteria detailed in the Design Guidelines for Sewage Works 2008 by the MECP and constructed per the Ontario Provincial Standard Details (OPSD's).

Design parameters for Phase 6 include an extraneous infiltration rate of 0.33 L/s/ha. Daily per capita flow rates of 280 L/p/d and residential densities of 3.4 persons per single unit, 2.7 persons per semi-detached units, 1.8 persons per apartment unit and 60 persons per net hectare of futured development blocks were used in the design of this development. The residential peaking factor used is based on the Harmon Equation, with a maximum of 4.0 and a minimum of 2.0.

Phase 6 of the subdivision has been accounted for in the design of sanitary sewers of previous phases. As noted above the new phase of the subdivision will have multiple sanitary outlets. Ultimately the flows will be directed towards the Treelawn Boulevard and to Garden Avenue sewer outlets. Within the *Perthmore Development Phase III – Sanitary Sewer Report*, dated February 1998 by McIntosh Hill, the Treelawn Boulevard and Garden Avenue Sewers have been sized to accommodate the full buildout of the Perthmore Subdivision.

It was assumed the total number of lots being serviced by the Treelawn Boulevard sewer would be 258 lots with a total flow of 17.6 L/s for the full build-out of the development. According to the previous report, the existing 200mm sanitary sewer within Treelawn Boulevard is sloped at 0.40%, therefore the total capacity of the pipe is approximately 21.6 L/s. Phase 6 of the development will generate a total flow of 5.07 L/s to be captured by the Treelawn Boulevard sanitary sewer.

See *Sanitary Sewer Design Sheet* and *PP-13-9668-01 – Sanitary Drainage Areas - SAN* in Appendix 'C' of this report for more details.

4.4 Storm Sewer Design

Stormwater runoff will be conveyed through curb and gutter and rear-yard swale networks towards catch basins, where it will be captured and conveyed into the new storm sewer network. The storm sewers are designed with a minimum of 1.5m cover. The storm sewer network within the subdivision is designed to accommodate a storm event with a 5-year return period. Storms in excess of this event will result in surcharging at catch basin and road sag locations. Stormwater runoff during these major events will be conveyed via overland flow routes within rear-yard swales and along the roadway, as is typical in subdivisions of this nature. A detailed lot grading and drainage plan will be prepared during the detailed design stage outlining the proposed drainage pattern within the subdivision.

The storm sewers within Phase 6 will flow via gravity to a newly proposed stormwater management facility located to the south of the Street A cul-de-sac at the eastern boundary of the property. Future development areas will require additional design to be carried out during their respective designs. See Drawing 100 – General Plan of Services for details pertaining to the layout of the storm sewers.

The storm sewers within this phase of development range in diameter from 250mm to 900mm and are designed with a minimum full flow target velocity (cleansing velocity) of 0.8 m/s (cleansing velocity) and a full flow velocity of not more than 3.0 m/s. No storm sewer will have a slope less than 0.1%. Appropriately sized maintenance holes will be installed at every change in pipe size or direction and will be spaced no more than 120m apart in order to facilitate cleaning and maintenance. All sewers and associated structures will be designed and constructed per the design criteria detailed in the Design Guidelines for Sewage Works 2008 by the MECP and constructed per the Ontario Provincial Standard Details (OPSD's).

A preliminary storm sewer design sheet was created using the rational method, which allows for the proper sizing of the storm pipes within the development. Drainage area information, along with respective pipe slopes and other necessary information was utilized to evaluate the performance of the storm sewer network. The time of concentration calculated for the storm sewer system is based on a 20-minute inlet time. Rainfall intensities were obtained from Intensity-Duration-Frequency (IDF) curves for the Town of Perth from the Ministry of Transportation (MTO).

The preliminary storm sewer design sheet identifies the 5-year flow that is conveyed through each pipe section of the storm sewer network. The peak flow and peak velocity are the maximum results based on gravity flow. Included in the sheet is the full flow capacity of the pipe and the associated full flow velocity when the pipe is under gravity flow condition. The peak flow was checked against the full flow capacity to ensure that each storm sewer pipe can convey the 5-year flow unrestricted.

The proposed storm sewer layout and approach is further detailed in Section 5.0 *Proposed Stormwater Management.*

See *Storm Sewer Design Sheet* and *PP-13-9668-01 - Storm Drainage Areas - STM* in Appendix D of this report for more details regarding pipe sizing.

4.5 Site Utilities

All relevant utility companies will be contacted prior to construction in order to confirm adequate utility servicing for the site. Existing utilities are present in prior phases of the development and will be extended to provide service for this phase.

4.6 Service Locations/Cover

The minimum cover for the sanitary, storm and water mains will be as follows:

Service	Minimum Cover
Sanitary Sewer	1.8m
Storm Sewer	1.5m
Watermain	2.4m

All minimum cover requirements are as per municipal standards. Separation distances between the storm, water and sanitary will be maintained as per the MECP requirements.

5.0 PROPOSED STORMWATER MANAGEMENT

5.1 Design Criteria and Methodology

In Ontario, the watershed-level management and planning are typically done using watershed plans, sub-watershed plans and/or individual stormwater management plans, in that order. The subject property is not covered by any specific watershed or sub watershed plans and has no existing stormwater controls in place. In the absence of such plans for the subject property, the MECP *Stormwater Management Planning and Design Manual* (March 2003) is used to govern the management of stormwater. This methodology promotes stormwater management from an environmentally sustainable perspective. The intent of the stormwater management plan is to provide adequate stormwater treatment for both quantity and quality control.

The following design criteria is established based on the Stormwater Management Manual, 2003:

- Stormwater quantity controls will be required to regulate the post-development peak flows to pre-development levels for all design storms including the 2-, 5-, 10-, 25-, 50-, and 100-year storm events,

- Stormwater quality controls will be required to achieve the “Enhanced” level of protection, which corresponds to 80% long term average removal of Total Suspended Solids (TSS) as recommended in the MECP SWMPD Manual, 2003;

Stormwater Best Management Practices (BMPs) will be implemented at the “lot level” and “conveyance” locations. These concepts are explained further in Section 5.7.1. To summarize, roof water will be directed to grass surfaces that in turn will be collected in enhanced grassed swales or in rear yard/roadway catch basins prior to entering into the proposed storm sewer network.

An existing stormwater management (SWM) pond is located on the northeast side of Perthmore Street as shown on Figure 1, below. In this upcoming phase of development, the existing SWM facility will be retained, and a new independent SWM pond will be built to fulfill the water quality and quantity control needs of the tributary drainage area.

5.2 Overall SWM Strategy

As the existing stormwater pond will continue to serve Phase 5, this new phase will look to direct all runoff towards a new end of pipe facility. The ultimate outlet for this site will remain consistent in being the Perth Long Swamp. Previous submissions for the Perthmore Subdivision Phase 6 Stormwater Management Plan faced hurdles because of the necessity to rebuild the existing Phase 5 pond. Meeting the surficial area requirements for a stormwater management (SWM) facility capable of handling Phase 5's runoff volume proved challenging, prompting an expansion toward the wetland boundary, which was ultimately rejected by the Rideau Valley Conservation Authority (RVCA). Consequently, a fresh approach has been developed to position the new pond outside the wetland boundary, while still ensuring it possesses the requisite capabilities to independently manage Phase 6's stormwater requirements.

An assembled Visual OTTHMO Version 6 (VO6) model was utilized for analysis, necessitating various measured and calculated input parameters, the calculations for which are outlined below.

5.3 Pre-Development Drainage

5.3.1 General

Since the pre-development land use was rural, the NASHYD command was employed in the VO5 model to calculate the runoff flows. NASHYD is used to simulate runoff flows with NASH instantaneous unit hydrograph. This hydrograph is made of a cascade of “n” linear reservoirs. The n (number of linear reservoirs) parameter was set at 3, in the model, and the rainfall losses were computed by the SCS CN procedure.

5.3.2 Time of Concentration/Time to Peak

The Time of Concentration (Tc), for the pre-development drainage basins, was calculated using the Airport Formula.

$$T_c = 3.26 * (1.1 - C) * L^{0.5} * S_W^{-0.33}$$

Where:

Tc = time of concentration in minutes
C = runoff coefficient
L = watershed length in metres
S_W = watershed slope in percentage

From the Tc value, the Time to Peak (Tp) value was calculated as 0.67 times Tc. The parameters employed in the calculation of Tc and Tp for the single drainage basins is shown in Table 1.

Table 1 – Time of Concentration and Time to Peak

Sub-Catchment	Area	Flow Length	Fall	Slope	Tc[1]	Tp[2]
	ha	m	m	%	min	hrs
Area 1	12.20	435	7	1.61	54.6	0.61

Notes:

1. Airport Formula
2. 0.67×Tc

5.3.3 SCS Curve Number

The Curve Number (CN) is the most important parameter in determining surface runoff when the SCS equation is used. Table 2 shows the parameters and the resulting CN value for Area 1.

Table 2 – Hydrologic Parameters

Sub-Catchment	Land Use / Soil Type	Land Use / Soil Type	Land Use / Soil Type	Land Use / Soil Type	Runoff	CN[2]	Ia
	Pasture B (ha)	Pasture C (ha)	Forest B (ha)	Forest C (ha)	Coefficient[1]	(AMC II)	mm
Area 1	5.45	1.76	1.56	3.20	0.16	64.0	6.9

Notes:

1. MTO Drainage Management Manual – Design Chart 1.07
2. MTO Drainage Management Manual – Design Chart 1.09

5.3.4 Rainfall

For the rainfall input to the VO5 model, the 12-hour and 24- hour SCS rainfall distribution, representing a high volume lower intensity storm, and a 4 hour Chicago rainfall distribution, representing a high intensity "thunder storm" type of rainfall event were used ion the analysis. The Intensity-Duration-Frequency (IDF) curve was obtained from the Ministry of Transportation (MTO) IDF Curve Lookup tool with the location centred over the property.

5.4 Pre-Development Results

Employing the above noted parameters and the VO5 hydrologic model, Table 3 shows the calculated pre-development flow values for the 12-hour, 24-hour SCS Type II and 4-hour Chicago rainfall hyetographs. These flow values will be used for the water quantity control assessment of the proposed SWM facility.

Table 3 – Pre-Development Calculated Peak Flows

Return Period (Yrs)	4-hour Chicago (m^3/s)	12-hour SCS (m^3/s)	24-hour SCS (m^3/s)
2	0.053	0.114	0.148
5	0.105	0.211	0.259
10	0.149	0.278	0.352
25	0.210	0.383	0.475
50	0.262	0.463	0.585
100	0.317	0.560	0.678

5.5 Post-Development Drainage

As discussed in Section 5.2, the proposed stormwater management (SWM) facility will serve the entirety of the Phase 6 development. The proposed SWM facility will receive runoff from future medium and high-density areas located within west block and accounted for which will require their own site-specific stormwater management design, as the development of that block undergoes site plan control. Runoff from these controlled areas will still be directed to the ponds and therefore, undergo a further reduction of peak flow rates. The wooded area to the north of Phase 6 will remain in its natural state and maintain its existing drainage pattern, directing runoff towards the planned end-of-pipe stormwater management facility.

It's essential to highlight that Phase 7 of the Perthmore development, situated in the western block, is slated to have its dedicated stormwater management (SWM) facility to cater to its drainage requirements, subsequently discharging into the Phase 6 SWM facility. Consequently, the sizing of the SWM facility has been meticulously planned to accommodate the flows from all these drainage areas, thereby ensuring comprehensive stormwater management coverage for the entirety of the Perthmore Subdivision.

5.5.1 Post-Development Parameters

For the post-development hydrologic analysis, since the proposed development is fully urban with full municipal services, the STANHYD command was used in the VO5 model. Table 4 shows the post-development input parameters for the VO5 model. The total imperviousness and directly connected parameters were calculated based on a typical lot in the existing development area. The flow lengths for the pervious area were assumed to be 10 m and the flow lengths for the impervious area were calculated by the standard equation in the VO5 model as shown in the notes below the Table 4. Lastly, the slopes used in the model for pervious and impervious areas were assumed to be 2.0% and 1.0% respectively.

Table 4 – Post-Development Hydrologic Model Parameters

				Pervious Area				Impervious Area		
Sub-Catchment	Area	Total Imp	Directly Connected	CN	Slope	Manning's n	IA	Slope	Manning's n	Depression Storage
	ha	%	%		%		mm	%		mm
West Block[2]	3.43	50.0	35.0	59.0	2.0	0.25	5.0	1.0	0.013	1.0
Block 70	0.83	0.0	0.0	75.0	2.0	0.25	10.0	1.0	0.013	1.0
SWM Block[2]	0.41	0.0	0.0	75.0	2.0	0.25	10.0	1.0	0.013	1.0
Developed Portions[1,2]	5.32	50.0	35.0	59.0	1.0	0.25	5.0	1.0	0.130	1.0

Drainage Area ID	Total Area (ha)	Weighted CN Value	Weighted IA Value	Tc[3] (min)	Tp[4] (hr)
UND - Undeveloped Area	2.05	73.0	10.0	19.07	0.22

Notes:
1. 604(1) - 0.56ha, 604(2) - 0.23ha, 606 - 1.19ha, 608 - 0.79ha, 609 - 0.16ha, 612 - 1.21ha, 617 - 0.48ha, RY1 - 0.32ha and RY2 - 0.25ha
2. To Pond
3. Airport Formula was used to estimate the time of concentration
4. 0.67×Tc

5.6 Quantity Control

The quantity control for the site will mainly be provided by the proposed end of pipe facility. For the phase 7 block and the undeveloped portions the hydrologic modelling assumes that the peak flows, up to and including the 100-year storm event will flow through the Phase 6 SWM facility. It is also noted, the west block outflow from future phases has to be restricted to existing levels through on-site SWM quantity controls within the block. The preliminary calculation of the required on-site detention storage is 1,100 m^3 for the West Block. The imperviousness value for the SWM block was assumed to be high, considering the rainfall on the block would be converted to direct runoff.

Tables 5 and 6 show the calculated post-development (uncontrolled) and controlled flow values outletting from the proposed SWM facility. As the 24hr SCS storm resulted in higher outflows and more storage requirements, the results are shown below, however, the 4-year Chicago storm and 12-hour SCS storm data can be found in Appendix F.

Table 5 – Post-Development Calculated Flows – Uncontrolled

24 Hour SCS Uncontrolled							
Return Period	West Block	Undeveloped	Block 70	SWM Block	Developed Portions	Total	Pre Dev
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.225	0.061	0.029	0.014	0.197	0.467	0.148
5	0.336	0.109	0.051	0.025	0.296	0.729	0.259
10	0.417	0.148	0.069	0.033	0.390	0.989	0.352
25	0.518	0.199	0.092	0.044	0.490	1.257	0.475
50	0.606	0.243	0.111	0.054	0.611	1.516	0.585
100	0.680	0.280	0.128	0.062	0.689	1.716	0.678

Table 6 – Post-Development Calculated Flows – Controlled

24 Hour SCS Controlled								
Return Period	West Block	Undeveloped	Block 70	SWM Block	Developed Portions	Outflow From Pond[1]	Total	Pre Dev
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.225	0.061	0.029	0.014	0.197	0.094	0.097	0.148
5	0.336	0.109	0.051	0.025	0.296	0.199	0.207	0.259
10	0.417	0.148	0.069	0.033	0.390	0.275	0.287	0.352
25	0.518	0.199	0.092	0.044	0.490	0.350	0.366	0.475
50	0.606	0.243	0.111	0.054	0.611	0.452	0.474	0.585
100	0.680	0.280	0.128	0.062	0.689	0.557	0.587	0.678

Notes:
1. Restricted flow from the West Block SWM facility.

The proposed stormwater management facility has been designed to have sufficient storage to attenuate the post-development peak flows leaving the site. The estimate of the active storage requirements based on the proposed SWM facility has been performed in VO6 and the results are provided in the Table 7 below. To provide the quantity control as shown in the table would require a total of 2,030 m3 of detention storage. Further details of the SWM facility are available within Appendix F, which were used to ensure the conceptual pond met all MECP design criteria. Additional details concerning the configuration and multi-stage flow control outlet of the SWM pond will be finalized as part of the detailed design process.

Table 7 – Quantity Control Storage Requirements

Catchment ID	5-Year Restricted Flow (m^3/s)	5-Year Required Active Storage (m^3)	100-Year Restricted Flow (m^3/s)	100-Year Required Active Storage (m^3)
Phase 6, Centre, East and West Blocks, and SWM Block	0.199	1,090	0.557	2,030

5.6.1 *Major Drainage Route*

The internal storm sewer network within the subdivision will be designed to accommodate the 5-year storm. Storm events greater that 5-year will make use the roadway as the major drainage route, and this will be incorporated into the grading plan design. The roadway will direct these flows to the proposed SWM pond. Rear yard drainage swales and easements will be incorporated to provide additional overflow capacity.

5.6.2 *Peak Flow Comparison Summary*

The stormwater pond to be constructed on-site will be equipped with a permanent multi-stage outlet flow control structure designed to restrict the outflow rates to meet the quantity control objectives. Based on the available storage and the discharge through the control structure, the peak flow rates to the respective outlets were modelled in VO6 and are summarized below.

Table 8 – Peak Flowrates Comparison Summary

24-hour SCS Storm Event				
Return Period	POST Outflow From Site	PRE Outflow from Site	Post to Pre	Post to Pre
Yrs.	m^3/s	m^3/s	Δ	%
2	0.097	0.148	-0.051	34.5%
5	0.207	0.259	-0.052	20.1%
10	0.287	0.352	-0.065	18.5%
25	0.366	0.475	-0.109	22.9%
50	0.474	0.585	-0.111	19.0%
100	0.587	0.678	-0.091	13.4%

The Table 8 confirms that the proposed SWM facility will restrict the post-development flow rates to existing levels. The elevation and sizing details of the flow controls can be finalized during the detailed design phase of the development.

5.7 Quality Control

In addition to incorporating treatment train low-impact development designs at the lot and conveyance levels, the end-of-pipe SWM facility is specifically designed to function independently and offer the required Enhanced level of protection to achieve the necessary quality control for the Phase 6 development.

The facility's design will encompass a wet pond configuration, aimed at achieving an enhanced level of water quality control with 80% total suspended solids (T.S.S.) removal capacity. The determination of the necessary storage volume, totaling 165 m3/ha, was derived using Table 3.2 from the Stormwater Management Planning and Design Manual, factoring in the weighted impervious level of 46% for the entire tributary drainage area. To prevent downstream pond flooding, the MECP Manual (Section 3.3.2) recommends increasing the extended detention capacity from 40m3/ha to 80m3/ha in cases where upstream storage facilities are in place, as dictated by the requirements for the West Block's storage needs.This increase to the extended detention reduces the permanent pool volume, as the majority of the runoff reaching the site has already achieved the 80% TSS removal from the upstream facilities. With that, the permanent pool for this site is required to be 966 m^3 with an extended detention volume (458 m^3) can be combined with the water quantity volume detailed.

The SWM pond has a combined storage volume of 3,911 m3, with a designated allocation of 1,881 m3 specifically designated for permanent pool storage. As noted, conceptual pond details are included in Appendix F, which include forebay calculations, and extended detention drawdown, pond cleanout, emergency spillway, outlet control device sizing and stage storage discharge tables that were used in modelling the site in VO6. All these features meet MECP requirements and will be further vetted and refined through the detailed design. The total permanent pool volume to be provided will exceed the minimum volume requirement for quality control.

Table 9 - MECP Table 3.2 Quality Control Storage Requirements

<table>
<tr><th>Drainage Area</th><th>Extended Detention Volume Accounted</th><th>Permanent Pool Volume Required</th><th>Permanent Pool Volume Required</th><th>Permanent Pool Volume Provided</th></tr>
<tr><td rowspan="2">11.21 ha</td><td>80 m^3/ha</td><td>85 m^3/ha</td><td rowspan="2">1850 m^3</td><td rowspan="2">1881 m^3</td></tr>
<tr><td>458 m^3</td><td>953 m^3</td></tr>
</table>

Considering the information presented in the table and the inclusion of additional treatment train low-impact development (LID) features, it is clear that the proposed SWM plan will surpass both the required enhanced level of protection and the statutory quality control standards.

5.7.1 Best Management Practices

The entire subdivision will employ Best Management Practices (BMPs) wherever possible. The intent of implementing stormwater BMPs throughout the entire development is to ensure that water quality and quantity concerns are addressed at all stages of the development. Stormwater BMPs will be implemented at lot, conveyance and end of pipe levels.

Lot level BMPs include the directing of roof leaders onto grassed areas (downspout disconnections), minimizing ground slopes and maintaining as much of the lot as possible in a natural state. Roof leaders will flow to grass areas, which will provide an opportunity for initial filtration of any sediment and provide an opportunity for absorption and ground water recharge. Recent recommendations by a number of Conservation Authorities and the MECP suggest that yard grading as flat as 0.5% be implemented to promote infiltration. The target range for finished ground slopes will be 1% - 5% where possible. This range of slope will still provide an opportunity for the absorption and filtration process.

The conveyance system to be employed within the subdivision is a combination of side/rear swales and road catch basins. All swales will be constructed at minimal gradient where possible, thus promoting infiltration, as well as providing some opportunity for filtration. The gradient of the system will be enough to ensure the continuous flow of stormwater, limiting any standing water. Riprap will be placed at erosion-prone areas and all disturbed areas shall be re vegetated as soon as possible.

6.0 LOW IMPACT DEVELOPMENT

As the practice of SWM has evolved, increasing emphasis has been placed on treating the runoff as close as possible to the source using a sequence of treatment methods called “treatment train approach”. As a result, Low Impact Development approaches were established to mimic the existing natural hydrologic environment and to allow the rainwater to infiltrate, filter and evaporate close to the source.

Typical LID practices include Rainwater harvesting, green roofs, downspout disconnection, soak away pits, infiltration trenches and underground chambers, bio-retention cells, vegetated filter strips, enhanced grass swales and permeable pavements.

6.1 Treatment Train

Based on the type of the proposed development and the available geotechnical information, downspout disconnections (lot level), enhanced grass swales (conveyance level) and infiltration basins (conveyance and end-of-pipe level) are identified to be the most suitable LID features for the site.

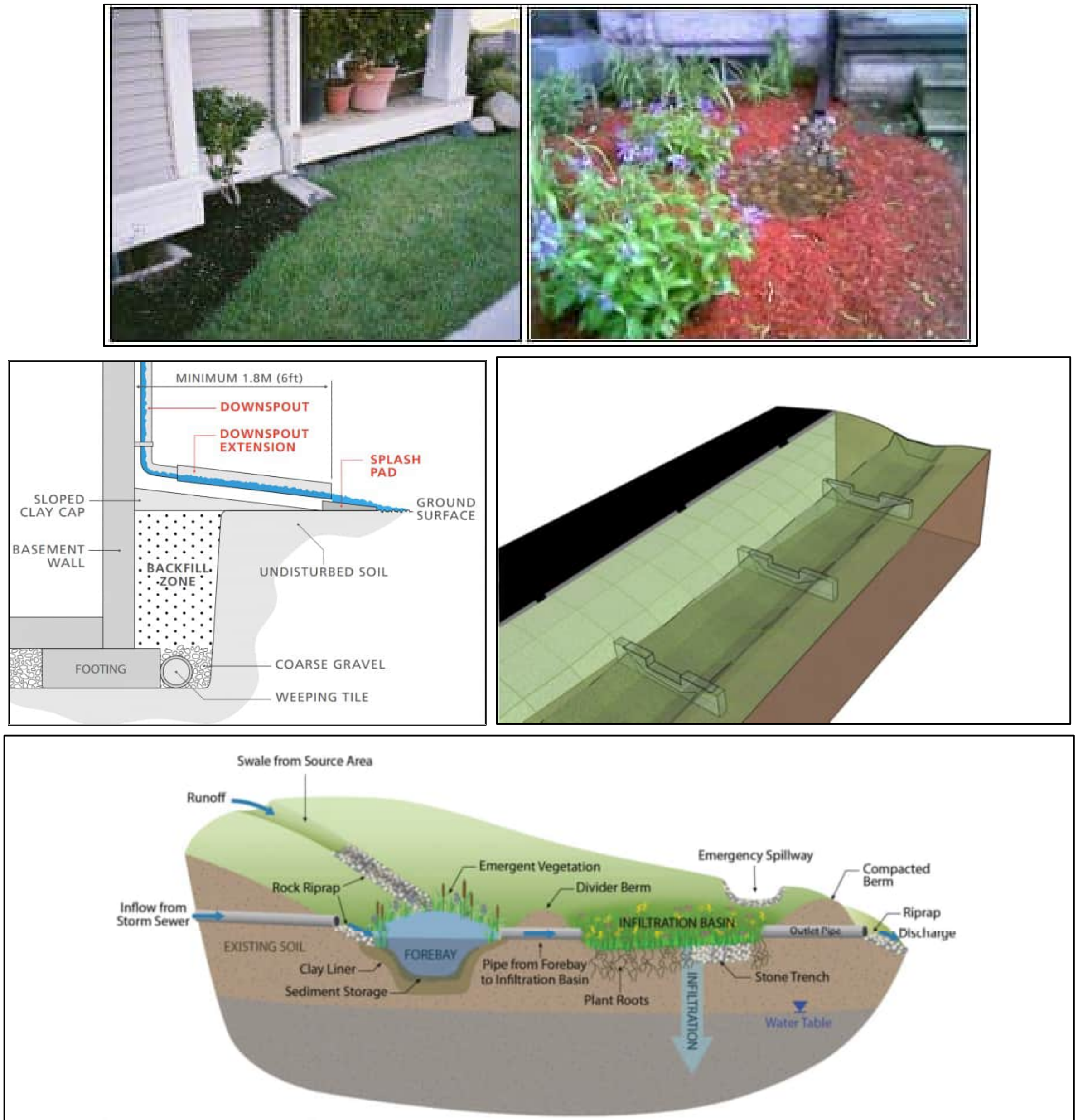
The feasibility of alternative LID features like rainfall harvesting, green roofs, or soak away pits on this site could be limited by their demanding operation and maintenance prerequisites, especially when installed on private properties, where municipal oversight may be challenging to enforce. Moreover, implementing LID features on roadways, such as permeable pavement or bioswales, could pose challenges if proper maintenance is not ensured, potentially negatively impacting the overall development. The soils in the area are not conducive to accepting stormwater runoff due to the high drawdown timing requirement and are thus likely to remain full at the next storm event, which will render them inefficient.

Lot Level - Downspout disconnection involves directing the runoff from roof leader downspouts to a pervious area, which drains away from the building. This gives an opportunity for the runoff to infiltrate before it reaches the typical curb and gutter system on the street. This also prevents the stormwater runoff from directly entering the storm sewer system or flowing across a “connected” impervious surface such as driveways.

Conveyance Level - Enhanced Grass Swales are designed as vegetated open channels that serve multiple functions in stormwater management. Traditionally, simple grass channels or ditches have been utilized for stormwater conveyance, especially for road drainage. However, enhanced grass swales go beyond the basic design by incorporating modified geometry and check dams to enhance their performance in terms of contaminant removal and runoff reduction. These design features improve the functionality of simple grass channels and roadside ditches, providing more effective treatment of storm sewer runoff. Drawing upon the geotechnical findings anticipated during the future detailed design stages of development, the integration of an infiltration trench into these enhanced grass swales can enhance both the quality control measures and the fulfillment of water balance infiltration targets.

End-of-pipe Level - To promote infiltration and enhance the stormwater management facility, an infiltration basin will be integrated into the outflow from the wet cell. An infiltration basin will be planned and integrated into the SWM pond's outflow system, positioned beyond the wet cell and above the permanent pool elevation. This design aims to fulfill the water balance infiltration objectives. It is advisable to position the infiltration trench past the wet cell area to mitigate the risk of sedimentation and clogging. The storage capacity within the infiltration basin has been excluded from the SWM pond storage calculations. Consequently, any volume retained and infiltrated through this basin will supplement the storage volumes allocated for the permanent pool of the SWM facility. This strategic placement ensures that the stormwater runoff is efficiently managed and encourages the natural process of infiltration, thereby facilitating groundwater recharge and reducing the volume of runoff leaving the proposed development.

Figure 1 – Typical Downspout Disconnection, Enhanced Grass Swale and Infiltration Basin (LID Planning and Design Guide, CVC 2011)



It is important to acknowledge that the recommendations for Low Impact Developments (LIDs) are made based on the available information. However, it is recognized that the design and recommendations may need to be revaluated and potentially adjusted during the detailed design phase, considering the geotechnical information and the maintenance requirements imposed by the Town of Perth. A conceptual LID treatment train plan illustrating the proposed LID features is included in Appendix F.

7.0 WATER BALANCE

7.1 Purpose

The RVCA, in their review comments, have requested an examination of the site's water balance to verify that it hasn't diminished the overall infiltration volumes, particularly considering the site's location in a sensitive groundwater aquifer area. As such, the following provides a review of the conceptual water balance, complete with mitigation measures for the site which were reviewed and broken into the requirements for the developed portion of the land as well as the individual blocks to provide guidance to the designers when they proceed through their site plan control process.

7.2 Land Use

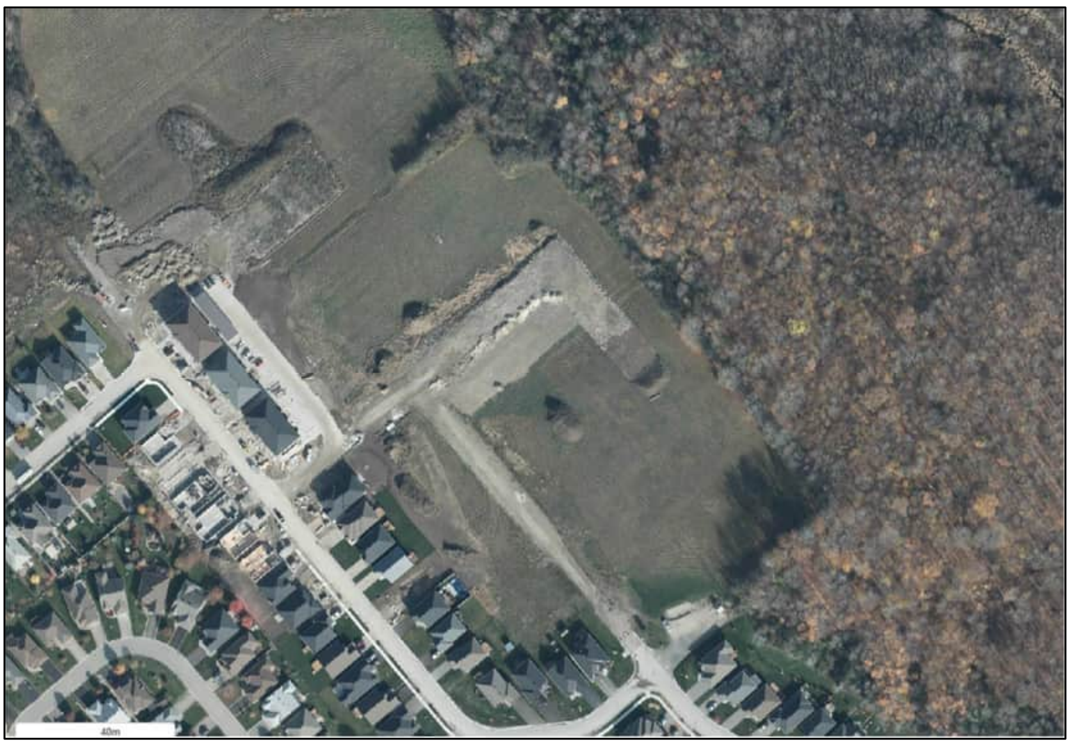


Figure 2 - Land Use

The current vacant land is predominantly a mixture of pasture sections (generally the western, southern and central portions of this phase) and treed areas (generally the northern and eastern extremities of this phase). Perthmore subdivision is directly adjacent to the Perth Long Swamp wetland which surrounds the site to the north, east and west. It is acknowledged that the Provincially Significant Wetlands are a significant natural heritage feature therefore, tree removal and other disturbances will be limited as much as possible. The entire undeveloped site is sloped toward the above-noted wetland. Elevations range from 134 m at the northeast corner of the site to 141 m at the highpoint of the property.

7.3 Soil Conditions

A detailed Geotechnical Report is not available at the conceptual design stage. Therefore, MP used the publicly available documents on AgMaps to review the soils for the site. The area is primarily comprised of Hydrological Soil Group B and C soils through the developed portion of land. The surrounding wetland is Hydrological Soils Group D. Based on the previous phase, McIntosh Perry has assumed that here is approximately 2' or 0.6m of soil overlaying bedrock. This relatively thin soils have been accounted for within the calculations to determine the soil moisture retention capacities of the soils. It is anticipated that during the detailed design stage, a geotechnical report will be completed at which time, these values can be updated if required.

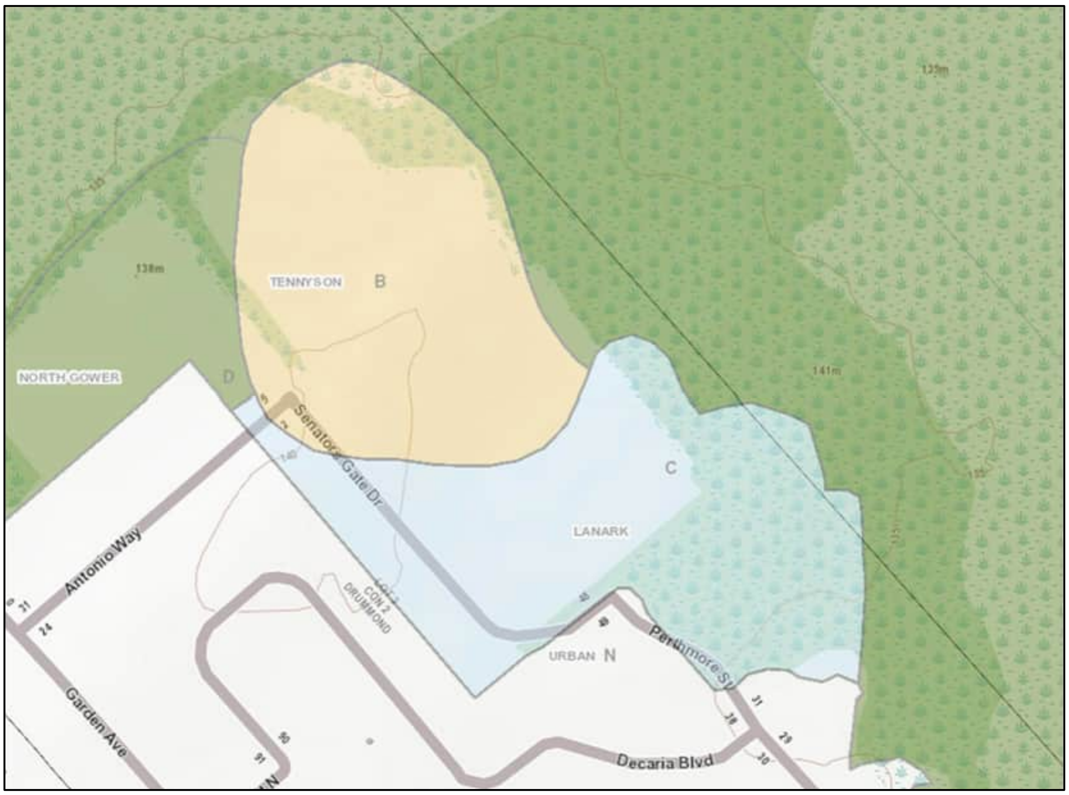


Figure 3 - AgMaps - Site Soils

7.4 Stormwater Management

As part of this assignment and to satisfy both RVCA and the Town, a servicing and stormwater management report has been prepared to ensure that the design criteria from both review agencies along with recommendations from the MNRF, MTO and MECP are adhered to. Site-specific stormwater management facilities will be located in the future high-density west block, which will be required to meet site-specific stormwater management criteria in order to be developed.

The stormwater management (SWM) strategy implemented for the Perthmore Subdivision Phase 6 adopts a treatment train approach, integrating a sequence of controls at various stages to effectively manage stormwater runoff. This comprehensive approach encompasses lot-level controls, conveyance controls, and end-of-pipe controls to address stormwater management requirements. Lot-level controls include measures such as downspout disconnection, which redirect roof runoff away from impervious surfaces and promote infiltration or reuse. Conveyance controls, such as enhanced grass swales, are incorporated to efficiently convey stormwater runoff while enhancing pollutant removal and runoff reduction capabilities. Lastly, end-of-pipe controls, such as infiltration basins, are implemented to facilitate the final treatment and infiltration of stormwater before it is discharged into the receiving environment. With the combination of these facilities, the mitigation measures that will be discussed below and the ultimate end of pipe facility, will ensure that runoff reaching the wetland is controlled to pre-development rates and exceeds an enhanced level of quality control (80% Total Suspended Solids (TSS) removal).

7.5 Water Balance Calculations

7.5.1 Data

Potential impacts to the existing wetland were reviewed through the use of standard water balance calculations. Data from Environment Canada for the Ottawa International Airport was used to calculate the runoff surplus and total precipitation for the site. Environment Canada data was limited to the precipitation and temperature data, while the remaining information was calculated using the Thornthwaite-Mather water balance methodology as described in the “Instructions and Tables for Computing Potential Evapotranspiration and the Water Balance, C.W. Thornthwaite and J.R. Mather, 1957”. Please see sample typical calculations within Appendix D. The pre- and post-development conditions were subdivided for the water balance as follows:

Soils:

- Sandy loam, noted to be HSG B; and
- Silt / clay loam, noted to be HSG C.

Pervious Land uses:

- Pasture overtopping sandy loam;
- Pasture overtopping silt/clay loam;
- Forest overtopping sandy loam; and
- Forest overtopping silt/clay loam.

Impervious Land Uses:

- Dwellings and asphalt.

The infiltration factors were chosen based on the following data:

Table 10 - Infiltration Factors from the "Tier 1 Water Budget and Water Quantity Stress Assessment" prepared by the Mississippi-Rideau Source Protection Region, August 2009

Description of Area / Development Site	Value of Infiltration Factor
Topography	
Flat Land (<1.5 slope range)	0.172
Rolling land (1.5 – 3% slope range)	0.120
Hilly land (>3% slope range)	0.073
Soil	
Low (clay, silt)	0.10
Low-Medium (till, sand-silt)	0.15
Medium (till, silty sand)	0.20
Medium-High (sands)	0.30
High (gravel, sands, organic deposits)	0.40
Variable (till)	0.20
Variable (fill)	0.40
Variable (sand)	0.35
Variable (bedrock)	
Precambrian Bedrock	0.20
Paleozoic Bedrock	0.05
Land Cover	
Low Infiltration – urban, aggregate	0.05
Medium Infiltration – agriculture, pasture, abandoned fields, wetland	0.10
High Infiltration – forest and plantation	0.20

For pre-development, the site has slopes generally under 1.5%, and as such was assigned a topographic infiltration factor of 0.172.

The soil classification was predominately sandy loam (infiltration rate of 0.2) for the HSG B soils and 0.15 for the HSG C soils.

The site is comprised of open vegetated areas which will results in a value of 0.10 being used and in forested areas, a land cover infiltration factor of 0.20 was used.

The soil classification for each area will not be changed for the pervious surfaces. This will be confirmed when the detailed grading design is advanced.

7.6 Sensitivity Analysis

Each of the land use and soil type was reviewed based on Table 10 of the Thornthwaite – Mather literature to obtain the applicable soil moisture retention of the underlying soils. The soil moisture retention used in our calculations is provided as "mm/m", therefore once the average on-site soil depth above the groundwater (is estimated to be 0.6 m) was applied, a corresponding site-specific soil moisture retention value was obtained for each category above. These soil moisture retention values are used to determine the soil moisture storage, given the accumulated water losses which are calculated based on the climatic data (temperature and precipitation) for the site. These tables are only noted in specific depths (25 mm and 50 mm intervals), therefore in some instances, the closest possible table was used. Table 11 below illustrates an example at a soil moisture retention value of 75 mm. Located in Appendix G, calculations for 75 mm, 100 mm, 125 mm, 150 mm, 200 mm, 250 mm, 350 mm and 400 mm were completed as part of a bulk sensitivity analysis for the surplus data. Results of this analysis, as calculated for each soil moisture value noted above, indicate that changing moisture retention values by 25 mm to 50 mm yields approximately 1% change in water surplus. This would indicate that regardless of whether the soils had 150 mm or 200 mm of moisture retention, the difference in surplus will be minor.

Table 11 – Monthly Water Balance Example - 75mm - Climate Data per Environment Canada data for Ottawa International Airport (1981 - 2010)

Month	Temp	Heat Index	PET	P	ΔP = P - PET	WL	ST	ΔS	AET	D	S	RO	SMRO	TR	DT
January	-10.3	0	0	65	65		217	0	0	0	0	11	0	11	228
February	-8.1	0	0	54	54		271	0	0	0	0	5	0	5	276
March	-2.3	0	0	64	64		336	0	0	0	0	2	0	2	338
April	6.3	1.4	32	75	43		75	0	32	0	43	22	26	48	166
May	13.3	4.4	79	80	2		75	0	79	0	2	12	117	129	206
June	18.5	7.2	112	93	-19	-19	57	-18	111	1	0	6	59	65	122
July	21	8.8	133	92	-41	-60	33	-24	116	17	0	3	29	32	65
August	19.8	8.0	114	86	-29	-88	22	-11	97	18	0	2	15	17	39
September	15	5.3	73	90	17		39	17	73	0	0	1	7	8	47
October	8	2.0	34	86	52		75	36	34	0	17	9	4	13	105
November	1.5	0.2	5	82	77		75	0	5	0	77	43	2	45	197
December	-6.2	0	0	76	76		151	0	0	0	0	22	1	23	174
Total		37.4	580	944				0	545	35	138	138	260	398	

PET = Potential Evapotranspiration, P = Total Precipitation, ΔP = P-PET, WL = Accumulated Water Loss, ST= Storage, ΔS = Soil Moisture Storage, AET = Actual Evapotranspiration, D = Soil Moisture Deficit, S = Soil Moisture Surplus, RO = Water Runoff, SMRO = Snow Melt Runoff, TR = Total Runoff, DT = Total Moisture Detention

Note: Shaded cells taken from Thornwaite-Mather Tables. See sample calculation in Appendix D for cell by cell calculations. Total Surplus for example above is 398mm.

Monthly T from Environment Canada:

Heat Index (I) = 37.4, a: 1.06

Sample Calculations:

Calculated Potential Evapotranspiration (PET)

Thornthwaite Equation:

$$PET = 16\left(\frac{L}{12}\right)\left(\frac{N}{30}\right)\left(\frac{10Ta}{I}\right)^{\propto}$$

L = Average Daylight (hours)

N = Number of Days per Month

Ta = Average Temperature (°C)

I = Heat Index =

$$I = \sum_{i=1}^{12}\left(\frac{Tai}{5}\right)^{1.514}$$

α = (6.75x 10^{-7}) I^3 – (7.71 x 10^{-5}) I^2 + (1.792 x 10^{-2}) I + 0.492

Example April

Temperature (Ta) = 6.3°C

I = (Tai/5)^1.514 = (6.3/5)^1.514 = 1.4

Sum of all months I = 37.4

α = (6.75x 10^{-7}) 37.4^3 – (7.71 x 10^{-5}) 37.4^2 + (1.792 x 10^{-2}) 37.4 + 0.49239 = 1.06

L = 13.6 hours, N = 30 days

PET = 16 x (13.6/12) x (30/30) x ((10x6.3)/37.4)^1.06 = 32mm

Change between Precipitation and Potential Evapotranspiration (**Δ**P = P-PET)

Example April

P = 75mm

PET = 32mm

ΔP = P – APET = 75mm – 32mm = 43mm

Accumulated Water Loss

All Values where the ΔP are negative are brought forward and accumulated on a monthly basis

Example July

ΔP June = -19mm

ΔP July = -41mm

WL July = -19mm + -41mm = -60mm

Soil Moisture Storage

Starting Values Taken from Table 10 of Thornthwaite Mather's Water Balance 1957 for individual soil type.

For sample calculations below, assumed soil moisture storage maximum of 75mm. Start in first month with positive temperature (April), carry (75mm) to next month where ΔP is positive. When ΔP becomes negative, accumulated water loss (WL) is reviewed and the reduced soil moisture storage is inserted into the spreadsheet based on the Tables within the Thornthwaite Mather's Water Balance 1957. For the example, Table 25 is used for 75mm soil water retention. The values are then inserted into the ST table based on the corresponding WL for the given month.

WL July = -60mm

Table 25 is used and a ST of 33mm is obtained

Upon positive ΔP values, the ΔP and ST_{i-1} are added together for that months ST value until the maximum soil moisture storage is achieved.

ST September = ΔP September + ST_{i-1} (August) = 17mm + 22mm = 39mm

Upon achieving the maximum soil moisture storage, no additional storage is available until the temperature falls below -1°C, when snow is said to be able to be stored above the ground. At that time the P is added to the previous months ST (ST_{i-1}) until the temporary is above -1°C and snow melt occurs.

Change in Soil Moisture Storage

Change in Soil Moisture Storage = Soil Moisture Storage – Soil Moisture Storage of the previous month

($\Delta S = ST - ST_{i-1}$)

Example June

Storage (ST - May) = 75mm

ST June (Table 25, Thornthwaite Mather, 1957) = 57mm

ΔS= 57mm – 75mm = -18mm

Actual Evapotranspiration (AET)

Three Situations Exist:

1) No PET therefore, AET = 0 if, PET = 0;
2) WL > 0. AET = PET if, Soil Moisture Storage Capacity is positive; and
3) WL < 0. AET = Soil Moisture Storage Capacity + Total Precipitation ($AET = \Delta S + P_T$).

1) Example January

AET = 0 as PET = 0

2) Example April

WL = 0mm

ST = 75mm

PET = 32mm = AET

3) Example July

WL = -41 mm

ΔS = -18mm (June)

P (June) = 93mm

AET (June) = 18mm + 93mm = 111mm *Note disregard ΔS sign.

Monthly Soil Moisture Deficit or Surplus

Three Situations Exist:

1) Where Accumulated Potential Water Loss is lower than 0mm, a deficit exists;
2) Where Soil Moisture Capacity is above its maximum, a surplus exist; and
3) Where Soil Moisture Capacity is less than the maximum but there is no Accumulated Potential Water Loss, the runoff is being absorbed by the soil (soil is either wetting or drying).

1) Example Deficit (July):

WL = -41mm

ST (July) = 33mm

ΔS (July) = -24mm

PET = 133mm

AET = 116mm

Soil Moisture Deficit (July) = PET – AET = 133mm – 116mm = 17mm

2) Example Wetting (September)

WL = 0mm

ST (August) = 22mm

ΔP = 17mm

ST (September) = ΔP + ST (August) = 17mm + 22mm = 39mm, less than 75mm therefore wetting, no surplus, S = 0

3) Example Surplus (October):

WL = 0mm

S (September) = 39mm

ΔP = 52mm

Soil Moisture Surplus (October) = ΔP + S(September) = 39mm + 52mm = 91mm, as it is over 75mm, 75 is carried and the additional volume is a surplus of 91mm – 75mm = 16mm

Water Runoff

Thornthwaite Mather (1957) noted that the surplus water runoff values in no month can cause a runoff higher than 50% of the its total surplus volume, therefore, 50% is attributed to the month with the initial surplus, then carried forward at a 50% per month value until it is dissipated (i.e.: reaches 0mm).

For this example (rounded to the nearest mm), start at October;

S_{Oct} = 17mm,

RO_{Oct} = 17mm/2 = 9mm,

November

S_{Nov} = 77mm,

RO_{Nov} = (Remaining RO_{Oct} + S_{Nov})/2 = (9mm + 77mm)/2 = 43mm,

December

RO = (Remaining RO_{Nov} + S)/2 = (43mm + 0mm)/2 = 22mm.

This continues until 0mm is reached.

Snow Melt Runoff (SMRO)

Thornthwaite Mather (1957) noted that in areas with an elevation under 500m above sea level, that in the first month with temperatures above -1°C, only 10% of snow melt runoff occurs. A maximum of 50% melt will occur in each successive month until it is dissipated (i.e.: reaches 0mm).

For this example (rounded to the nearest mm), start at April (first positive average temperature, total snow fall is 260mm, note: 260mm = precipitation accumulated in months with negative temperatures (December through to March);

April

SMRO = 10% = 26mm, remaining 90% (234mm) brought forward to May;

May, 234mm x 50% = 117mm, carry remaining 117mm to June;

June, 117mm x 50% = 59mm.

This continues until 0mm is reached and all snow melt has been accounted for.

Total Runoff

Total runoff is the sum of the water runoff and snow runoff for each month.

TR (April) = RO_{April} + $SMRO_{April}$ = 22mm + 26mm = 48mm

7.6.1 Sensitivity Analysis Conclusion -For Soil Moisture Maximum Capacity

McIntosh Perry completed a sensitivity analysis on the soil moisture capacity and found that for soil depths above 100mm, the annual surplus volume in millimetres diminished at a rate of less than 1%/year per 25mm of available soil. Therefore, as the depths of soils have been averaged across the site and a conservative approach has been pushed forward, it is not expected that in concentrated areas where the soil is less than the indicated depth that the soils will function materially different.

7.7 Pre-Development, Post-Development and Post-Development with Mitigation

Under pre-development, post-development and post-development with mitigation, precipitation, drainage, and infiltration conditions were reviewed. In pre-development, one consolidated area was used, whereas in post-development and post-development with mitigation, the site was broken into each block (west, central, and east) as well as the remaining roadways, residential lots, SWM block and Block 70. The purpose of this breakdown is to provide each of those block's guidance when it comes to the site plan control to achieve approval in order to meet the site-specific stormwater management criteria. If they were not separated from the "main" area, it would be difficult to break out their individual contributions for the future. The summary, however, combines all together to ensure that the site meets the requirements of pre-development as desired by the RVCA. The results have been summarized below:

Table 12 - Summary Water Balance Table

Characteristic	Pre-Development	Post-Development	Change (Pre – to Post)	Post-Development with Mitigation	Change (Pre- to Post- with Mitigation
Developed Lands to Perth Long Swamp Pre = Post Areas					
Input (Volumes)					
Precipitation (m^3/year)	115168	113658	-1%	113658	-1%
Output (Volumes)					
Total Infiltration (m^3/year)	23051	16367	-29%	22549	-2%
Total Runoff (m^3/year)	23876	50248	110%	44066	85%

Table 12, above, illustrates that the pre-and post-development areas for the entire development remain relatively similar. The total infiltration is illustrated to indicate that in all instances, the development on-site (i.e.: when comparing post- to pre-development) results in a reduction in infiltration. To address the deficiency, infiltration-promoting measures will be required to ensure runoff is intercepted and permitted to recharge the groundwater aquifer.

Finally, the total runoff illustrated confirms that the wetland will see an increase in total volume as a result of the development. This will result in additional volume within the wetland temporarily until it is permitted to flow downstream. This information is critical for the natural sciences consultant to confirm that the vegetation communities are capable of withstanding the additional volume of runoff over the short term. The evaluation of the potential increase in runoff and its associated impacts on Perth Long Swamp is evaluated in Section 8.0. Please see Appendix G for the water balance tables broken out for each catchment.

7.8 Mitigation Measures

As a result of the lack of recharge when comparing post- to pre-development, the project will require infiltration trenches to ensure that the volume of runoff required enters the ground, providing groundwater recharge and continuing to ensure that the aquifer is maintained.

In order to design the trenches, the 5 mm event was reviewed. Environment Canada data as shown in Table 13 below, indicates that there are 25.2 days with rain over 10 mm, 46.5 days with rain over 5 mm and 118.4 days of rain over 0.2 mm. Therefore, at a minimum there is:

- (46.5 – 25.2) days = 21.3 days x 5 mm = 107 mm; +
- (118.4 - 46.5) days = 71.9 days x 0.2 mm = 14 mm;
- Summing these volumes = 107 mm + 14 mm = 121 mm of minimum total volume that would be anticipated to be captured if the trenches are designed to accept the entire 5mm storm event.

Table 13 - Environment Canada - Days with Precipitation

1981 to 2010 Canadian Climate Normals station data

Days with Rainfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
>= 0.2 mm	4.4	3.9	6.7	10.9	13.4	13.2	11.9	11	12.3	13.7	11	6	118.4	A
>= 5 mm	1.6	1.2	2.1	4	4.9	5.8	5.4	4.8	5.1	5	4.2	2.3	46.5	A
>= 10 mm	0.87	0.57	1	2	2.7	2.9	3.1	2.8	3.2	2.7	2.1	1.2	25.2	A
>= 25 mm	0.13	0.07	0.10	0.33	0.47	0.73	0.77	0.67	0.60	0.47	0.43	0.13	4.9	A

As described above, the mitigation measures were reviewed for each catchment. The exact geometry and location within the catchment will be completed by the civil engineering team during the detailed design of the development. Based on the volume to be infiltrated, mitigation measures meet or exceed the required infiltration volume required to balance the site.

Table 14 - Mitigation Measure Sizing - Development Lands to Perth Long Swamp

Description	Phase 6 (Bk 70, SWM Bk, Residential Lots and Roadway)	West Block
Area of Asphalt (m^2)	26600	17150
Asphalt Runoff Coefficient	0.9	0.9
Volume of Runoff in 5 mm Event (m^3) to be infiltrated	120	77
Mitigation Required (m^3/yr)	2873	1852
Annual Volume to be infiltrated by designing for 5 mm Event (m^3)	2897	1868

Based on the analysis conducted, it is recommended to provide an infiltration storage volume of 120 cubic meters for the Phase 6 developments to meet the annual water balance infiltration targets. Additionally, a volume of 108 cubic meters should be allocated for the future west block to meet the annual water balance infiltration targets. To determine the rough sizing of the infiltration trench, typical depths of 0.5 meters and 0.75 meters were assumed. The resulting footprint area requirements are summarized in the following table, which helps estimate the necessary surface area for the implementation of the infiltration trench and ensure sufficient storage capacity for infiltration purposes. Detailed calculations are included in Appendix G.

Table 15 – Infiltration Trench Footprint Requirements

Description	Infiltration Target (m^3)	Assumed depth (m)	Footprint (m^2)
Phase 6 Developments	26,600	0.50	600
		0.75	400
West Block	17,150	0.50	540
		0.75	360

7.8.1 Drawdown Of Infiltration Trenches

As detailed above, the trenches were sized to fully capture the 5 mm storm. The design criteria typical for a site draining to a wetland is that the trenches must be able to drawdown fully between 5 mm storm events. It is acknowledged that in larger events, the trenches will be overtopped and the grading on site will provide conveyance measures to direct the overtopped runoff towards the stormwater management facilities. With the assumed infiltration rates noted below, the drawdown values were reviewed to verify that the trenches were empty between 48-72 hrs as recommended by the TRCA.

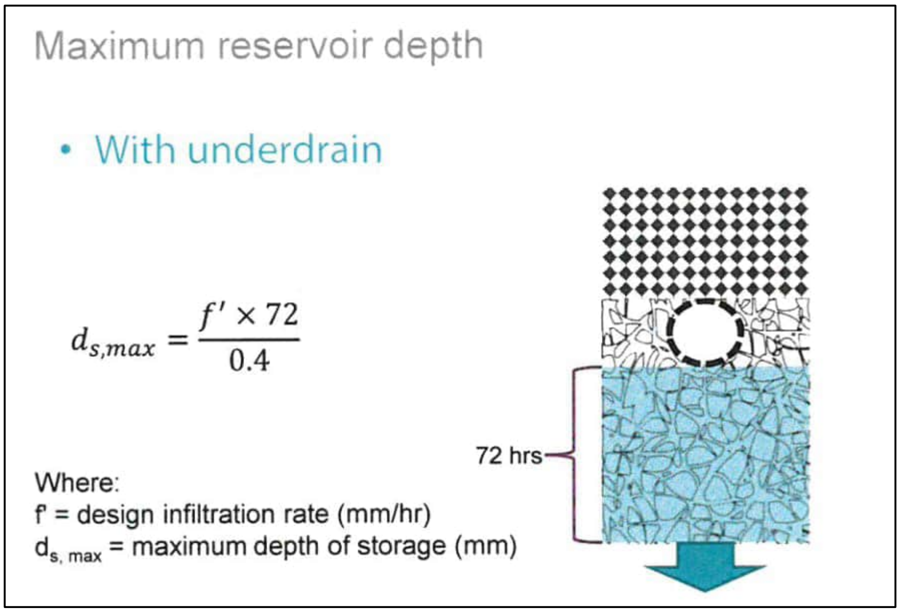


Figure 4 - Maximum Reservoir Depth (TRCA, 2018)

Table 16 - Drawdown Calculations

	Phase 6 Developments	West Block
Assumed Infiltration Rate (mm/hr)	25	25
Assumed Factor of Safety	4.5	4.5
Corrected Infiltration Rate (mm/hr) **assumed*	5.5	5.5
Maximum Depth of Storage – 72 hrs (mm)	990	990
Maximum Depth of Storage – 48 hrs (mm)	660	660
Depths of Trenches Provided On Site (mm)	500 / 750	500 / 750
Meets Infiltration Drawdown Criteria	Yes	Yes

As indicated above, the infiltration trench is anticipated to empty between 48 – 72 hrs and therefore, is assumed to meet the drawdown criteria and is anticipated to function as intended by being empty within 2 to 3 days of a 5 mm storm event.

8.0 ANALYSIS OF IMPACTS TO THE WETLAND

The drainage flow from the site will be directed towards the underground storm sewer network before reaching the stormwater management pond, ultimately discharging into the wetland. To prevent downstream erosion and manage surface flows effectively, riprap and other flow spreaders will be employed at the pond outlet, dispersing surface flows and dissipating their energy before directing them toward the wetland. This strategy aims to distribute concentrated flows across a wider area, mitigating the risk of erosion downstream.

To evaluate the water quantity effects of uncontrolled post-development flows, we conducted calculations to determine water depths in the wetlands under both pre-development and post-development scenarios. In this analysis, we first multiplied the runoff depth obtained from the VO6 model results by the tributary drainage area to calculate the runoff volume. Subsequently, we divided this volume by the wetland's surface area to determine the water depth within the wetland. It's important to note that this approach is conservative as it assumes the presence of "vertical walls" around the wetland, potentially underestimating the water depths compared to scenarios where the wetland surface area is greater and water depths may be lower than indicated in the table below.

Table 17 – Water Depths in Perth Long Swamp

Pre and Post Development Runoff from the site to Perth Long Swamp							
Return Period (yrs)	Pre-development Runoff Depth (mm)	Pre-development Runoff Volume (m3)	Post-development Runoff Depth (mm)	Post-development Runoff Volume (m3)	Pre-development Depth in Wetland (mm)	Post-development Depth in Wetland (mm)	Difference (mm)
2	11.16	1362	23.06	2813	0.30	0.63	-0.32
5	19.12	2333	34.05	4153	0.52	0.92	-0.40
10	25.64	3128	42.51	5186	0.70	1.15	-0.46
25	34.22	4175	53.21	6491	0.93	1.44	-0.51
50	41.89	5111	62.48	7623	1.14	1.69	-0.56
100	48.33	5896	70.11	8553	1.31	1.90	-0.59

As shown in Table 17, the maximum increase in water depth in the wetlands is approximately 0.6 mm for the 100-year storm event. This increase in water elevation will have negligible impact on the wetlands or the downstream systems.

In conclusion, the overall area of the Perth Long Swamp wetland is immense when compared to the size of this site. Any additional volume, in excess of pre-development volume, once the pond and mitigation measures are in place will not make a measurable difference to the quality, function and operation of the wetland.

9.0 ENVIRONMENTAL COMPLIANCE APPROVAL

In compliance with Ontario's 2021 mandatory stormwater management (SWM) criteria for consolidated linear infrastructure, an environmental compliance approval will be necessary. As part of the approval process, a detailed application will be prepared and submitted during the detailed design phase. This application will include comprehensive information on the storm sewer infrastructure, the proposed design and function of the SWM facility, associated control structures and other relevant details.

10.0 SEDIMENT EROSION CONTROL

10.1 Temporary Measures

Before construction begins, temporary silt fence, straw bales or rock flow check dams will need to be installed at all-natural runoff outlets from the property. It is crucial that these controls be maintained throughout construction and inspection of sediment and erosion control will be facilitated by the Contractor or Contract Administration staff throughout the construction period.

The Contractor, at their discretion or at the instruction of the Town of Perth, RVCA or the Contract Administrator shall increase the quantity of sediment and erosion controls on-site to ensure that the site is operating as intended and no additional sediment finds its way into the storm sewer network on site. The straw bales and silt fences shall be inspected weekly and after rainfall events. Care shall be taken to properly remove sediment from the fences and check dams as required.

Work through winter months shall be closely monitored for erosion along sloped areas. Should erosion be noted, the Contractor shall be alerted and shall take all necessary steps to rectify the situation. Should the Contractor's efforts fail at remediating the eroded areas, the Contractor shall contact the Conservation Authority to review the site conditions and determine the appropriate course of action.

As each lot is developed, proper sediment and erosion controls will need to be installed and maintained. Sediment controls shall consist of, at minimum, straw bales at the down gradient property line. Grass shall be established as soon as possible, and excess fill shall be removed or leveled promptly. All manholes, catch basins and other drainage structures shall be covered in geosock when installed.

10.2 Permanent Measures

Rip-rap will be placed at all locations that have the potential for concentrated flow. It is crucial that the Contractor ensure that the geotextile is keyed in properly to ensure runoff does not undermine the rip-rapped area. Additional rip-rap is to be placed at erosion prone locations as identified by the Contractor / Contract Administrator / Town of Perth or RVCA.

It is expected that the Contractor will promptly ensure that all disturbed areas receive topsoil and seed/sod and that grass be established as soon as possible. Any areas of excess fill shall be removed or levelled as soon as possible and must be located a sufficient distance from any watercourse to ensure that no sediment is washed out into the watercourse. As the vegetation growth within the site provides a key component to the control of sediment for the site, it must be properly maintained once established. Once the construction is complete, it will be up to the landowner to maintain the vegetation and ensure that the vegetation is not overgrown or impeded by foreign objects.

11.0 SUMMARY

- A new subdivision with 34 single family homes, 38 semi-detached homes and 14 apartment units will be constructed in Phase 6 of the Perthmore Subdivision.
- Proposed watermains ranging in diameter from 200mm to 300mm will be installed throughout the subdivision and will have multiple connection points to existing infrastructure.
- The proposed sanitary sewer will be 200 mm in diameter, will be installed throughout the subdivision and will gravity drain through the existing subdivision infrastructure though multiple connections.
- The proposed storm sewer, ranging in diameter from 250 mm to 900 mm, will be installed throughout the subdivision and will drain to a newly proposed stormwater management facility.
- The proposed treatment train low-impact developments, in combination with the end-of-pipe stormwater management facility, will collectively deliver both stormwater quality and quantity controls.
- A review of water balance criteria indicated the necessity for mitigation measures to achieve pre-development infiltration volumes, and while infiltration trenches have been suggested, final design details, including placement, will be determined in conjunction with the detailed grading and drainage plan during the detailed design phase.
- By maintaining post-development stormwater management and water balance criteria within the limits of pre-development rates and volumes and positioning the pond upstream of the wetland, there are no expected adverse effects on the Perth Long Swamp.
- Sediment and erosion protection measures will be installed as soon as ground conditions warrant and permit and shall remain in place until construction is complete, and vegetation is re-established.

12.0 RECOMMENDATIONS

Based on the information presented in this report, we recommend that the Town approve this Preliminary Servicing and Stormwater Management Report in support of the Draft Plan of Subdivision Application for Phase 6 of the Perthmore Subdivision.

Please feel free to contact the personnel below if you have any questions or concerns.

Regards,

McIntosh Perry Consulting Engineers Ltd.

Brent Cuming, P.Eng.
Project Engineer | Land Development
McIntosh Perry Consulting Engineers
T: 343.764.2012
E: b.cuming@mcintoshperry.com

Raja Subramaniam Raja Chockalingam, M.Eng, P.Eng.
Design Lead | Water Resources
McIntosh Perry Consulting Engineers
T: 249.494.2971
E: r.rajachockalingam@mcintoshperry.com

13.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of Perthmore Developments Co. The purpose of the report is to assess the existing servicing infrastructure and to provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment, Conservation and Parks, Town of Perth and local approval agencies. McIntosh Perry reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by McIntosh Perry and site visits were performed, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. McIntosh Perry accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, McIntosh Perry should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

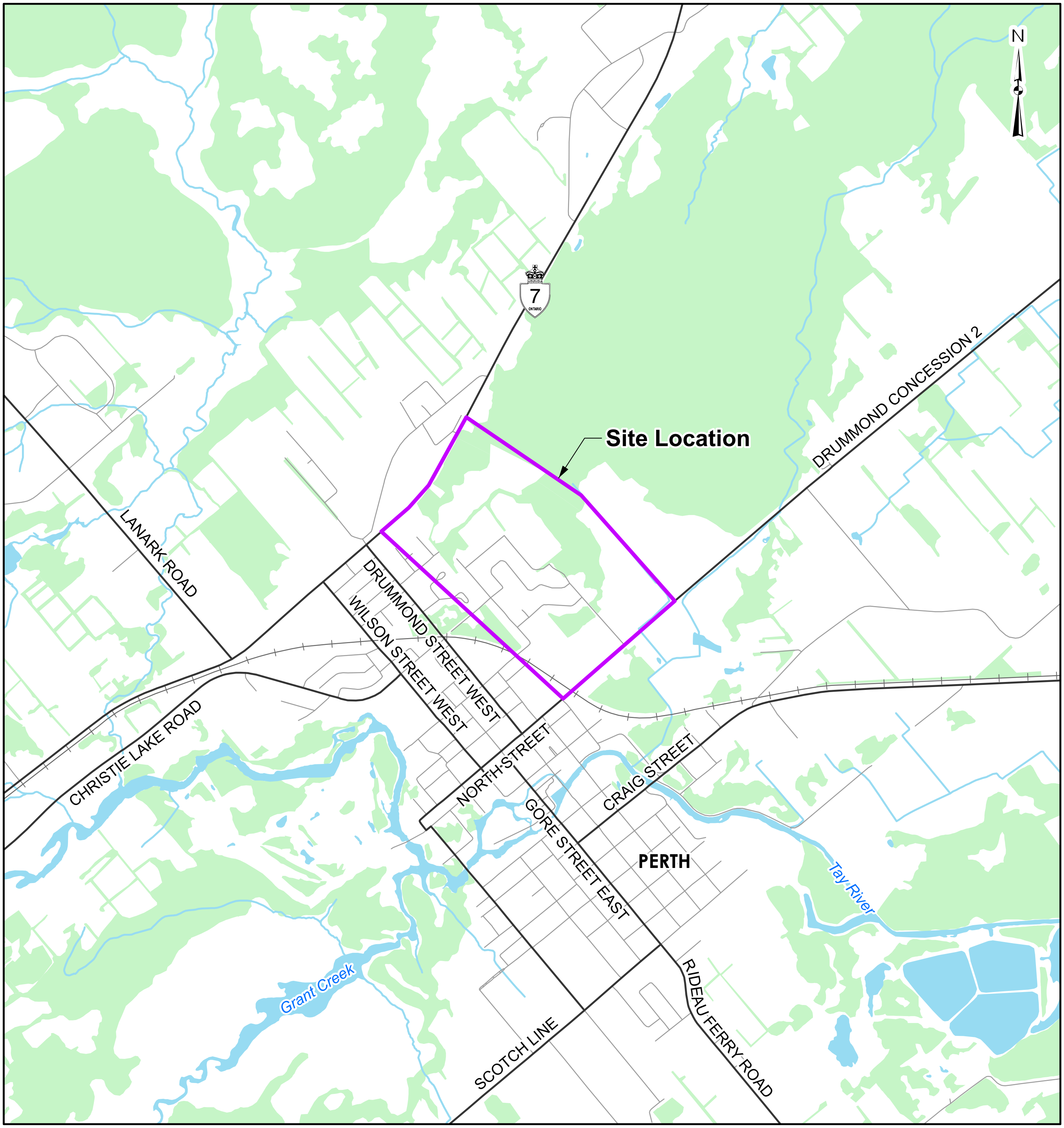
13.0 STATEMENT OF LIMITATIONS

This report was produced for the exclusive use of Perthmore Developments Co. The purpose of the report is to assess the existing servicing infrastructure and to provide recommendations and designs for the post-construction scenario that are in compliance with the guidelines and standards from the Ministry of the Environment, Conservation and Parks, Town of Perth and local approval agencies. McIntosh Perry reviewed the site information and background documents listed in Section 2.0 of this report. While the previous data was reviewed by McIntosh Perry and site visits were performed, no field verification/measures of any information were conducted.

Any use of this review by a third party, or any reliance on decisions made based on it, without a reliance report is the responsibility of such third parties. McIntosh Perry accepts no responsibility for damages, if any, suffered by any third party as a result of decisions or actions made based on this review.

The findings, conclusions and/or recommendations of this report are only valid as of the date of this report. No assurance is made regarding any changes in conditions subsequent to this date. If additional information is discovered or becomes available at a future date, McIntosh Perry should be requested to re-evaluate the conclusions presented in this report, and provide amendments, if required.

APPENDIX A
LOCATION PLAN



LEGEND

Approximate Site Boundary	Railroad
Local Road	Watercourse
Major Road	Waterbody
	Wooded Area

CLIENT:
PERTHMORE DEVELOPMENT CO.

PROJECT:
PERTHMORE SUBDIVISION PHASE 6

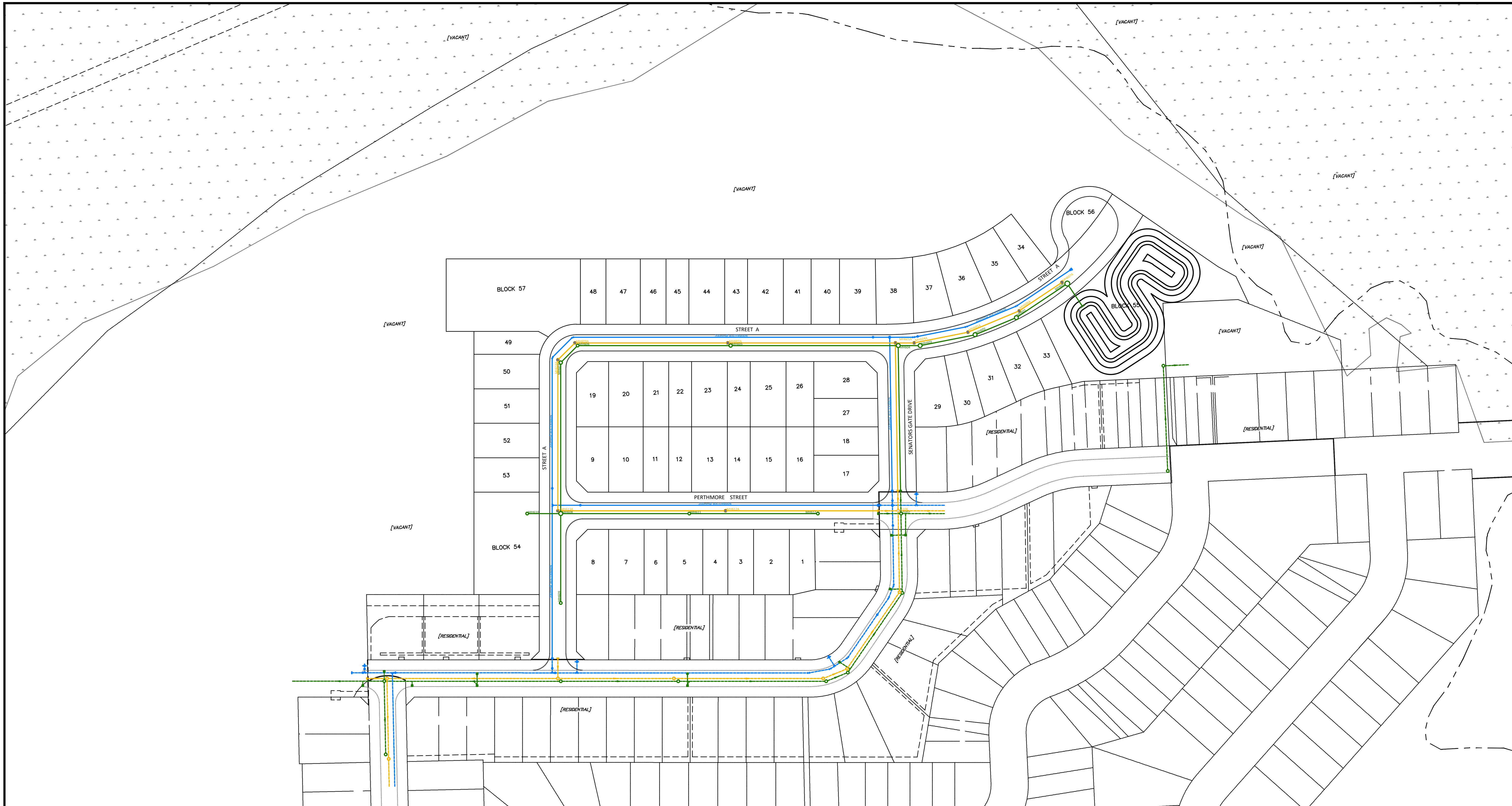
TITLE:
LOCATION PLAN

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

PROJECT NO:PP-13-9668-01		FIGURE:
Date	Dec., 21, 2020	1
GIS	EU	
Checked By	CH	

REFERENCE

GIS data provided by the Ontario Ministry of Natural Resources and Forestry, 2020.

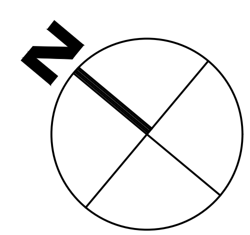


LEGEND

- - - -	EXISTING WATERMAIN
——	PROPOSED WATERMAIN
- - - -	EXISTING SANITARY SEWER
——	PROPOSED SANITARY SEWER
- - - -	EXISTING STORM SEWER
——	PROPOSED STORM SEWER

SCALE 1 : 2000

0 50 100 150 200 Metres



McINTOSH PERRY

115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client:
PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

Project:
PERTHMORE SUBDIVISION PHASE 6

Drawing Title:
GENERAL PLAN OF SERVICES

No.	Revisions	Date
4	RE-ISSUED FOR DRAFT APPROVAL	OCT.10.2023
3	RE-ISSUED FOR DRAFT APPROVAL	JUNE.23.2023
2	ISSUED FOR DRAFT PLAN APPROVAL	AUG.03.2022

Drawn by: P.G.K.
Checked By: B.S.C.
Scale: 1:2000
Project Number: PP-13-9668-01
Drawing Number: 100

FILENAME: U:\Ottawa\01 Project - Proposals\2013 Jobs\0PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03-Drawings\Production\PP-13-9668-01_Drawings.dwg
LAST SAVED: Thursday, October 05, 2023 LAST SAVED BY: s.hall
LAST PLOTTED: Tuesday, October 10, 2023 CTB FILE USED: ----

FILENAME: U:\Ottawa\01 Project - Proposals\2013 Jobs\0PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03-Drawings\Production\PP-13-9668-01_Drawings.dwg
LAST SAVED: Thursday, October 05, 2023 LAST SAVED BY: s.hall
LAST PLOTTED: Tuesday, October 10, 2023 CTB FILE USED: ----

SCALE 1 : 2000

0 50 100 150 200 Metres

LEGEND

139.40	FINISHED ELEVATION
138.28	EXISTING ELEVATION

N

MCINTOSH PERRY

115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

Project: PERTHMORE SUBDIVISION PHASE 6

Drawing Title: LOT GRADING & DRAINAGE PLAN

Drawn by:	Checked By:
P.G.K.	B.S.C.
Scale: 1:2000	Project Number: PP-13-9668-01

No.	Revisions	Date
4	RE-ISSUED FOR DRAFT APPROVAL	OCT.10.2023
3	RE-ISSUED FOR DRAFT APPROVAL	JUNE.23.2023
2	ISSUED FOR DRAFT PLAN APPROVAL	AUG.03.2022

Drawing Number: 200

APPENDIX B
WATERMAIN DESIGN

McINTOSH PERRY

PP-13-9668-01 - Perthmore Subdivision Phase 6 - Water Demands 1

Peaking Factors:

Table 3-1: Peaking Factors

POPULATION	MINIMUM RATE FACTOR (MINIMUM HOUR)	MAXIMUM DAY FACTOR	PEAK RATE FACTOR (PEAK HOUR)
500 - 1,000	0.40	2.75	4.13
1,001 - 2,000	0.45	2.50	3.75
2,001 -3,000	0.45	2.25	3.38
3,001 - 10,000	0.50	2.00	3.00
10,001 - 25,000	0.60	1.90	2.85
25,001 - 50,000	0.65	1.80	2.70
50,001 - 75,000	0.65	1.75	2.62
75,001 - 150,000	0.70	1.65	2.48
greater than 150,000	0.80	1.50	2.25

Note: Domestic water demand peaking factors are per Section 3.4.2 of the Design Guidelines for Drinking-Water Systems 2008.

Population Density:

Unit Type	Persons Per Unit (ppu)
Single Family	3.4
Semi-detached	2.7
Townhouse	2.7
Apartment	1.8
Unknown	60/ha

Calculations:

Phase 6 - Consists of 34 single family, 38 Semi-detached units, 14 Apartment units

Population = 243.40 people

*Average Day Flow		Max. Day Flow		Peak Hourly Flow		
(L/s)	(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	
0.79	47.33	2.17	130.15	3.26	195.46	
0.79	**47.33**	**2.17**	**130.15**	**3.26**	**195.46**	**Total**

*Domestic flow was assumed to be 280L/(cap-day)

PP-13-9668-01 - Perthmore Subdivision Phase 6 - Water Demands 2

Peaking Factors:

Table 3-1: Peaking Factors

POPULATION	MINIMUM RATE FACTOR (MINIMUM HOUR)	MAXIMUM DAY FACTOR	PEAK RATE FACTOR (PEAK HOUR)
500 - 1,000	0.40	2.75	4.13
1,001 - 2,000	0.45	2.50	3.75
2,001 -3,000	0.45	2.25	3.38
3,001 - 10,000	0.50	2.00	3.00
10,001 - 25,000	0.60	1.90	2.85
25,001 - 50,000	0.65	1.80	2.70
50,001 - 75,000	0.65	1.75	2.62
75,001 - 150,000	0.70	1.65	2.48
greater than 150,000	0.80	1.50	2.25

Note: Domestic water demand peaking factors are per Section 3.4.2 of the Design Guidelines for Drinking-Water Systems 2008.

Population Density:

Unit Type	Persons Per Unit (ppu)
Single Family	3.4
Semi-detached	2.7
Townhouse	2.7
Apartment	1.8
Unknown	60/ha

Calculations:

Phase 6 - Consists of 34 single family, 38 Semi-detached units and 14 Apartment units

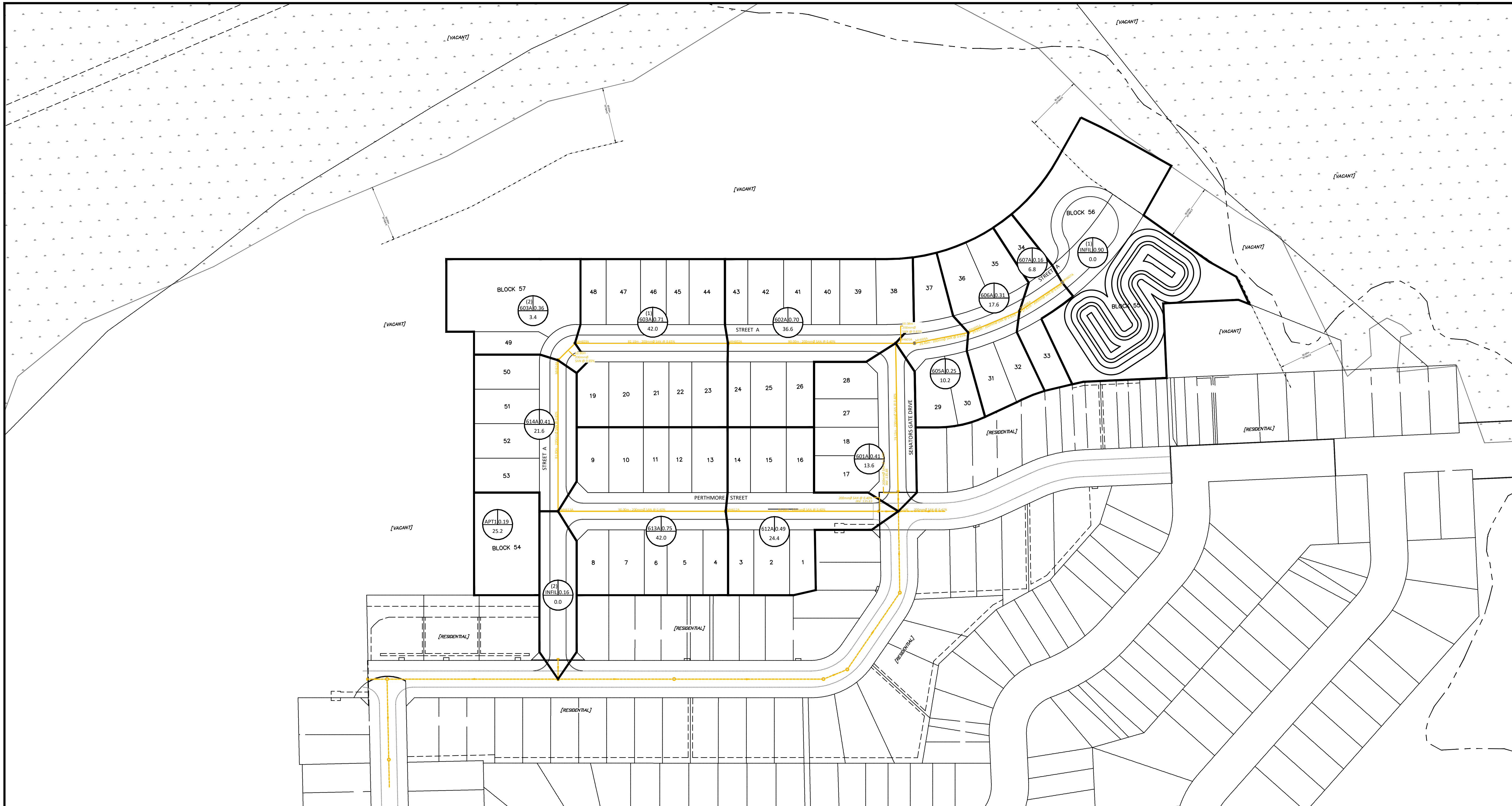
Future Development - Consists of 5.45 ha development area

Population = 570.40 people

*Average Day Flow		Max. Day Flow		Peak Hourly Flow		
(L/s)	(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	
1.85	110.91	5.08	305.01	7.63	458.06	
1.85	**110.91**	**5.08**	**305.01**	**7.63**	**458.06**	**Total**

*Domestic flow was assumed to be 280L/(cap-day)

APPENDIX C
SANITARY SEWER DESIGN



SCALE 1 : 2000

0 50 100 150 200 Metres

LEGEND

LOCATION I.D. — AREA (ha) — 123 0.25 — 6.8 — POPULATION

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

Project: PERTHMORE SUBDIVISION PHASE 6

Drawing Title: SANITARY DRAINAGE AREA PLAN

Drawn by:	Checked By:
P.G.K.	B.S.C.
Scale: 1:2000	Project Number: PP-13-9668-01

No.	Revisions	Date
4	RE-ISSUED FOR DRAFT APPROVAL	OCT.10.2023
3	RE-ISSUED FOR DRAFT APPROVAL	JUNE.23.2023
2	ISSUED FOR DRAFT PLAN APPROVAL	AUG.03.2022

Drawing Number: 500

FILENAME: U:\Ottawa\01 Project - Proposals\2013 Jobs\PP\PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03-Drawings\Production\PP-13-9668-01_Drawings.dwg
LAST SAVED: Thursday, October 05, 2023 LAST SAVED BY: s.hall
LAST PLOTTED: Tuesday, October 10, 2023 CTB FILE USED: ----

SANITARY SEWER DESIGN SHEET

McINTOSH PERRY

PROJECT: PERTHMORE SUBDIVISION PHASE 6
LOCATION: PERTH, ON
CLIENT: PERTHMORE DEVELOPMENT CO.

LOCATION				RESIDENTIAL									ICI AREAS							INFILTRATION ALLOWANCE			FLOW	SEWER DATA								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	30	31
				UNIT TYPES				AREA	POPULATION			PEAK	AREA (ha)						PEAK	AREA (ha)		FLOW	DESIGN	CAPACITY	LENGTH	DIA	SLOPE	VELOCITY	FLOW	VELOCITY	AVAILABLE CAPACITY	
													INSTITUTIONAL		COMMERCIAL		INDUSTRIAL															
STREET	AREA ID	FROM MH	TO MH	SF	SD	TH	APT	(ha)	IND	CUM	PEAK FACTOR	FLOW (L/s)	IND	CUM	IND	CUM	IND	CUM	FLOW (L/s)	IND	CUM	(L/s)	FLOW (L/s)	(L/s)	(m)	(mm)	(%)	(full) (m/s)	DEPTH (mm)	(actual) (m/s)	L/s	(%)
STREET A	603A(1)	603A	602A	6	8			0.71	42.0	42.0	4.00	0.54		0.00		0.00		0.00	0.00	0.71	0.71	0.23	0.78	27.59	82.10	200	0.65	0.851	24.7	0.378	26.81	97.18
	602A	602A	601A	6	6			0.70	36.6	78.6	4.00	1.02		0.00		0.00		0.00	0.00	0.70	1.41	0.47	1.48	21.64	90.00	200	0.40	0.667	37.5	0.387	20.16	93.14
STREET A	INFIL(1), 607A	607A	606A	2				1.06	6.8	6.8	4.00	0.09		0.00		0.00		0.00	0.00	1.06	1.06	0.35	0.44	27.59	27.61	200	0.65	0.851	18.9	0.317	27.15	98.41
	606A	606A	605A	2	4			0.31	17.6	24.4	4.00	0.32		0.00		0.00		0.00	0.00	0.31	1.37	0.45	0.77	27.59	29.81	200	0.65	0.851	24.6	0.376	26.82	97.21
	605A	605A	604A	3				0.25	10.2	34.6	4.00	0.45		0.00		0.00		0.00	0.00	0.25	1.62	0.53	0.98	27.59	29.40	200	0.65	0.851	27.6	0.405	26.60	96.44
		604A	601A						0.0	34.6	4.00	0.45		0.00		0.00		0.00	0.00	0.00	1.62	0.53	0.98	27.59	10.08	200	0.65	0.851	27.6	0.405	26.60	96.44
SENATORS GATE DRIVE	601A	601A	*CAP*	4				0.41	13.6	126.8	4.00	1.64		0.00		0.00		0.00	0.00	0.41	3.44	1.14	2.78	21.64	79.13	200	0.40	0.667	50.4	0.465	18.86	87.16
		CAP-1	*S106*					0.00	0.0	126.8	4.00	1.64		0.00		0.00		0.00	0.00	0.00	3.44	1.14	2.78	21.64	*11.00*	*200*	*0.40*	0.667	50.4	0.465	18.86	87.16
STREET A	603A(2)	603A	614A	1				0.36	3.4	3.4	4.00	0.04		0.00		0.00		0.00	0.00	0.36	0.36	0.12	0.16	27.59	12.90	200	0.65	0.851	11.9	0.234	27.42	99.41
	614A	614A	613A		8			0.41	21.6	25.0	4.00	0.32		0.00		0.00		0.00	0.00	0.41	0.77	0.25	0.58	27.59	81.00	200	0.65	0.851	21.5	0.345	27.01	97.90
PERTHMORE STREET	APT1, INFIL(2), 613A	613A	612A	6	8		14	1.10	67.2	92.2	4.00	1.20		0.00		0.00		0.00	0.00	1.10	1.87	0.62	1.81	21.64	90.00	200	0.40	0.667	41.2	0.410	19.83	91.63
	612A	612A	*CAP*	4	4			0.49	24.4	116.6	4.00	1.51		0.00		0.00		0.00	0.00	0.49	2.36	0.78	2.29	21.64	81.68	200	0.40	0.667	46.0	0.439	19.35	89.42
		CAP-2	*S106*					0.00	0.0	116.6	4.00	1.51		0.00		0.00		0.00	0.00	0.00	2.36	0.78	2.29	21.64	*11.00*	*200*	*0.40*	0.667	46.0	0.439	19.35	89.42

Design Parameters:

Residential			ICI Areas			Peak Factor
SF	3.4	p/p/u				
SD	2.7	p/p/u	INST	28,000	L/Ha/day	1.5
TH	2.7	p/p/u	COM	28,000	L/Ha/day	1.5
APT	1.8	p/p/u	IND	35,000	L/Ha/day	MOE Chart
Other	60	p/p/Ha				

Notes:
1. Mannings coefficient (n) = 0.013
2. Demand (per capita): 280 L/day
3. Infiltration allowance: 0.33 L/s/Ha
4. Residential Peaking Factor:
   Harmon Formula = 1+(14/(4+P^0.5))
   where P = population in thousands

Designed: P.G.K.

Checked: B.S.C.

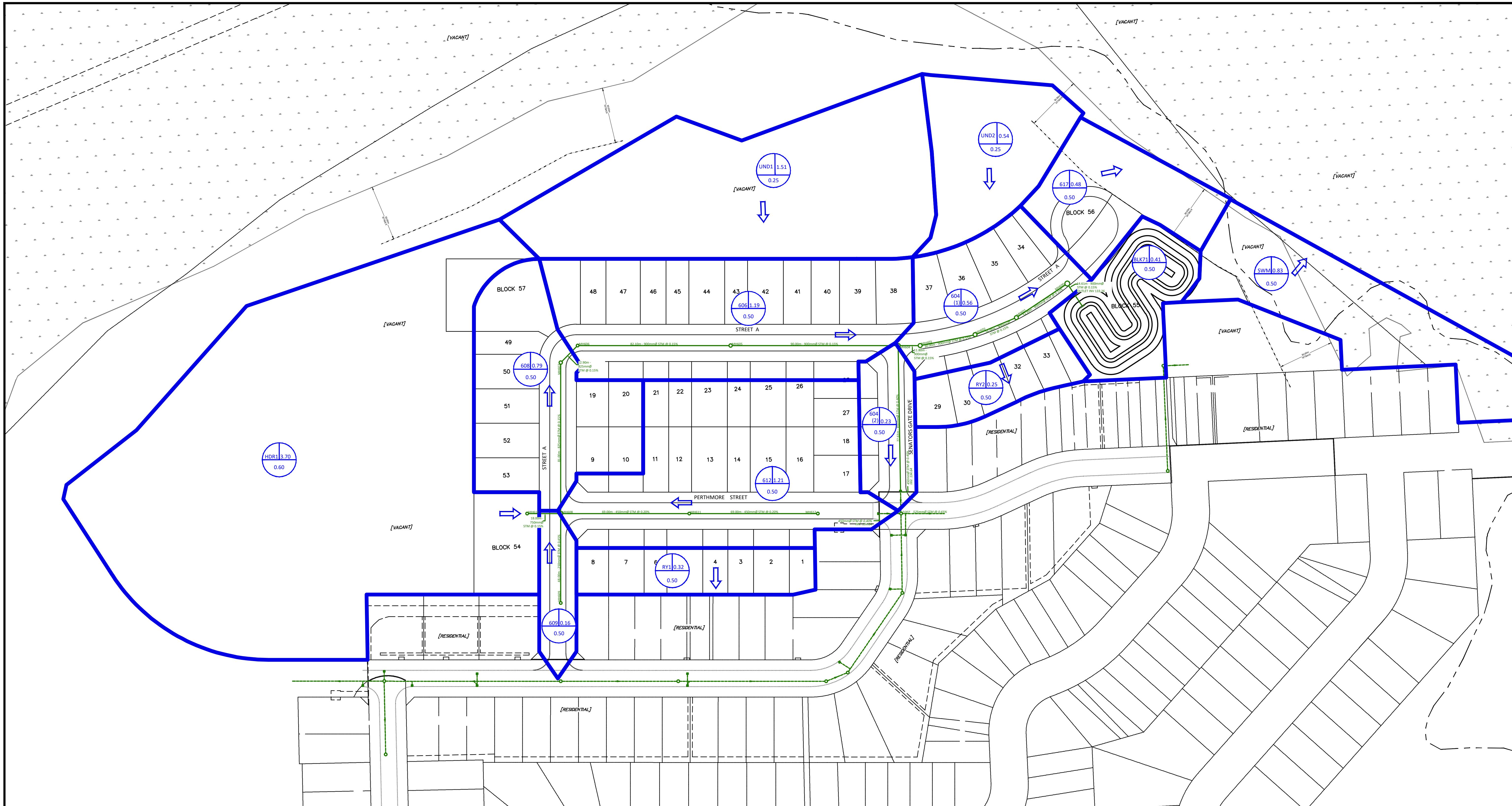
Project No.: PP-13-9668-01

No.	Revision	Date
1.	ISSUED FOR DRAFT PLAN APPLICATION	DEC. 18, 2020
2.	ISSUED FOR DRAFT PLAN APPROVAL	AUG.3, 2022
3.	ISSUED FOR DRAFT PLAN APPROVAL	JUN. 23, 2023
4.	RE-ISSUED FOR DRAFT PLAN APPROVAL	OCT.10, 2023

Sheet No: 1 of 1

APPENDIX D
STORM SEWER DESIGN

McINTOSH PERRY



SCALE 1 : 2000

0 50 100 150 200 Metres

LEGEND

LOCATION I.D.

AREA (ha)

123F 0.25

0.60

AVERAGE COEFFICIENT 5-year

N

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

Project: PERTHMORE SUBDIVISION PHASE 6

Drawing Title: STORM DRAINAGE AREA PLAN

Drawn by:	Checked By:
P.G.K.	B.S.C.
Scale: 1:2000	Project Number: PP-13-9668-01

No.	Revisions	Date
4	RE-ISSUED FOR DRAFT APPROVAL	OCT.10.2023
3	RE-ISSUED FOR DRAFT APPROVAL	JUNE.23.2023
2	ISSUED FOR DRAFT PLAN APPROVAL	AUG.03.2022

Drawing Number: 501

FILENAME: U:\Ottawa\01 Project - Proposals\2013 Jobs\OPP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03-Drawings\Production\PP-13-9668-01_Drawings.dwg
LAST SAVED: Tuesday, October 10, 2023 LAST SAVED BY: s.hall
LAST PLOTTED: Tuesday, October 10, 2023 CTB FILE USED: ---

STORM SEWER DESIGN SHEET

McINTOSH PERRY

PROJECT: PERTHMORE SUBDIVISION PHASE 6
LOCATION: PERTH, ON
CLIENT: PERTHMORE DEVELOPMENT CO.

LOCATION				CONTRIBUTING AREA (ha)								RATIONAL DESIGN FLOW											SEWER DATA								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
STREET	AREA ID	FROM MH	TO MH	C-VALUE 0.25	0.40	0.50	0.60	0.80	1.00	INDIV AC	CUMUL AC	INLET (min)	TIME IN PIPE	TOTAL (min)	i (5) (mm/hr)	i (10) (mm/hr)	i (100) (mm/hr)	5yr PEAK FLOW (L/s)	10yr PEAK FLOW (L/s)	100yr PEAK FLOW (L/s)	FIXED FLOW (L/s)	DESIGN FLOW (L/s)	CAPACITY (L/s)	LENGTH (m)	PIPE SIZE (mm) DIA	W	H	SLOPE (%)	VELOCITY (m/s)	AVAIL CAP (5yr) (L/s)	(%)
	HDR1	610	608				3.70			2.22	2.22	20.00	0.30	20.30	58.41	67.89	97.42	360.47				360.47	449.81	18.00	750			0.15	0.986	89.34	19.86
STREET A	609	609	608			0.16				0.08	0.08	20.00	0.97	20.97	58.41	67.89	97.42	12.99				12.99	41.62	48.00	250			0.45	0.821	28.63	68.79
PERTHMORE STREET	612	612	611			1.21				0.61	0.61	20.00	1.42	21.42	58.41	67.89	97.42	98.24				98.24	133.02	69.00	450			0.20	0.810	34.78	26.15
		611	608							0.00	0.61	21.42	1.42	22.84	55.68	64.71	92.86	93.64				93.64	133.02	69.00	450			0.20	0.810	39.38	29.60
STREET A	608	608	607			0.79				0.40	3.30	22.84	1.28	24.12	53.23	61.88	88.79	488.36				488.36	579.98	81.00	825			0.15	1.051	91.62	15.80
		607	606							0.00	3.30	24.12	0.20	24.33	51.24	59.55	85.46	470.04				470.04	579.98	12.90	825			0.15	1.051	109.94	18.96
	UND1, 606	606	605	1.51		1.19				0.97	4.27	24.33	1.23	25.56	50.93	59.20	84.95	604.98				604.98	731.45	82.10	900			0.15	1.114	126.47	17.29
		605	604							0.00	4.27	25.56	1.35	26.90	49.21	57.20	82.08	584.50				584.50	731.45	90.00	900			0.15	1.114	146.95	20.09
STREET A	UND2, 604(1)	604	603	0.54		0.68				0.48	4.75	26.90	0.18	27.08	47.48	55.18	79.18	626.58				626.58	731.45	11.80	900			0.15	1.114	104.87	14.34
		603	602							0.00	4.75	27.08	0.45	27.53	47.26	54.93	78.82	623.72				623.72	731.45	30.00	900			0.15	1.114	107.73	14.73
		602	601							0.00	4.75	27.53	0.36	27.89	46.72	54.30	77.92	616.59				616.59	731.45	24.00	900			0.15	1.114	114.85	15.70
		601	600							0.00	4.75	27.89	0.49	28.38	46.30	53.81	77.22	611.03				611.03	731.45	32.90	900			0.15	1.114	120.41	16.46
		600	POND							0.00	4.75	28.38	0.22	28.60	45.73	53.16	76.28	603.60				603.60	731.45	14.61	900			0.15	1.114	127.84	17.48
SENATORS GATE DRIVE	604(2)	604	*BULKHEAD*			0.23				0.12	0.12	20.00	1.13	21.13	58.41	67.89	97.42	18.67				18.67	188.11	77.63	450			0.40	1.146	169.44	90.07
		BULKHEAD	*D207*							0.00	0.12	21.13	0.18	21.31	56.21	65.33	93.75	17.97				17.97	188.11	*12.50*	*450*			*0.40*	1.146	170.14	90.45
PERTHMORE STREET		*BULKHEAD*	*D207*							0.00	0.00	20.00	0.18	20.18	58.41	67.89	97.42	0.00				0.00	188.11	*12.50*	*450*			*0.40*	1.146	188.11	100.00

Definitions:
Q = 2.78CiA, where:
Q = Peak Flow in Litres per Second (L/s)
A = Area in Hectares (ha)
i = Rainfall intensity in millimeters per hour (mm/hr)
[i = 27.1 * Tc^-0.699] 5 YEAR
[i = 31.5 * Tc^-0.699] 10 YEAR
[i = 45.2 * Tc^-0.699] 100 YEAR

Notes:
1. Mannings coefficient (n) = 0.013

Designed: P.G.K.

Checked: B.S.C.

Project No.: PP-13-9668-01

No.	Revision	Date
1.	ISSUED FOR DRAFT PLAN APPLICATION	DEC. 18, 2020
2.	ISSUED FOR DRAFT PLAN APPROVAL	AUG. 3, 2022
3.	RE-ISSUED FOR DRAFT PLAN APPROVAL	JUN. 23, 2023
4.	RE-ISSUED FOR DRAFT PLAN APPROVAL	OCT. 10, 2023

Sheet No: 1 of 1

APPENDIX E

EXISTING CONDITIONS MEMO

MCINTOSH PERRY

McINTOSH PERRY

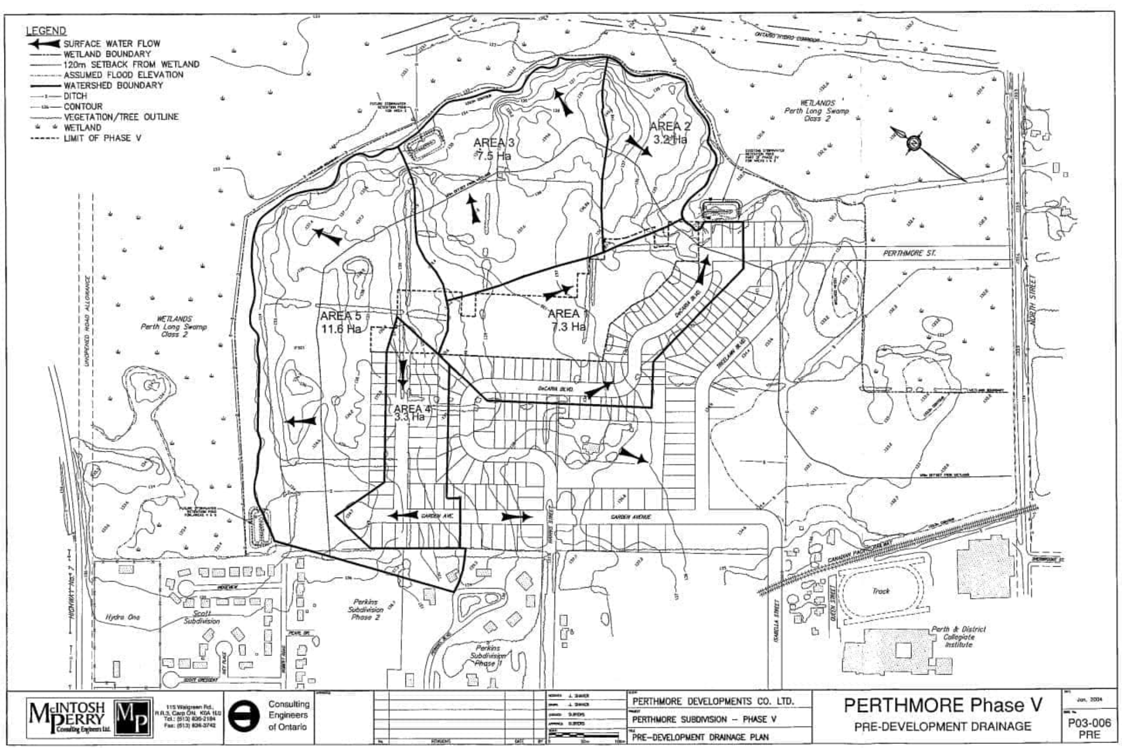
MEMORANDUM

To:	Ryan Kennedy, P. Eng., Practice Lead, Land Development Adam O'Connor, P.Eng., Assistant Vice President, Land Development
From:	John Price, P. Eng., Senior Water Resource Engineer
Cc:	Jason Sharp, P. Eng. Manager, Water Resources
Date:	December 2, 2020
Re:	Perthmore Subdivision

1.0 BACKGROUND

The Perthmore subdivision is located northwest of North Street in the Town of Perth. Various phases of the subdivision have been under development since the 1990s and the draft plan for a subsequent phase is now under consideration. The drainage and stormwater management infrastructure has also been constructed in phases over many years. The original pre-development flow values were first calculated in 1990s using the Rational Equation.

An existing stormwater management (SWM) pond is located on the northeast side of Perthmore Street as shown on the figure below. As part of development of this subsequent phase, this SWM facility will be reconstructed and expanded to address the water quality and quantity control requirements for the tributary drainage area. For the SWM design the pre-development flows, to be used as the target flows for the quantity control, were reassessed.



2.0 ANALYSIS

A Visual OTTHMO Version 5 (VO5) model was assembled for the analysis. As shown in the figure above, the pre-development tributary area to the SWM facility consists of Areas 1 and 2 and the total tributary pre-development drainage area is 10.5 ha. The VO5 hydrologic model requires various measured and calculated input parameters. The calculations of these input parameters area detailed below.

2.1 Parameters

2.1.1 General

Since the pre-development land use was rural the NASHYD command was employed in the VO5 model to calculate the runoff flows. NASHYD is used to simulate runoff flows with NASH instantaneous unit hydrograph. This hydrograph is made of a cascade of “n” linear reservoirs. The n (number of linear reservoirs) parameter was set at 3, in the model, and the rainfall losses were computed by the SCS CN procedure.

2.1.2 Time of Concentration/Time to Peak

The Time of Concentration (Tc), for the pre-development drainage basins, was calculated using the Airport Formula.

$$T_c = 3.26 * (1.1 - C) * L^{0.5} * S_W^{-0.33}$$

Where:

> Tc = time of concentration in minutes
> C = runoff coefficient
> L = watershed length in metres
> S_W = watershed slope in percentage

From the Tc value, the Time to Peak (Tp) value was calculated as 0.67 times Tc. The parameters employed in the calculation of Tc and Tp for the two drainage basins are show in Table 1.

Table 1 – Time to Peak

Catchment	Area	Flow Length	Fall	Slope	Tc[1]	Tp[2]
	ha	m	m	%	min	hrs
Area 1	7.3	435	7	1.61	58.1	0.65
Area 2	3.2	165	7	4.24	26.0	0.29

Notes: 1 – Airport Formula
2 – 0.67*Tc

2.1.3 SCS Curve Number

The Curve Number (CN) is the most important parameter in determining surface runoff when the SCS equation is used. Table 2 shows the parameters and the resulting CN value for Areas 1 and 2.

Table 2 – Curve Number

Catchment	Soil Type	Hydrologic Soil Group[1]	Land Use (0-5% Slope)	Runoff Coefficient[2]	CN[3] (AMC II)	Ia mm
Area 1	Sandy Loam	AB	Pasture	0.10	59	5
Area 2	Sandy Loam	AB	Pasture	0.10	59	5

Notes: 1 – MTO Drainage Management Manual – Design Chart 1.08
2 - MTO Drainage Management Manual – Design Chart 1.07
3 - MTO Drainage Management Manual – Design Chart 1.09 (Pasture, fair condition – average of A and B Hydrologic Soil Groups)

2.1.4 Rainfall

For the rainfall input to the VO5 model, the 12 hour SCS rainfall distribution, representing a high volume lower intensity storm, and a 4 hour Chicago rainfall distribution, representing a high intensity "thunder storm" type of rainfall event were used ion the analysis. The Intensity-Duration-Frequency (IDF) curve was obtained from the Ministry of Transportation (MTO) IDF Curve Lookup tool with the location centred over the property.

3.0 RESULTS

Employing the above noted parameters and the VO5 hydrologic model, Table 3 shows the calculated pre-development flow values for the 12 hour SCS and 4 hour Chicago rainfall hyetographs. It is recommended that these flow values be used for the water quantity control assessment of the reconstructed SWM facility. The redesign of the end of pipe facility will also include water quality control for the post-development tributary drainage area.

Table 3 – Calculated Flows

	12 hour SCS			4 hour Chicago		
Return Period	Area 1	Area 2	Total	Area 1	Area 2	Total
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.061	0.047	0.093	0.030	0.022	0.045
5	0.110	0.085	0.168	0.057	0.041	0.085
10	0.143	0.111	0.220	0.080	0.058	0.119
25	0.197	0.152	0.303	0.111	0.083	0.166
50	0.238	0.184	0.367	0.137	0.101	0.206
100	0.288	0.223	0.444	0.165	0.122	0.248

This memorandum is respectfully submitted by,
McIntosh Perry Consulting Engineers Ltd.

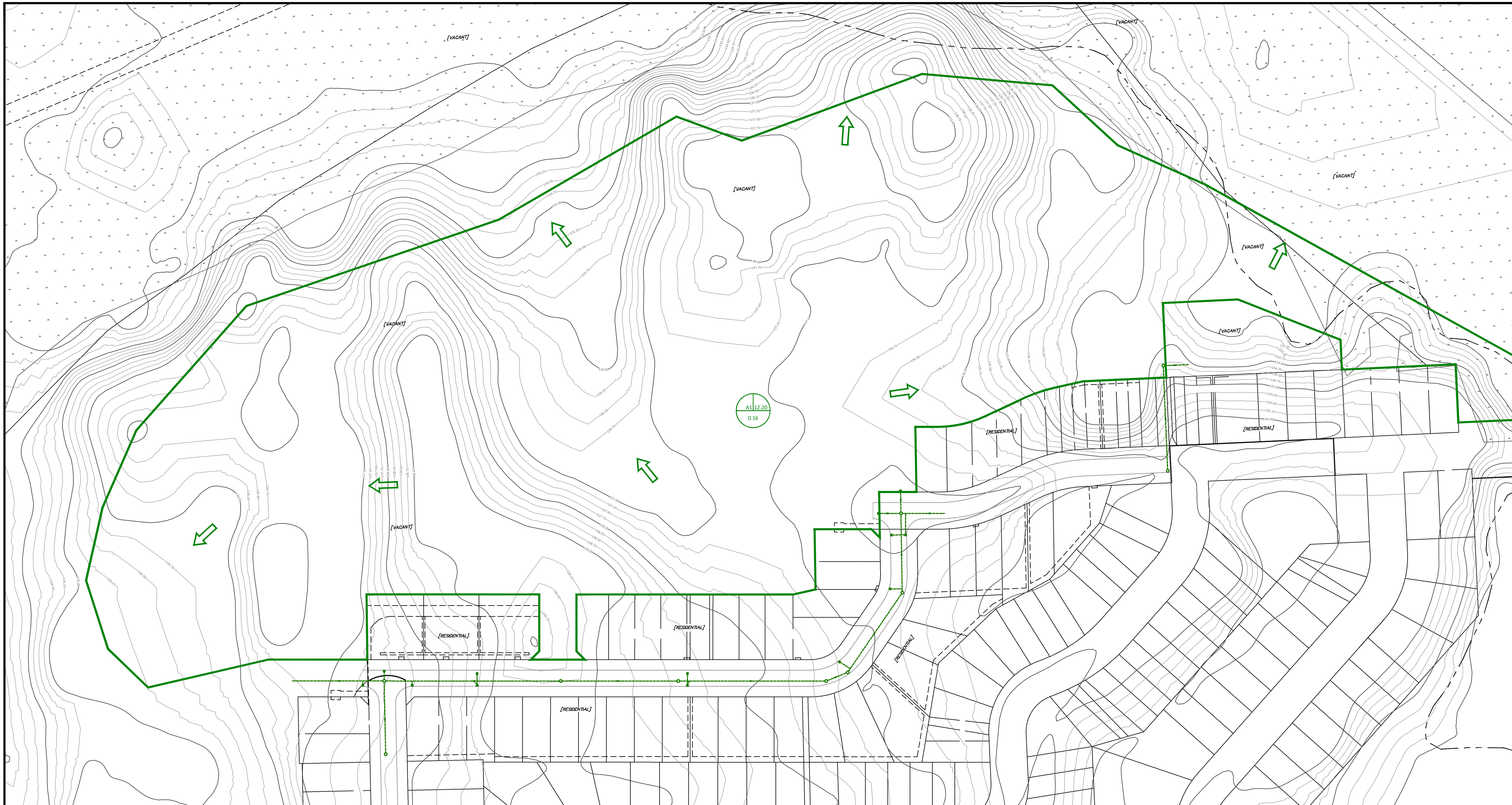
John Price

John Price, P. Eng.
Senior Water Resource Engineer
PH No. 613 714 5906
Email. J.Price@McIntoshPerry.com

APPENDIX F

STORMWATER MANAGEMENT DESIGN

McINTOSH PERRY



SCALE 1 : 2000

0 50 100 150 200 Metres

LEGEND

LOCATION I.D. — 123F | 0.25 — AREA (ha)

0.60 — RUNOFF COEFFICIENT

N

McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client: PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

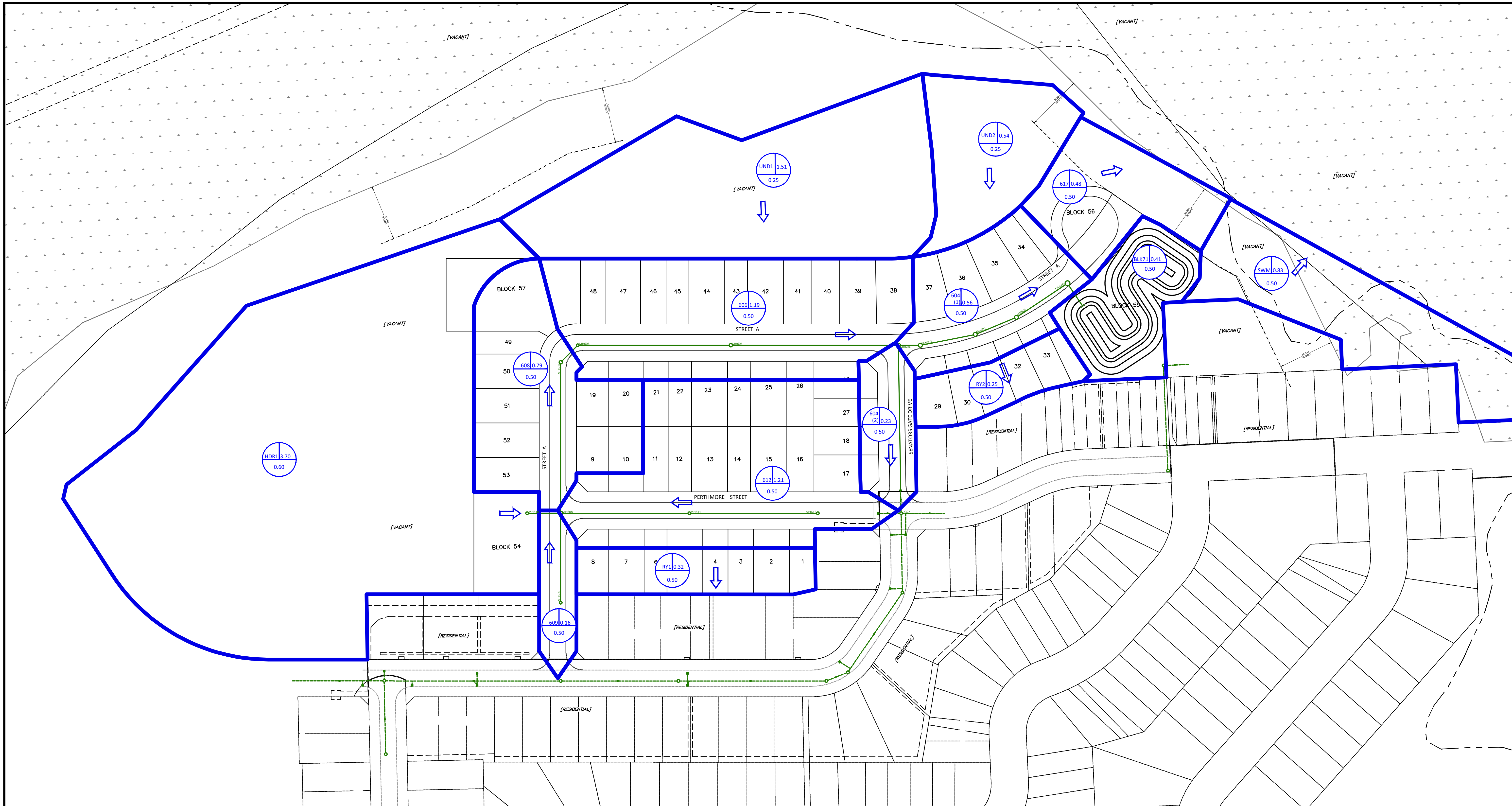
Project: PERTHMORE SUBDIVISION PHASE 6

Drawing Title: PRE-DEVELOPMENT DRAINAGE AREA PLAN

Drawn by:	Checked By:
P.G.K.	B.S.C.
Scale: 1:2000	Project Number: PP-13-9668-01

No.	Revisions	Date
4	RE-ISSUED FOR DRAFT APPROVAL	OCT.10.2023
3	RE-ISSUED FOR DRAFT APPROVAL	JUNE.23.2023
2	ISSUED FOR DRAFT PLAN APPROVAL	AUG.03.2022

Drawing Number: PRE



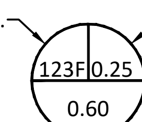
SCALE 1 : 2000

0 50 100 150 200 Metres

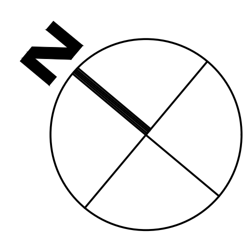
LEGEND

LOCATION I.D.

AREA (ha)



RUNOFF COEFFICIENT



McINTOSH PERRY
115 Walgreen Road, RR3, Carp, ON K0A 1L0
Tel: 613-836-2184 Fax: 613-836-3742
www.mcintoshperry.com

Client:
PERTHMORE DEVELOPMENT CO.
80 DUFFERIN STREET PERTH, ON K7H 3M6

Project:
PERTHMORE SUBDIVISION PHASE 6

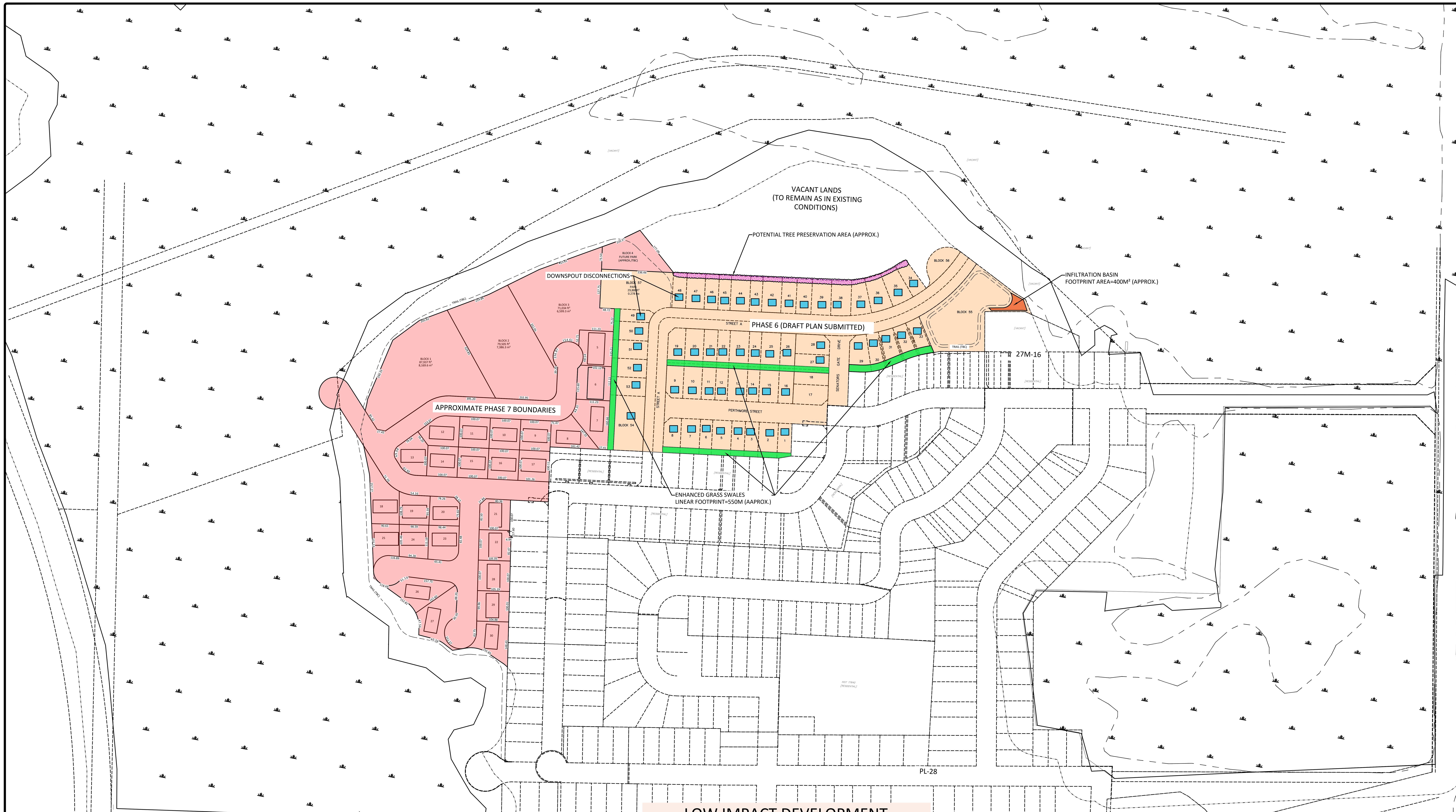
Drawing Title:
POST-DEVELOPMENT DRAINAGE PLAN

Drawn by:	Checked By:
P.G.K.	B.S.C.
Scale: 1:2000	Project Number: PP-13-9668-01

No.	Revisions	Date
4	RE-ISSUED FOR DRAFT APPROVAL	OCT.10.2023
3	RE-ISSUED FOR DRAFT APPROVAL	JUNE.23.2023
2	ISSUED FOR DRAFT PLAN APPROVAL	AUG.03.2022

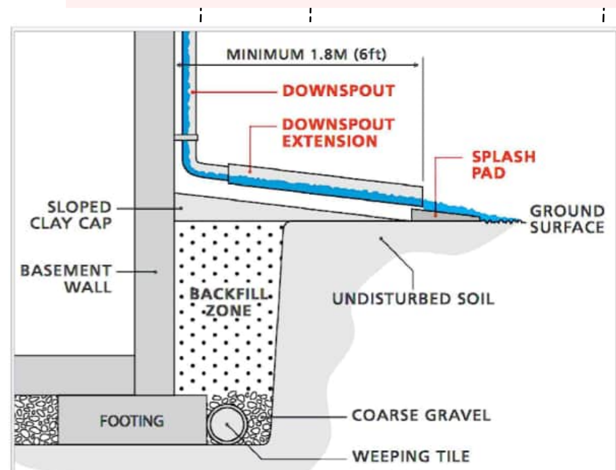
Drawing Number:
POST

FILENAME: U:\Ottawa\01 Project - Proposals\2013 Jobs\0PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03-Drawings\Production\PP-13-9668-01_Drawings.dwg
LAST SAVED: Thursday, October 05, 2023 LAST SAVED BY: s.hall
LAST PLOTTED: Tuesday, October 10, 2023 CTB FILE USED: ----

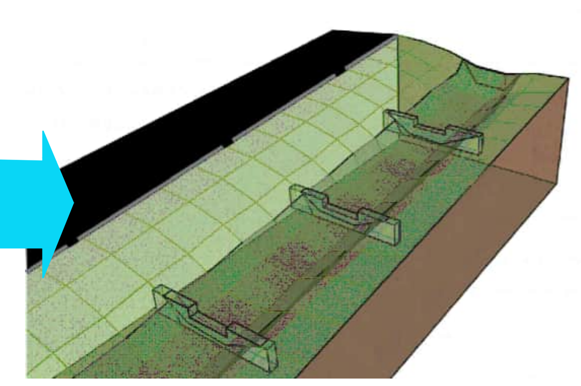


LOW IMPACT DEVELOPMENT TREATMENT-TRAIN

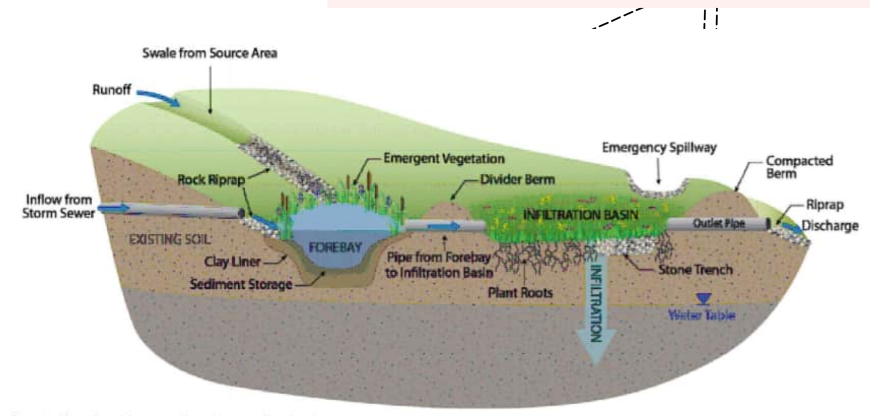
DOWNSPOUT DISCONNECTION



ENHANCED GRASS SWALES



INFILTRATION BASIN



LEGEND

(dashed line)	EXISTING LEGAL FABRIC
(dashed line)	WETLAND 30m SETBACK
(dashed line)	FLOODPLAIN BOUNDARY
(solid line)	CONCEPTUAL LINEWORK
(hatched line)	MNRF PROVINCIALLY SIGNIFICANT WETLAND
(dashed line)	CONCEPTUAL PATHWAY
(blue)	DOWNSPOUT DISCONNECTION (LOT LEVEL LID)
(green)	ENHANCED SWALE (CONVEYANCE LID)
(orange)	INFILTRATION BASIN (END-OF-PIPE LID)

DISCLAIMER:

BOUNDARIES SHOWN ON THIS SITE PLAN ARE COMPILED FROM EXISTING PLANS, FOR THE PURPOSES OF CREATING A CONCEPTUAL SUBDIVISION LAYOUT ONLY. MCINTOSH PERRY DOES NOT CERTIFY THAT THE BOUNDARIES OF THE PROPERTY SHOWN ON THIS PLAN ARE ACCURATE WITHIN THE MEANING OF THE SURVEYS ACT. PROPER LEGAL SURVEY RE-ESTABLISHMENT OF ANY BOUNDARY LOCATIONS OF PROPERTIES ON THIS PLAN MUST BE COMPLETED BY AN ONTARIO LAND SURVEYOR WORKING WITHIN THE SURVEYS ACT, SURVEYOR'S ACT, AND LAND TITLES OR REGISTRY ACT AND REGULATIONS MADE THEREUNDER.

BUILDING ENVELOPES

LOTS 7-30 = 80' x 42'2"
LOTS 5 & 6 = 103'4"x 54'

NOTE: LOT DIMENSIONS DISPLAYED IN FEET

SCALE 1 : 2000
0 50 100 150 200 Metres

NORTH:

STAMP:

FOR REVIEW ONLY
NOT FOR CONSTRUCTION

No.	Revision/Issue	Date

McINTOSH PERRY
3240 Drummond Conc. 5A, R.R. #7
Perth, ON K7H 3C9
Tel: 613-267-6524 Fax: 613-267-7992
www.mcintoshperry.com

Designed by:	RP
Drawn by:	
Checked By:	BC
Scale:	1:2000

Client: PERTHMORE DEVLOPMENT CO. LTD

Project: PERTHMORE ESTATES - PHASE 7

Drawing Title: LOW IMPACT DEVELOPMENT CONCEPT PLAN

Date: MAY.2023

Project Number: PP-13-9668-03

Drawing Number: CON2

Check and verify all dimensions before proceeding with the work

Do not scale drawings

FILENAME: U:\Ottawa\01 Project - Proposals\2013 Jobs\PP\PP-13-9668-01 Perthmore Development Co_Perthmore Subdivision\03 Drawings\PP-13-9668 - Concept Plan - LID.dwg
LAST SAVED: Friday, June 23, 2023 LAST SAVED BY: L.hall
LAST PLOTTED: Monday, October 02, 2023 CTB FILE USED: ---

CCO-13-9668-01 - PERTHMORE SUBDIVISION - PRE-DEVELOPMENT

Values

Land Use	Pasture	Pasture	Forest	Forest
Hydrologic Soil Group	B	C	B	C
Runoff Coefficients*	0.1	0.28	0.08	0.25
CN Values**	59	75	60	73
IA (mm)	5	5	10	10

* Design Chart 1.07 MTO Drainage Management Manual

** Design Chart 1.09 MTO Drainage Management Manual

Land Use

Drainage Area ID	Total Area (ha)	Pasture	Pasture	Forest	Forest	Weighted CN Value	Weighted C Value	Weighted IA Value
		B	C	B	C			
		Sub-Area (ha)	Sub-Area (ha)	Sub-Area (ha)	Sub-Area (ha)			
A1	12.2	5.45	1.76	1.56	3.2	64.0	0.16	6.9

Airport Formula

For use when the runoff coefficient is less than 0.4

$t_c = 3.26 * (1.1 - C) * L^{0.5} * S_w^{-0.33}$

Where

tc = time of concentration in minutes

C = runoff coefficient

L = watershed length in metres

S_w = watershed slope in %

Source: MTO Drainage Manual 1997 - Chapter 8, page 28

A1

C = 0.16

L = 435 m

S_w = 1.61 %

T_c = 54.6 min

T_c = 0.91 hours

T_p = 36.6 min

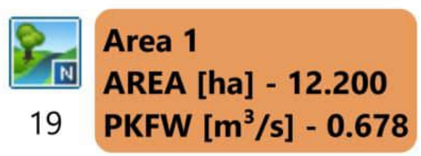
T_p = 0.61 hours

$T_p = 0.67\ T_c$

MCINTOSH PERRY

CCO-13-9668-01 - PERTHMORE SUBDIVISION - PRE-DEVELOPMENT RESULTS

Return Period (Yrs)	4 hour Chicago (m^3/s)	12 hour SCS (m^3/s)	24 hour SCS (m^3/s)
2	0.053	0.114	0.148
5	0.105	0.211	0.259
10	0.149	0.278	0.352
25	0.210	0.383	0.475
50	0.262	0.463	0.585
100	0.317	0.560	0.678



3240 Drummond Concession 5A, R.R.7 Perth, Ontario K7H 3C9 Tel.: 613.267.6524 Fax: 613.267.7992
info@mcintoshperry.com www.mcintoshperry.com

CCO-13-9668-01 - PERTHMORE SUBDIVISION - POST-DEVELOPMENT

Values

Land Use	Pasture	Pasture	Forest	Forest
Hydrologic Soil Group	B	C	B	C
Runoff Coefficients*	0.1	0.28	0.08	0.25
CN Values**	59	75	60	73
IA (mm)	5	5	10	10

* Design Chart 1.07 MTO Drainage Management Manual

** Design Chart 1.09 MTO Drainage Management Manual

Land Use

Drainage Area ID	Total Area (ha)	Pasture B Sub-Area (ha)	Pasture C Sub-Area (ha)	Forest B Sub-Area (ha)	Forest C Sub-Area (ha)	Weighted CN Value	Weighted C Value	Weighted IA Value
UND - Undeveloped Area	2.05	0	0	0.00	2.05	73.0	0.25	10.0

Airport Formula

For use when the runoff coefficient is less than 0.4

$t_c = 3.26 * (1.1 - C) * L^{0.5} * S_w^{-0.33}$

Where

tc = time of concentration in minutes

C = runoff coefficient

L = watershed length in metres

S_w = watershed slope in %

Source: MTO Drainage Manual 1997 - Chapter 8, page 28

UND:

C=	0.25	Tc=	19.7	min
L=	80.00	Tp=	0.22	hr
Sw=	2.00			

				Pervious Area					Impervious Area				
Sub-Catchment	Area	Total Imperviousness	Directly Connected	CN	Slope	Flow Length	Manning's n	Ia	Slope	Flow Length (measured)	Flow Length[3]	Manning's n	Depression Storage
	ha	%	%		%	m		mm	%	m			mm
West Block[6]	3.43	50.0	35.0	59.0	2.0	40.0	0.25	5.0	1.0	150.0	151.2	0.013	1.0
Block 70	0.83	0.0	0.0	75.0	2.0	10.0	0.25	10.0	1.0	75.0	74.4	0.013	1.0
SWM Block[4,6]	0.41	0.0	0.0	75.0	2.0	10.0	0.25	10.0	1.0	50.0	52.3	0.013	1.0
Developed Portions[5,6]	5.32	50.0	35.0	59.0	1.0	40.0	0.25	5.0	1.0	350.0	188.3	0.130	1.0

Notes 1 -Airport Formula

2 - 0.67* Tc

3 - Flow Length = SquareRoot (Area/1.5) - (Area in square metres)

4 - Block 71

5 - 604(1) - 0.56ha, 604(2) - 0.23ha, 606 - 1.19ha, 608 - 0.79ha, 609 - 0.16ha, 612 - 1.21ha, 617 - 0.48ha, RY1 - 0.32ha and RY2 - 0.25ha

6 - To Pond

Storage Requirements

Drainage Area:	11.21	ha	
Facility Type:	Wet Pond		
Level of Protection:	Enhanced		
			%Imperviousness
Req'd Permanent Pool Storage Volume			46%
Vs =	85	m^3/ha	(Table 3.2, p. 3-10, SWMP Manual - 165m3/ha - 80m3/ha)
Vs =	953	m^3	Given the upstream individual storage requirements from Blocks 67, 68 and 69, the MECP SWMP Manual notes that the extended detention is increased to account for upstream storage)
Req'd Extended Detention Volume			MECP SWMP Manual - Section 3.3.2.
Ved =	80	m^3/ha	It should be noted that the total drainage area contributing to the facility should be included in sizing (lumped imperviousness or separate calculations for internal and external drainage areas is permissible) in most cases. The exception occurs when an external drainage area is itself controlled by a separate water quality facility (and erosion and quantity control are either not required or provided separately). Modelling studies (Marshall Macklin Monaghan Limited, 1997) indicate comparable combined long-term removal rates for ponds in series and separate parallel ponds. More frequent overflows will occur from the most downstream pond, but this can be compensated for by doubling the water quality active storage volume from 40 to 80 m³/ha.
Ved =	897	m^3	
Required Permanent Pool Volume			
	1850	**m^3**	

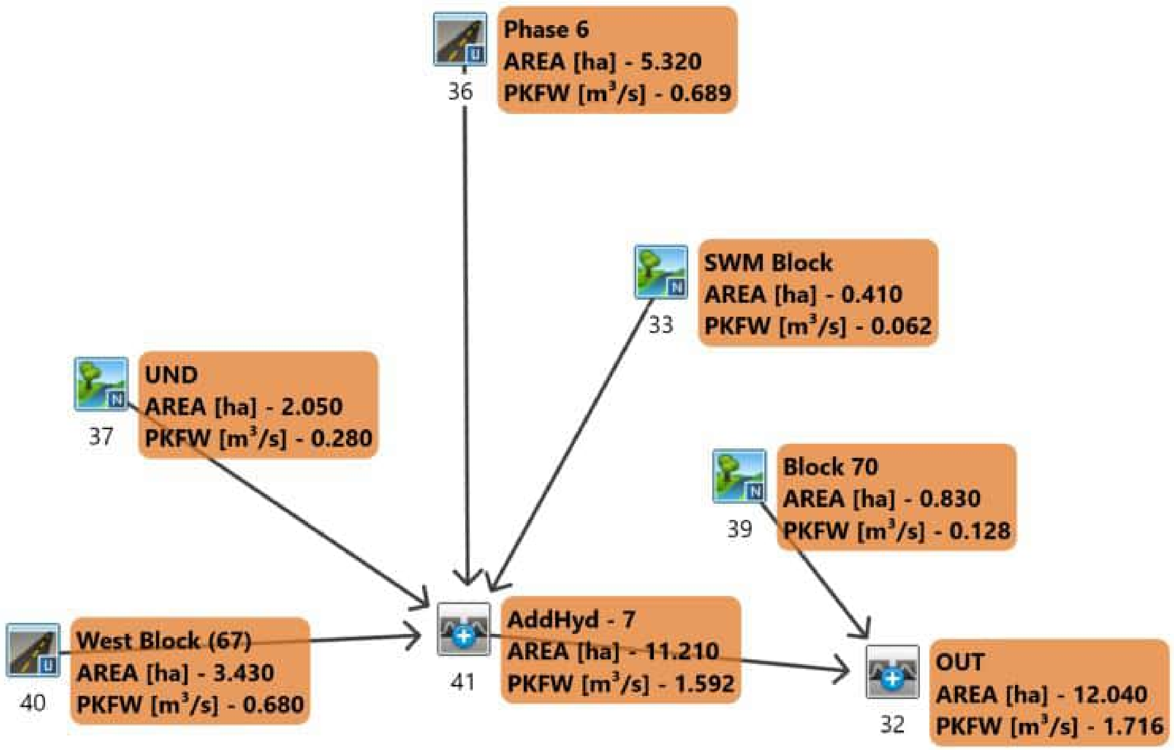
CCO-13-9668-01 - PERTHMORE SUBDIVISION - POST-DEVELOPMENT - RESULTS - UNCONTROLLED

4 Hour Chicago						
Return Period	West Block	Undeveloped	Block 70	SWM Block	Developed Portions	Total
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.228	0.015	0.007	0.004	0.153	0.318
5	0.315	0.036	0.017	0.008	0.223	0.459
10	0.374	0.053	0.026	0.012	0.292	0.606
25	0.461	0.078	0.038	0.018	0.368	0.765
50	0.523	0.100	0.048	0.023	0.423	0.886
100	0.587	0.123	0.059	0.028	0.481	1.012

12 Hour SCS						
Return Period	West Block	Undeveloped	Block 70	SWM Block	Developed Portions	Total
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.215	0.046	0.022	0.011	0.184	0.420
5	0.306	0.089	0.043	0.020	0.278	0.647
10	0.384	0.118	0.056	0.027	0.355	0.875
25	0.481	0.163	0.077	0.037	0.447	1.123
50	0.551	0.197	0.092	0.044	0.542	1.324
100	0.634	0.238	0.110	0.053	0.631	1.547

24 Hour SCS						
Return Period	West Block	Undeveloped	Block 70	SWM Block	Developed Portions	Total
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.225	0.061	0.029	0.014	0.197	0.467
5	0.336	0.109	0.051	0.025	0.296	0.729
10	0.417	0.148	0.069	0.033	0.390	0.989
25	0.518	0.199	0.092	0.044	0.490	1.257
50	0.606	0.243	0.111	0.054	0.611	1.516
100	0.680	0.280	0.128	0.062	0.689	1.716

Post-Development Uncontrolled - VO5 Model



CCO-13-9668-01 - PERTHMORE SUBDIVISION - POST-DEVELOPMENT - RESULTS - CONTROLLED

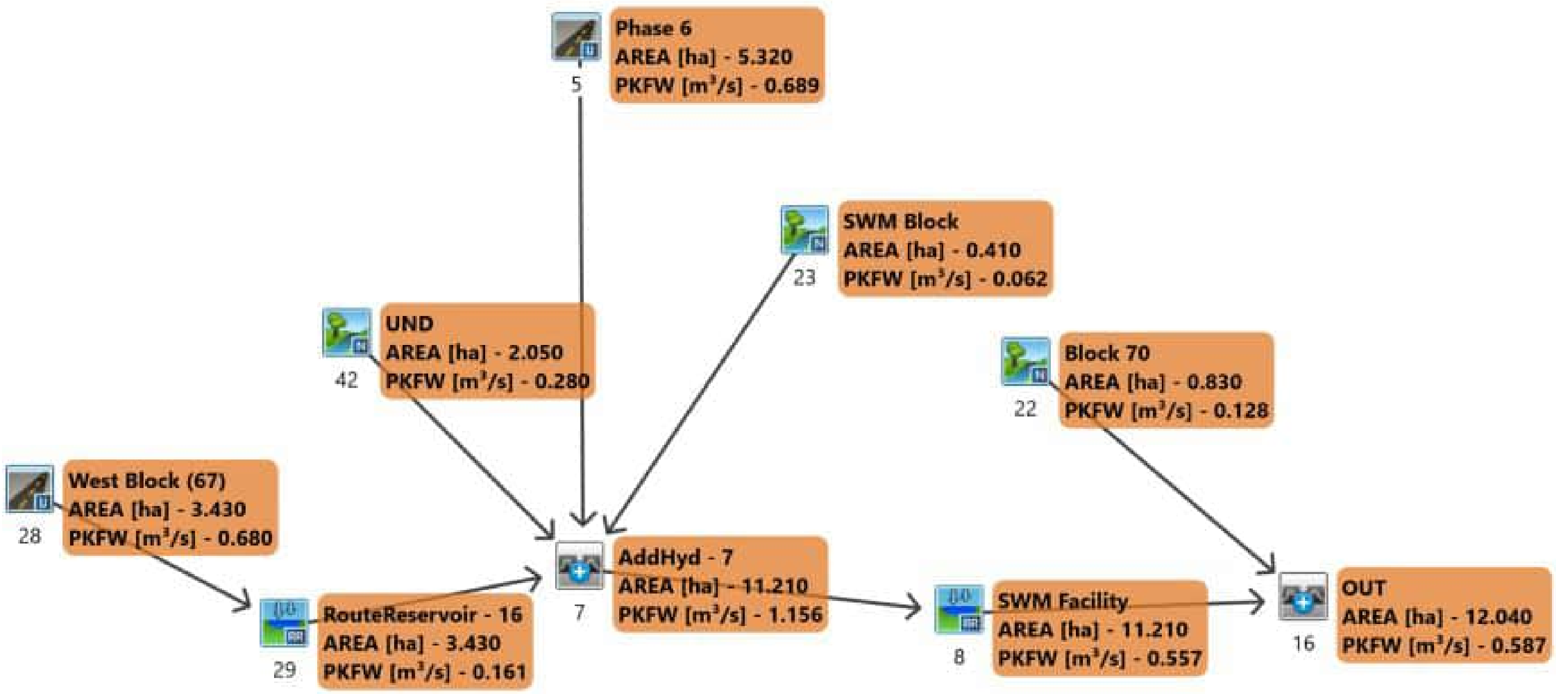
4 Hour Chicago						
Return Period	West Block	Undeveloped	Block 70	SWM Block	Developed Portions	Total
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.228	0.015	0.007	0.004	0.153	0.077
5	0.315	0.036	0.017	0.008	0.223	0.098
10	0.374	0.053	0.026	0.012	0.292	0.139
25	0.461	0.078	0.038	0.018	0.368	0.217
50	0.523	0.100	0.048	0.023	0.423	0.264
100	0.587	0.123	0.059	0.028	0.481	0.311

12 Hour SCS						
Return Period	West Block	Undeveloped	Block 70	SWM Block	Developed Portions	Total
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.215	0.046	0.022	0.011	0.184	0.091
5	0.306	0.089	0.043	0.020	0.278	0.169
10	0.384	0.118	0.056	0.027	0.355	0.241
25	0.481	0.163	0.077	0.037	0.447	0.324
50	0.551	0.197	0.092	0.044	0.542	0.377
100	0.634	0.238	0.110	0.053	0.631	0.480

24 Hour SCS						
Return Period	West Block	Undeveloped	Block 70	SWM Block	Developed Portions	Total
Yrs	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s	m^3/s
2	0.225	0.061	0.029	0.014	0.197	0.097
5	0.336	0.109	0.051	0.025	0.296	0.207
10	0.417	0.148	0.069	0.033	0.390	0.287
25	0.518	0.199	0.092	0.044	0.490	0.366
50	0.606	0.243	0.111	0.054	0.611	0.474
100	0.680	0.280	0.128	0.062	0.689	0.587

McINTOSH PERRY

Post-Development Controlled - VO5 Model



McINTOSH PERRY

CCO-13-9668-01 - PERTHMORE SUBDIVISION - PRE- TO POST-DEVELOPMENT RESULTS COMPARISON

4 Hour Chicago				
Return Period	POST Outflow From Site	PRE Outflow from Site	Post to Pre	Post to Pre
Yrs	m^3/s	m^3/s	Δ	%
2	0.075	0.053	0.022	-41.5%
5	0.094	0.105	-0.011	10.5%
10	0.133	0.149	-0.016	10.7%
25	0.208	0.210	-0.002	1.0%
50	0.252	0.262	-0.010	3.8%
100	0.295	0.317	-0.022	6.9%

12 hour SCS				
Return Period	POST Outflow From Site	PRE Outflow from Site	Post to Pre	Post to Pre
Yrs	m^3/s	m^3/s	Δ	%
2	0.088	0.114	-0.026	22.8%
5	0.164	0.211	-0.047	22.3%
10	0.232	0.278	-0.046	16.5%
25	0.310	0.383	-0.073	19.1%
50	0.359	0.463	-0.104	22.5%
100	0.456	0.560	-0.104	18.6%

24 Hour SCS				
Return Period	POST Outflow From Site	PRE Outflow from Site	Post to Pre	Post to Pre
Yrs	m^3/s	m^3/s	Δ	Δ
2	0.094	0.148	-0.054	36.5%
5	0.199	0.259	-0.060	23.2%
10	0.275	0.352	-0.077	21.9%
25	0.350	0.475	-0.125	26.3%
50	0.452	0.585	-0.133	22.7%
100	0.557	0.678	-0.121	17.8%

3240 Drummond Concession 5A, R.R.7 Perth, Ontario K7H 3C9 Tel.: 613.267.6524 Fax: 613.267.7992
info@mcintoshperry.com www.mcintoshperry.com

CCO-13-9668-01 - PERTHMORE SUBDIVISION - STAGE / STORAGE / DISCHARGE TABLE

VO6 Route Reservoir Input - Rating Curve

Stage (m)	Discharge (m^3/s)	Storage (ha.m)	Storage (m^3)	
133.36	0	0.0000	0	
133.46	0.041	0.0120	120	
133.56	0.058	0.0253	253	25mm storm
133.66	0.071	0.0399	399	
133.76	0.083	0.0559	559	
133.86	0.092	0.0732	732	
133.96	0.101	0.0918	918	
134.06	0.213	0.1116	1116	5year - 1090 m^3
134.16	0.286	0.1321	1321	
134.26	0.339	0.1535	1535	
134.36	0.384	0.1758	1758	
134.46	0.539	0.1989	1989	
134.56	0.648	0.2228	2228	100year-2030 m^3
134.66	0.732	0.2476	2476	
134.76	0.805	0.2733	2733	Top of Pond
134.86	0.871	0.2998	2998	
134.96	0.932	0.3263	3263	
135.06	0.988	0.3528	3528	

For Orifice Flow, C =	0.60
For Weir Flow, C =	1.84

	Orifice 1	Orifice 2	Orifice 3
Invert Elevation	133.36	134.00	134.40
Center of Crest Elevation			
Orifice Width/Weir Length	250 mm	450 mm	475 mm
Orifice Height			
Orifice Area (m^2)	0.049	0.159	0.177

Elevation	Orifice 1		Orifice 2		Orifice 3		Total
	H [m]	Q [l/s]	H [m]	Q [l/s]	H [m]	Q [l/s]	Q [l/s]
133.36	0.00	0					0
133.46	0.10	41					41
133.56	0.20	58					58
133.66	0.30	71					71
133.76	0.40	83					83
133.86	0.50	92					92
133.96	0.60	101					101
134.06	0.70	109	0.06	104			213
134.16	0.80	117	0.16	169			286
134.26	0.90	124	0.26	216			339
134.36	1.00	130	0.36	254			384
134.46	1.10	137	0.46	287	0.06	115	539
134.56	1.20	143	0.56	316	0.16	188	648
134.66	1.30	149	0.66	343	0.26	240	732
134.76	1.40	154	0.76	368	0.36	283	805
134.86	1.50	160	0.86	392	0.46	319	871
134.96	1.60	165	0.96	414	0.56	352	932
135.06	1.70	170	1.06	435	0.66	383	988

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.

*2. Orifice Equation: $Q = cA(2gh)^{1/2}$ (m^3/s *1000 = l/s)*

*3. Weir Equation: $Q = CLH^{3/2}$ (m^3/s *1000 = l/s)*

4. These Computations Do Not Account for Submergence Effects

5. H for orifice equations is depth of water above the centroide of the orifice.

6. H for weir equations is depth of water above the weir crest.

Reference: Urban Hydrology, Hydraulics and Stormwater Quality: engineering application and computer modeling / A. Akan, Robert J. Houghtalen, 2003.

CCO-13-9668-01 - PERTHMORE SUBDIVISION - EXTENDED DETENSION AND DRAWDOWN

Table E-3

As per the Section 4.6.2 (Wet Ponds) of the MECP Stormwater Management Planning and Design Manual, March 2003, a detention time of 24 hours should be targeted in all instances. The detention time can be easily solved if the relationship between pond surface area and pond depth is approximated using a linear regression equation as follows:

A1 **Drawdown Time Equation ---->**

$$t = \frac{0.66\, C_2\, h^{1.5} + 2\, C_3\, h^{0.5}}{2.75\, A_o}$$

Equation 4.11 (MECP SWM Planning Design Manual, 2003)

where,

t =	Drawdown time in seconds
C_2 =	Slope coefficient from the area-depth linear regression
C_3 =	Intercept from the area-depth linear regression
h =	Maximum water elevation above the orifice (m)
A_o =	Cross-sectional area of the orifice (m^2)

The relationship between A and h using Linear Regression (i.e., $A = C_2 h + C_3$)

Orifice Details:

Orifice Diameter =	250 mm	450 mm
Orifice Invert Elevation =	133.36 m	134.00 m

Active Storage Pond Details:

Active Storage Elevation (m)	Max Water Elevation Above Orifice (m)	Surface area of the Pond (m^2)	
133.36	0.00	18,800.00	Permanent Pool Level
133.46	0.10	20,009.54	
133.56	0.20	21,339.54	25mm Event
133.76	0.40	24,398.04	
133.86	0.50	26,126.64	
133.96	0.60	27,991.04	

Drawdown Time Results (During Construction):

	Extended Detention	25mm Event	
Orifices	250 mm	250 mm	
Slope (C_2) =	15,309	15,309	
Intercept (C_3) =	18,672	18,518	
Maximum Water Elevation Above Orifice (h) =	0.40 m	0.20 m	
Therefore, A =	24,796	21,580	
Cross-sectional area of the orifice (A_o) =	0.049 m2	0.049 m2	
Drawdown time	193,901 s	129,393 s	
Drawdown Time	**54 hrs**	**36 hrs**	**0 hrs**
		36 hrs	

CCO-13-9668-01 - PERTHMORE SUBDIVISION - STORMWATER MANAGEMENT POND FOREBAY AND PERMANENT POOL STORAGE VOLUME

Cell 1		
Elevation (m)	Total Storage (m^3)	
131.76	0	
131.86	9	
131.96	20	
132.06	32	
132.16	47	
132.26	64	
132.36	82	
132.46	103	
132.56	127	
132.66	153	
132.76	181	***Top of forebay***

Cell 2	
Elevation (m)	Total Storage (m^3)
131.26	0
131.36	37
131.46	48
131.56	61
131.66	76
131.76	93
131.86	112
131.96	134
132.06	159
132.16	186
132.26	216
132.36	249
132.46	285
132.56	324
132.66	366
132.76	411
132.86	523
132.96	645
133.06	777
133.16	921
133.26	1074
133.36	1700

Combined		
Elevation (m)	Total Storage (m^3)	
131.26	0	
131.36	218	
131.46	229	
131.56	242	
131.66	257	
131.76	274	
131.86	293	
131.96	315	
132.06	340	
132.16	367	
132.26	397	
132.36	430	
132.46	466	
132.56	504	
132.66	547	
132.76	592	
132.86	704	
132.96	826	
133.06	958	
133.16	1101	
133.26	1255	
133.36	1881	***Top of Permanent Pool***

1. Forebay Storage Volumes

A conservative estimate for forebay volume is equal to or greater than ten (10) years of sediment accumulation.
The conservative estimate for minimum forebay volume based on ten (10) times the sediment accumulation is 118 m3.
The total forebay volume is 181 m3.
Therefore, the forebay volume meets the conservative minimum requirements for total volume.

2. Permanent Pool Storage Volumes

Total Permanent Pool Volume Required = **953 m^3**
Total Permanent Pool Volume Provided = 1881 **m^3**
Therefore, the permanent pool volume provided is greater than the required volume.

3. Settling Length

Distance = $\frac{rQ_p}{V_s}$ Equation 4.5 : Settling Length, MECP SMPDM, March 2003

Length-to-Width Ratio --->	$r =$	2	(recommended)
Peak Flow Rate --->	$Q_p =$	0.147 m^3/s	(quality storm outflow --- 25mm storm event)
Settling Velocity --->	$V_s =$	0.0003 m/s	(recommended)

Distance = 31 m Settling Length (based on settling particles of approx. 0.15mm diameter)

4. Dispersion Length

Distance = $\frac{(8Q)}{dV_f}$ Equation 4.6 : Dispersion Length, MECP SMPDM March 2003

Inlet Flow Rate --->	$Q =$	0.49 m^3/s	(5 year Post)
Depth of Permanent Pool --->	$d =$	1.00 m	(in Forebay)
Settling Velocity --->	$V_f =$	0.5 m/s	(recommended)

Distance = 8 m Length of dispersion (based on pipe full flow capacity)

The forebay should be 31 m long to settle particles and for pipe full flow dispersion.
The forebay length provided in the proposed pond design is 40 m long for particle settlement and dispersion.
Therefore, the forebay length meets the minimum requirements for particle settlement and dispersion

5. Forebay Width

Width = $\frac{\text{Dist.}}{8}$ Equation 4.7 : Minimum Forebay Bottom Width

Width = $\frac{31}{8}$ = 4 m

The forebay deep zone should be at least 4 m wide.
The forebay deep zone width provided in the proposed pond design is 4 m wide.
Therefore, the forebay deep zone provided meets the minimum requirements for bottom width.

6. Forebay Surface Area

In all instances the forebay surface area should not exceed one-third (33.3 %) of the total permanent pool area:

Forebay surface area =	344	m^2
Permanent Pool surface area =	1374	m^2
The forebay surface area is	25.0%	of the pond surface area

Therefore, the pond surface area meets the MECP requirements.

7. Forebay Volume

In all instances the forebay volume should not exceed 20% of the total permanent pool volume:

Forebay volume =	181	m^3
Total Permanent Pool Volume =	1881	m^3
The forebay volume is --->	9%	of the total permanent pool volume

Therefore, the pond volume meets the MECP requirements.

CCO-13-9668-01 - PERTHMORE SUBDIVISION - STORMWATER MANAGEMENT POND CLEANOUT FREQUENCY

Catchment Imperviousness	Annual Loading (kg/ha)	Wet Density (kg/m^3)	Annual Loading (m^3/ha)
35%	770	1,230	0.6
55%	2,300	1,230	1.9
70%	3,495	1,230	2.8
85%	4,680	1,230	3.8

Requirements		Pond 1	Units
Catchment Imperviousness	=	46%	
Sediment Loading Per 1-Year	=	1.3	m^3/ha
Total Area to Pond	=	11.2	ha
Yearly Sediment to Pond	=	14.7	m^3
Initial Removal Efficiency	=	80%	
Yearly Accumulation in Pond	=	11.8	m^3
Required Quality Volume	=	*165*	m^3/ha
Required Permanent Pool Volume [(140 - 80 Extended Detention) x Total Area]	=	953	m^3
Permanent Pool Volume Provided	**=**	**1,881**	**m^3**
Required Quality Volume @ 5% less Efficient	=	*157*	m^3/ha
Required Permanent Pool Volume @ 5% less Efficient [(133 - 80 Extended Detention) x Total Area]	=	860	m^3
Total Sediment Accumlation Allowed Before Removal Required (Provided - Max Allowed 5% Reduction)	=	1021	m^3
Total Approximate Number of Years Before Sediment Removal is Required	**=**	**87**	**years**

See Extended Detention and Permanent Pool Volumes

3240 Drummond Concession 5A, R.R.7 Perth, Ontario K7H 3C9 Tel.: 613.267.6524 Fax: 613.267.7992
info@mcintoshperry.com www.mcintoshperry.com

CCO-13-9668-01 - PERTHMORE SUBDIVISION - STORMWATER MANAGEMENT POND EMERGENCY SPILLWAY

Outlet Control Device - Outlet Control Structure

For Orifice Flow, C =	0.60
For Weir Flow, C =	1.70

	Emergency Weir
Invert Elevation	134.76
Weir Length	7.50 m

Elevation	Weir		Total
	H [m]	Q [l/s]	Q [l/s]
134.76	x	x	0
134.86	0.10	403	403
134.96	0.20	1140	1140
135.06	0.30	2095	2095

Notes: 1. For Orifice Flow, User is to Input an Elevation Higher than Crown of Orifice.

*2. Orifice Equation: $Q = cA(2gh)^{1/2}$ (m^3/s *1000 = l/s)*

*3. Weir Equation: $Q = CLH^{3/2}$ (m^3/s *1000 = l/s)*

4. These Computations Do Not Account for Submergence Effects Within the Pond Riser.

Reference: Urban Hydrology, Hydraulics and Stormwater Quality: engineering application and computer modeling

3240 Drummond Concession 5A, R.R.7 Perth, Ontario K7H 3C9 Tel.: 613.267.6524 Fax: 613.267.7992
info@mcintoshperry.com www.mcintoshperry.com

VO Model Pre-Development Results

****
** SIMULATION:1-002yr 4hr 10min Chicago **
****

```
--------------------
| CALIB              |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.45	1.083	13.68	2.083	5.08	3.08	2.85
0.167	2.45	1.167	13.68	2.167	5.08	3.17	2.85
0.250	2.76	1.250	71.35	2.250	4.44	3.25	2.67
0.333	2.76	1.333	71.35	2.333	4.44	3.33	2.67
0.417	3.17	1.417	17.30	2.417	3.96	3.42	2.52
0.500	3.17	1.500	17.30	2.500	3.96	3.50	2.52
0.583	3.78	1.583	10.08	2.583	3.59	3.58	2.39
0.667	3.78	1.667	10.08	2.667	3.59	3.67	2.39
0.750	4.76	1.750	7.43	2.750	3.30	3.75	2.27
0.833	4.76	1.833	7.43	2.833	3.30	3.83	2.27
0.917	6.70	1.917	5.99	2.917	3.05	3.92	2.16
1.000	6.70	2.000	5.99	3.000	3.05	4.00	2.16

Unit Hyd Qpeak (cms)= 0.764

```
PEAK FLOW       (cms)=   0.053 (i)
TIME TO PEAK    (hrs)=   2.167
RUNOFF VOLUME    (mm)=   3.556
TOTAL RAINFALL   (mm)=  31.287
RUNOFF COEFFICIENT   =   0.114
```

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

****
** SIMULATION:1-005yr 4hr 10min Chicago **
****

```
--------------------
| CALIB              |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.23	1.083	18.09	2.083	6.70	3.08	3.75
0.167	3.23	1.167	18.09	2.167	6.70	3.17	3.75
0.250	3.63	1.250	94.66	2.250	5.86	3.25	3.52
0.333	3.63	1.333	94.66	2.333	5.86	3.33	3.52
0.417	4.18	1.417	22.88	2.417	5.23	3.42	3.32
0.500	4.18	1.500	22.88	2.500	5.23	3.50	3.32
0.583	4.98	1.583	13.31	2.583	4.74	3.58	3.14
0.667	4.98	1.667	13.31	2.667	4.74	3.67	3.14
0.750	6.28	1.750	9.80	2.750	4.35	3.75	2.99
0.833	6.28	1.833	9.80	2.833	4.35	3.83	2.99
0.917	8.85	1.917	7.91	2.917	4.02	3.92	2.85
1.000	8.85	2.000	7.91	3.000	4.02	4.00	2.85

Unit Hyd Qpeak (cms)= 0.764

```
PEAK FLOW       (cms)=   0.105 (i)
TIME TO PEAK    (hrs)=   2.167
RUNOFF VOLUME    (mm)=   6.703
TOTAL RAINFALL   (mm)=  41.381
RUNOFF COEFFICIENT   =   0.162
```

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

****
** SIMULATION:1-010yr 4hr 10min Chicago **
****

```
--------------------
| CALIB              |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	3.78	1.083	21.14	2.083	7.85	3.08	4.40
0.167	3.78	1.167	21.14	2.167	7.85	3.17	4.40
0.250	4.26	1.250	110.25	2.250	6.86	3.25	4.13
0.333	4.26	1.333	110.25	2.333	6.86	3.33	4.13
0.417	4.90	1.417	26.74	2.417	6.13	3.42	3.89
0.500	4.90	1.500	26.74	2.500	6.13	3.50	3.89
0.583	5.83	1.583	15.57	2.583	5.55	3.58	3.69
0.667	5.83	1.667	15.57	2.667	5.55	3.67	3.69
0.750	7.35	1.750	11.47	2.750	5.09	3.75	3.50
0.833	7.35	1.833	11.47	2.833	5.09	3.83	3.50
0.917	10.36	1.917	9.26	2.917	4.72	3.92	3.34

```
             1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.149 (i)
     TIME TO PEAK    (hrs)=   2.083
     RUNOFF VOLUME    (mm)=   9.318
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.193

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

--------------------------------------------------------------------------------
******************************************
** SIMULATION:1-025yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                                ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
             0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
             0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
             0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
             0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
             0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
             0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
             0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
             0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
             0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
             0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
             1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.210 (i)
     TIME TO PEAK    (hrs)=   2.083
     RUNOFF VOLUME    (mm)=  12.871
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.227

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

--------------------------------------------------------------------------------
```

```
******************************************
** SIMULATION:1-050yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                                ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
             0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
             0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
             0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
             0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
             0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
             0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
             0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
             0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
             0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
             0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
             1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.262 (i)
     TIME TO PEAK    (hrs)=   2.083
     RUNOFF VOLUME    (mm)=  15.873
     TOTAL RAINFALL   (mm)=  63.117
     RUNOFF COEFFICIENT   =   0.251

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

--------------------------------------------------------------------------------
******************************************
** SIMULATION:1-100yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                                ---- TRANSFORMED HYETOGRAPH ----
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	5.46	1.083	30.39	2.083	11.31	3.08	6.34
0.167	5.46	1.167	30.39	2.167	11.31	3.17	6.34
0.250	6.14	1.250	157.92	2.250	9.88	3.25	5.95
0.333	6.14	1.333	157.92	2.333	9.88	3.33	5.95
0.417	7.06	1.417	38.42	2.417	8.83	3.42	5.61
0.500	7.06	1.500	38.42	2.500	8.83	3.50	5.61
0.583	8.40	1.583	22.40	2.583	8.00	3.58	5.31
0.667	8.40	1.667	22.40	2.667	8.00	3.67	5.31
0.750	10.58	1.750	16.51	2.750	7.34	3.75	5.05
0.833	10.58	1.833	16.51	2.833	7.34	3.83	5.05
0.917	14.91	1.917	13.33	2.917	6.80	3.92	4.82
1.000	14.91	2.000	13.33	3.000	6.80	4.00	4.82

```
Unit Hyd Qpeak  (cms)=   0.764

PEAK FLOW       (cms)=   0.317 (i)
TIME TO PEAK    (hrs)=   2.083
RUNOFF VOLUME    (mm)=  19.050
TOTAL RAINFALL   (mm)=  69.460
RUNOFF COEFFICIENT   =   0.274

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

```
--------------------------------------------------------------------------------
***************************************
** SIMULATION:2-025yr 12hr 15min SCS **
***************************************
--------------------
| CALIB             |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.34	6.250	102.96	9.33	2.73
0.167	0.00	3.250	2.34	6.333	14.04	9.42	2.73
0.250	0.00	3.333	3.12	6.417	14.04	9.50	2.73
0.333	1.95	3.417	3.12	6.500	14.04	9.58	2.73
0.417	1.95	3.500	3.12	6.583	14.04	9.67	2.73
0.500	1.95	3.583	3.12	6.667	14.04	9.75	2.73
0.583	1.95	3.667	3.12	6.750	14.04	9.83	2.73
0.667	1.95	3.750	3.12	6.833	6.24	9.92	2.73
0.750	1.95	3.833	3.12	6.917	6.24	10.00	2.73
0.833	1.95	3.917	3.12	7.000	6.24	10.08	2.73
0.917	1.95	4.000	3.12	7.083	6.24	10.17	2.73
1.000	1.95	4.083	3.12	7.167	6.24	10.25	2.73
1.083	1.95	4.167	3.12	7.250	6.24	10.33	1.56
1.167	1.95	4.250	3.12	7.333	4.68	10.42	1.56
1.250	1.95	4.333	4.68	7.417	4.68	10.50	1.56
1.333	1.95	4.417	4.68	7.500	4.68	10.58	1.56
1.417	1.95	4.500	4.68	7.583	4.68	10.67	1.56
1.500	1.95	4.583	4.68	7.667	4.68	10.75	1.56
1.583	1.95	4.667	4.68	7.750	4.68	10.83	1.56
1.667	1.95	4.750	4.68	7.833	4.68	10.92	1.56
1.750	1.95	4.833	6.24	7.917	4.68	11.00	1.56
1.833	1.95	4.917	6.24	8.000	4.68	11.08	1.56
1.917	1.95	5.000	6.24	8.083	4.68	11.17	1.56
2.000	1.95	5.083	6.24	8.167	4.68	11.25	1.56
2.083	1.95	5.167	6.24	8.250	4.68	11.33	1.56
2.167	1.95	5.250	6.24	8.333	2.73	11.42	1.56
2.250	1.95	5.333	9.36	8.417	2.73	11.50	1.56
2.333	2.34	5.417	9.36	8.500	2.73	11.58	1.56
2.417	2.34	5.500	9.36	8.583	2.73	11.67	1.56
2.500	2.34	5.583	9.36	8.667	2.73	11.75	1.56
2.583	2.34	5.667	9.36	8.750	2.73	11.83	1.56
2.667	2.34	5.750	9.36	8.833	2.73	11.92	1.56
2.750	2.34	5.833	37.44	8.917	2.73	12.00	1.56
2.833	2.34	5.917	37.44	9.000	2.73	12.08	1.56
2.917	2.34	6.000	37.44	9.083	2.73	12.17	1.56
3.000	2.34	6.083	102.96	9.167	2.73	12.25	1.56
3.083	2.34	6.167	102.96	9.250	2.73		

```
Unit Hyd Qpeak  (cms)=   0.764

PEAK FLOW       (cms)=   0.383 (i)
TIME TO PEAK    (hrs)=   6.833
RUNOFF VOLUME    (mm)=  23.625
TOTAL RAINFALL   (mm)=  78.000
RUNOFF COEFFICIENT   =   0.303

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

```
--------------------------------------------------------------------------------
***************************************
** SIMULATION:2-02yr 12hr 15min SCS **
***************************************
--------------------
| CALIB             |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	3.167	1.30	6.250	57.02	9.33	1.51
0.167	0.00	3.250	1.30	6.333	7.78	9.42	1.51
0.250	0.00	3.333	1.73	6.417	7.78	9.50	1.51
0.333	1.08	3.417	1.73	6.500	7.78	9.58	1.51
0.417	1.08	3.500	1.73	6.583	7.78	9.67	1.51
0.500	1.08	3.583	1.73	6.667	7.78	9.75	1.51
0.583	1.08	3.667	1.73	6.750	7.78	9.83	1.51
0.667	1.08	3.750	1.73	6.833	3.46	9.92	1.51
0.750	1.08	3.833	1.73	6.917	3.46	10.00	1.51
0.833	1.08	3.917	1.73	7.000	3.46	10.08	1.51
0.917	1.08	4.000	1.73	7.083	3.46	10.17	1.51
1.000	1.08	4.083	1.73	7.167	3.46	10.25	1.51
1.083	1.08	4.167	1.73	7.250	3.46	10.33	0.86
1.167	1.08	4.250	1.73	7.333	2.59	10.42	0.86
1.250	1.08	4.333	2.59	7.417	2.59	10.50	0.86
1.333	1.08	4.417	2.59	7.500	2.59	10.58	0.86
1.417	1.08	4.500	2.59	7.583	2.59	10.67	0.86
1.500	1.08	4.583	2.59	7.667	2.59	10.75	0.86
1.583	1.08	4.667	2.59	7.750	2.59	10.83	0.86
1.667	1.08	4.750	2.59	7.833	2.59	10.92	0.86
1.750	1.08	4.833	3.46	7.917	2.59	11.00	0.86
1.833	1.08	4.917	3.46	8.000	2.59	11.08	0.86
1.917	1.08	5.000	3.46	8.083	2.59	11.17	0.86
2.000	1.08	5.083	3.46	8.167	2.59	11.25	0.86
2.083	1.08	5.167	3.46	8.250	2.59	11.33	0.86
2.167	1.08	5.250	3.46	8.333	1.51	11.42	0.86
2.250	1.08	5.333	5.18	8.417	1.51	11.50	0.86
2.333	1.30	5.417	5.18	8.500	1.51	11.58	0.86
2.417	1.30	5.500	5.18	8.583	1.51	11.67	0.86
2.500	1.30	5.583	5.18	8.667	1.51	11.75	0.86
2.583	1.30	5.667	5.18	8.750	1.51	11.83	0.86
2.667	1.30	5.750	5.18	8.833	1.51	11.92	0.86
2.750	1.30	5.833	20.74	8.917	1.51	12.00	0.86
2.833	1.30	5.917	20.74	9.000	1.51	12.08	0.86
2.917	1.30	6.000	20.74	9.083	1.51	12.17	0.86
3.000	1.30	6.083	57.02	9.167	1.51	12.25	0.86
3.083	1.30	6.167	57.02	9.250	1.51		

```
    Unit Hyd Qpeak  (cms)=   0.764

    PEAK FLOW       (cms)=   0.114 (i)
    TIME TO PEAK    (hrs)=   6.833
    RUNOFF VOLUME    (mm)=   7.354
    TOTAL RAINFALL   (mm)=  43.200
    RUNOFF COEFFICIENT   =   0.170

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

--------------------------------------------------------------------------------
***************************************
** SIMULATION:2-050yr 12hr 15min SCS **
***************************************
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.59	6.250	114.05	9.33	3.02
0.167	0.00	3.250	2.59	6.333	15.55	9.42	3.02
0.250	0.00	3.333	3.46	6.417	15.55	9.50	3.02
0.333	2.16	3.417	3.46	6.500	15.55	9.58	3.02
0.417	2.16	3.500	3.46	6.583	15.55	9.67	3.02
0.500	2.16	3.583	3.46	6.667	15.55	9.75	3.02
0.583	2.16	3.667	3.46	6.750	15.55	9.83	3.02
0.667	2.16	3.750	3.46	6.833	6.91	9.92	3.02
0.750	2.16	3.833	3.46	6.917	6.91	10.00	3.02
0.833	2.16	3.917	3.46	7.000	6.91	10.08	3.02
0.917	2.16	4.000	3.46	7.083	6.91	10.17	3.02
1.000	2.16	4.083	3.46	7.167	6.91	10.25	3.02
1.083	2.16	4.167	3.46	7.250	6.91	10.33	1.73
1.167	2.16	4.250	3.46	7.333	5.18	10.42	1.73
1.250	2.16	4.333	5.18	7.417	5.18	10.50	1.73
1.333	2.16	4.417	5.18	7.500	5.18	10.58	1.73
1.417	2.16	4.500	5.18	7.583	5.18	10.67	1.73
1.500	2.16	4.583	5.18	7.667	5.18	10.75	1.73
1.583	2.16	4.667	5.18	7.750	5.18	10.83	1.73
1.667	2.16	4.750	5.18	7.833	5.18	10.92	1.73
1.750	2.16	4.833	6.91	7.917	5.18	11.00	1.73
1.833	2.16	4.917	6.91	8.000	5.18	11.08	1.73
1.917	2.16	5.000	6.91	8.083	5.18	11.17	1.73
2.000	2.16	5.083	6.91	8.167	5.18	11.25	1.73
2.083	2.16	5.167	6.91	8.250	5.18	11.33	1.73
2.167	2.16	5.250	6.91	8.333	3.02	11.42	1.73
2.250	2.16	5.333	10.37	8.417	3.02	11.50	1.73
2.333	2.59	5.417	10.37	8.500	3.02	11.58	1.73
2.417	2.59	5.500	10.37	8.583	3.02	11.67	1.73
2.500	2.59	5.583	10.37	8.667	3.02	11.75	1.73
2.583	2.59	5.667	10.37	8.750	3.02	11.83	1.73
2.667	2.59	5.750	10.37	8.833	3.02	11.92	1.73
2.750	2.59	5.833	41.47	8.917	3.02	12.00	1.73
2.833	2.59	5.917	41.47	9.000	3.02	12.08	1.73
2.917	2.59	6.000	41.47	9.083	3.02	12.17	1.73
3.000	2.59	6.083	114.05	9.167	3.02	12.25	1.73
3.083	2.59	6.167	114.05	9.250	3.02		

```
     Unit Hyd Qpeak  (cms)=   0.764
```

```
     PEAK FLOW       (cms)=   0.463 (i)
     TIME TO PEAK    (hrs)=   6.833
     RUNOFF VOLUME    (mm)=  28.421
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.329

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

--------------------------------------------------------------------------------
**************************************
** SIMULATION:2-05yr 12hr 15min SCS **
**************************************
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    1.73 | 6.250   76.03 |  9.33    2.02
                0.167    0.00 | 3.250    1.73 | 6.333   10.37 |  9.42    2.02
                0.250    0.00 | 3.333    2.30 | 6.417   10.37 |  9.50    2.02
                0.333    1.44 | 3.417    2.30 | 6.500   10.37 |  9.58    2.02
                0.417    1.44 | 3.500    2.30 | 6.583   10.37 |  9.67    2.02
                0.500    1.44 | 3.583    2.30 | 6.667   10.37 |  9.75    2.02
                0.583    1.44 | 3.667    2.30 | 6.750   10.37 |  9.83    2.02
                0.667    1.44 | 3.750    2.30 | 6.833    4.61 |  9.92    2.02
                0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
                0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
                0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
                1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
                1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
                1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
                1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
                1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
                1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
                1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
                1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
                1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
                1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
                1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
                1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
                2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
                2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
                2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
                2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
                2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
                2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
                2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
                2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
                2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
                2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
                2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
                2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
                3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
                3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.211 (i)
     TIME TO PEAK    (hrs)=   6.833
     RUNOFF VOLUME    (mm)=  13.279
     TOTAL RAINFALL   (mm)=  57.600
     RUNOFF COEFFICIENT   =   0.231

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

--------------------------------------------------------------------------------
***************************************
** SIMULATION:2-100yr 12hr 15min SCS **
***************************************
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
                0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
                0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
                0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
                0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
                0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
                0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
                0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
                0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
                0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
                0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
                1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
                1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
                1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
                1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
```

1.333	2.40	4.417	5.76	7.500	5.76	10.58	1.92
1.417	2.40	4.500	5.76	7.583	5.76	10.67	1.92
1.500	2.40	4.583	5.76	7.667	5.76	10.75	1.92
1.583	2.40	4.667	5.76	7.750	5.76	10.83	1.92
1.667	2.40	4.750	5.76	7.833	5.76	10.92	1.92
1.750	2.40	4.833	7.68	7.917	5.76	11.00	1.92
1.833	2.40	4.917	7.68	8.000	5.76	11.08	1.92
1.917	2.40	5.000	7.68	8.083	5.76	11.17	1.92
2.000	2.40	5.083	7.68	8.167	5.76	11.25	1.92
2.083	2.40	5.167	7.68	8.250	5.76	11.33	1.92
2.167	2.40	5.250	7.68	8.333	3.36	11.42	1.92
2.250	2.40	5.333	11.52	8.417	3.36	11.50	1.92
2.333	2.88	5.417	11.52	8.500	3.36	11.58	1.92
2.417	2.88	5.500	11.52	8.583	3.36	11.67	1.92
2.500	2.88	5.583	11.52	8.667	3.36	11.75	1.92
2.583	2.88	5.667	11.52	8.750	3.36	11.83	1.92
2.667	2.88	5.750	11.52	8.833	3.36	11.92	1.92
2.750	2.88	5.833	46.08	8.917	3.36	12.00	1.92
2.833	2.88	5.917	46.08	9.000	3.36	12.08	1.92
2.917	2.88	6.000	46.08	9.083	3.36	12.17	1.92
3.000	2.88	6.083	126.72	9.167	3.36	12.25	1.92
3.083	2.88	6.167	126.72	9.250	3.36		

```
Unit Hyd Qpeak  (cms)=   0.764

PEAK FLOW       (cms)=   0.560 (i)
TIME TO PEAK    (hrs)=   6.833
RUNOFF VOLUME    (mm)=  34.222
TOTAL RAINFALL   (mm)=  96.000
RUNOFF COEFFICIENT   =   0.356

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

```
--------------------------------------------------------------------------------
**************************************
** SIMULATION:2-10yr 12hr 15min SCS **
**************************************
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.98	6.250	87.12	9.33	2.31
0.167	0.00	3.250	1.98	6.333	11.88	9.42	2.31
0.250	0.00	3.333	2.64	6.417	11.88	9.50	2.31
0.333	1.65	3.417	2.64	6.500	11.88	9.58	2.31
0.417	1.65	3.500	2.64	6.583	11.88	9.67	2.31
0.500	1.65	3.583	2.64	6.667	11.88	9.75	2.31
0.583	1.65	3.667	2.64	6.750	11.88	9.83	2.31
0.667	1.65	3.750	2.64	6.833	5.28	9.92	2.31
0.750	1.65	3.833	2.64	6.917	5.28	10.00	2.31
0.833	1.65	3.917	2.64	7.000	5.28	10.08	2.31
0.917	1.65	4.000	2.64	7.083	5.28	10.17	2.31
1.000	1.65	4.083	2.64	7.167	5.28	10.25	2.31
1.083	1.65	4.167	2.64	7.250	5.28	10.33	1.32
1.167	1.65	4.250	2.64	7.333	3.96	10.42	1.32
1.250	1.65	4.333	3.96	7.417	3.96	10.50	1.32
1.333	1.65	4.417	3.96	7.500	3.96	10.58	1.32
1.417	1.65	4.500	3.96	7.583	3.96	10.67	1.32
1.500	1.65	4.583	3.96	7.667	3.96	10.75	1.32
1.583	1.65	4.667	3.96	7.750	3.96	10.83	1.32
1.667	1.65	4.750	3.96	7.833	3.96	10.92	1.32
1.750	1.65	4.833	5.28	7.917	3.96	11.00	1.32
1.833	1.65	4.917	5.28	8.000	3.96	11.08	1.32
1.917	1.65	5.000	5.28	8.083	3.96	11.17	1.32
2.000	1.65	5.083	5.28	8.167	3.96	11.25	1.32
2.083	1.65	5.167	5.28	8.250	3.96	11.33	1.32
2.167	1.65	5.250	5.28	8.333	2.31	11.42	1.32
2.250	1.65	5.333	7.92	8.417	2.31	11.50	1.32
2.333	1.98	5.417	7.92	8.500	2.31	11.58	1.32
2.417	1.98	5.500	7.92	8.583	2.31	11.67	1.32
2.500	1.98	5.583	7.92	8.667	2.31	11.75	1.32
2.583	1.98	5.667	7.92	8.750	2.31	11.83	1.32
2.667	1.98	5.750	7.92	8.833	2.31	11.92	1.32
2.750	1.98	5.833	31.68	8.917	2.31	12.00	1.32
2.833	1.98	5.917	31.68	9.000	2.31	12.08	1.32
2.917	1.98	6.000	31.68	9.083	2.31	12.17	1.32
3.000	1.98	6.083	87.12	9.167	2.31	12.25	1.32
3.083	1.98	6.167	87.12	9.250	2.31		

```
Unit Hyd Qpeak  (cms)=   0.764

PEAK FLOW       (cms)=   0.278 (i)
TIME TO PEAK    (hrs)=   6.833
RUNOFF VOLUME    (mm)=  17.293
TOTAL RAINFALL   (mm)=  66.000
RUNOFF COEFFICIENT   =   0.262

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

```
--------------------------------------------------------------------------------
************************************************
** SIMULATION:3-100yr 24hr 15min SCS Type II **
************************************************
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
```

|ID= 1 DT= 5.0 min | Ia   (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.09	12.250	127.21	18.33	2.08
0.167	0.00	6.250	2.09	12.333	20.17	18.42	2.08
0.250	0.00	6.333	2.15	12.417	20.15	18.50	2.08
0.333	1.19	6.417	2.15	12.500	20.15	18.58	2.01
0.417	1.19	6.500	2.15	12.583	13.72	18.67	2.01
0.500	1.19	6.583	2.20	12.667	13.72	18.75	2.01
0.583	1.22	6.667	2.20	12.750	13.72	18.83	1.93
0.667	1.22	6.750	2.20	12.833	9.44	18.92	1.93
0.750	1.22	6.833	2.26	12.917	9.44	19.00	1.93
0.833	1.25	6.917	2.26	13.000	9.44	19.08	1.86
0.917	1.25	7.000	2.26	13.083	7.97	19.17	1.86
1.000	1.25	7.083	2.32	13.167	7.97	19.25	1.86
1.083	1.28	7.167	2.32	13.250	7.97	19.33	1.79
1.167	1.28	7.250	2.32	13.333	6.75	19.42	1.79
1.250	1.28	7.333	2.38	13.417	6.75	19.50	1.79
1.333	1.31	7.417	2.38	13.500	6.75	19.58	1.71
1.417	1.31	7.500	2.38	13.583	5.96	19.67	1.71
1.500	1.31	7.583	2.44	13.667	5.96	19.75	1.71
1.583	1.34	7.667	2.44	13.750	5.96	19.83	1.64
1.667	1.34	7.750	2.44	13.833	5.22	19.92	1.64
1.750	1.34	7.833	2.50	13.917	5.22	20.00	1.64
1.833	1.37	7.917	2.50	14.000	5.22	20.08	1.57
1.917	1.37	8.000	2.50	14.083	4.66	20.17	1.57
2.000	1.37	8.083	2.56	14.167	4.66	20.25	1.57
2.083	1.39	8.167	2.56	14.250	4.66	20.33	1.52
2.167	1.39	8.250	2.56	14.333	4.25	20.42	1.52
2.250	1.39	8.333	2.74	14.417	4.25	20.50	1.52
2.333	1.43	8.417	2.74	14.500	4.25	20.58	1.51
2.417	1.43	8.500	2.74	14.583	4.05	20.67	1.51
2.500	1.43	8.583	3.02	14.667	4.05	20.75	1.51
2.583	1.46	8.667	3.02	14.750	4.05	20.83	1.49
2.667	1.46	8.750	3.02	14.833	3.83	20.92	1.49
2.750	1.46	8.833	3.33	14.917	3.83	21.00	1.49
2.833	1.48	8.917	3.33	15.000	3.83	21.08	1.48
2.917	1.48	9.000	3.33	15.083	3.63	21.17	1.48
3.000	1.48	9.083	3.61	15.167	3.63	21.25	1.48
3.083	1.51	9.167	3.61	15.250	3.63	21.33	1.46
3.167	1.51	9.250	3.61	15.333	3.42	21.42	1.46
3.250	1.51	9.333	3.76	15.417	3.42	21.50	1.46
3.333	1.55	9.417	3.76	15.500	3.42	21.58	1.45
3.417	1.55	9.500	3.76	15.583	3.22	21.67	1.45
3.500	1.55	9.583	3.76	15.667	3.22	21.75	1.45
3.583	1.57	9.667	3.76	15.750	3.22	21.83	1.43
3.667	1.57	9.750	3.76	15.833	3.01	21.92	1.43
3.750	1.57	9.833	4.01	15.917	3.01	22.00	1.43
3.833	1.60	9.917	4.01	16.000	3.01	22.08	1.42
3.917	1.60	10.000	4.01	16.083	2.81	22.17	1.42
4.000	1.60	10.083	4.46	16.167	2.81	22.25	1.42
4.083	1.63	10.167	4.46	16.250	2.81	22.33	1.40
4.167	1.63	10.250	4.46	16.333	2.67	22.42	1.40
4.250	1.63	10.333	5.07	16.417	2.67	22.50	1.40
4.333	1.68	10.417	5.07	16.500	2.67	22.58	1.39
4.417	1.68	10.500	5.07	16.583	2.60	22.67	1.39
4.500	1.68	10.583	5.75	16.667	2.60	22.75	1.39
4.583	1.73	10.667	5.75	16.750	2.60	22.83	1.37
4.667	1.73	10.750	5.75	16.833	2.52	22.92	1.37
4.750	1.73	10.833	6.73	16.917	2.52	23.00	1.37
4.833	1.79	10.917	6.73	17.000	2.52	23.08	1.36
4.917	1.79	11.000	6.73	17.083	2.45	23.17	1.36
5.000	1.79	11.083	7.86	17.167	2.45	23.25	1.36
5.083	1.85	11.167	7.86	17.250	2.45	23.33	1.35
5.167	1.85	11.250	7.86	17.333	2.37	23.42	1.35
5.250	1.85	11.333	9.93	17.417	2.37	23.50	1.35
5.333	1.91	11.417	9.93	17.500	2.37	23.58	1.33
5.417	1.91	11.500	9.93	17.583	2.30	23.67	1.33
5.500	1.91	11.583	12.64	17.667	2.30	23.75	1.33
5.583	1.97	11.667	12.64	17.750	2.30	23.83	1.31
5.667	1.97	11.750	12.64	17.833	2.23	23.92	1.31
5.750	1.97	11.833	51.54	17.917	2.22	24.00	1.31
5.833	2.03	11.917	51.54	18.000	2.22	24.08	1.30
5.917	2.03	12.000	51.54	18.083	2.15	24.17	1.30
6.000	2.03	12.083	127.20	18.167	2.15	24.25	1.30
6.083	2.09	12.167	127.21	18.250	2.15		

Unit Hyd Qpeak (cms)=   0.764

PEAK FLOW   (cms)=   0.678 (i)
TIME TO PEAK   (hrs)= 12.750
RUNOFF VOLUME   (mm)= 48.326
TOTAL RAINFALL   (mm)= 117.600
RUNOFF COEFFICIENT   =   0.411

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

****
** SIMULATION:3-10yr 24hr 15min SCS Type II **
****

| CALIB |
| NASHYD   (0019)| Area   (ha)= 12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min | Ia   (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.45	12.250	88.27	18.33	1.44
0.167	0.00	6.250	1.45	12.333	13.99	18.42	1.44
0.250	0.00	6.333	1.49	12.417	13.98	18.50	1.44
0.333	0.83	6.417	1.49	12.500	13.98	18.58	1.39
0.417	0.83	6.500	1.49	12.583	9.52	18.67	1.39
0.500	0.83	6.583	1.53	12.667	9.52	18.75	1.39
0.583	0.85	6.667	1.53	12.750	9.52	18.83	1.34
0.667	0.85	6.750	1.53	12.833	6.55	18.92	1.34
0.750	0.85	6.833	1.57	12.917	6.55	19.00	1.34
0.833	0.87	6.917	1.57	13.000	6.55	19.08	1.29
0.917	0.87	7.000	1.57	13.083	5.53	19.17	1.29
1.000	0.87	7.083	1.61	13.167	5.53	19.25	1.29
1.083	0.89	7.167	1.61	13.250	5.53	19.33	1.24
1.167	0.89	7.250	1.61	13.333	4.68	19.42	1.24
1.250	0.89	7.333	1.65	13.417	4.68	19.50	1.24
1.333	0.91	7.417	1.65	13.500	4.68	19.58	1.19
1.417	0.91	7.500	1.65	13.583	4.13	19.67	1.19
1.500	0.91	7.583	1.69	13.667	4.13	19.75	1.19
1.583	0.93	7.667	1.69	13.750	4.13	19.83	1.14
1.667	0.93	7.750	1.69	13.833	3.62	19.92	1.14
1.750	0.93	7.833	1.73	13.917	3.62	20.00	1.14
1.833	0.95	7.917	1.73	14.000	3.62	20.08	1.09
1.917	0.95	8.000	1.73	14.083	3.23	20.17	1.09
2.000	0.95	8.083	1.77	14.167	3.23	20.25	1.09
2.083	0.97	8.167	1.77	14.250	3.23	20.33	1.06
2.167	0.97	8.250	1.77	14.333	2.95	20.42	1.06
2.250	0.97	8.333	1.90	14.417	2.95	20.50	1.06
2.333	0.99	8.417	1.90	14.500	2.95	20.58	1.05
2.417	0.99	8.500	1.90	14.583	2.81	20.67	1.05
2.500	0.99	8.583	2.10	14.667	2.81	20.75	1.05
2.583	1.01	8.667	2.10	14.750	2.81	20.83	1.03
2.667	1.01	8.750	2.10	14.833	2.66	20.92	1.03
2.750	1.01	8.833	2.31	14.917	2.66	21.00	1.03
2.833	1.03	8.917	2.31	15.000	2.66	21.08	1.02
2.917	1.03	9.000	2.31	15.083	2.52	21.17	1.02
3.000	1.03	9.083	2.51	15.167	2.52	21.25	1.02
3.083	1.05	9.167	2.51	15.250	2.52	21.33	1.02
3.167	1.05	9.250	2.51	15.333	2.37	21.42	1.02
3.250	1.05	9.333	2.61	15.417	2.37	21.50	1.02
3.333	1.07	9.417	2.61	15.500	2.37	21.58	1.01
3.417	1.07	9.500	2.61	15.583	2.24	21.67	1.01
3.500	1.07	9.583	2.61	15.667	2.24	21.75	1.01
3.583	1.09	9.667	2.61	15.750	2.24	21.83	0.99
3.667	1.09	9.750	2.61	15.833	2.09	21.92	0.99
3.750	1.09	9.833	2.78	15.917	2.09	22.00	0.99
3.833	1.11	9.917	2.78	16.000	2.09	22.08	0.98
3.917	1.11	10.000	2.78	16.083	1.95	22.17	0.98
4.000	1.11	10.083	3.09	16.167	1.95	22.25	0.98
4.083	1.13	10.167	3.09	16.250	1.95	22.33	0.97
4.167	1.13	10.250	3.09	16.333	1.85	22.42	0.97
4.250	1.13	10.333	3.52	16.417	1.85	22.50	0.97
4.333	1.16	10.417	3.52	16.500	1.85	22.58	0.96
4.417	1.16	10.500	3.52	16.583	1.80	22.67	0.96
4.500	1.16	10.583	3.99	16.667	1.80	22.75	0.96
4.583	1.20	10.667	3.99	16.750	1.80	22.83	0.95
4.667	1.20	10.750	3.99	16.833	1.75	22.92	0.95
4.750	1.20	10.833	4.67	16.917	1.75	23.00	0.95
4.833	1.25	10.917	4.67	17.000	1.75	23.08	0.94
4.917	1.25	11.000	4.67	17.083	1.70	23.17	0.94
5.000	1.25	11.083	5.45	17.167	1.70	23.25	0.94
5.083	1.28	11.167	5.45	17.250	1.70	23.33	0.93
5.167	1.28	11.250	5.45	17.333	1.65	23.42	0.93
5.250	1.28	11.333	6.89	17.417	1.65	23.50	0.93
5.333	1.33	11.417	6.89	17.500	1.65	23.58	0.92
5.417	1.33	11.500	6.89	17.583	1.60	23.67	0.92
5.500	1.33	11.583	8.77	17.667	1.60	23.75	0.92
5.583	1.37	11.667	8.77	17.750	1.60	23.83	0.91
5.667	1.37	11.750	8.77	17.833	1.54	23.92	0.91
5.750	1.37	11.833	35.76	17.917	1.54	24.00	0.91
5.833	1.41	11.917	35.77	18.000	1.54	24.08	0.90
5.917	1.41	12.000	35.77	18.083	1.49	24.17	0.90
6.000	1.41	12.083	88.26	18.167	1.49	24.25	0.90
6.083	1.45	12.167	88.27	18.250	1.49		

```
Unit Hyd Qpeak  (cms)=   0.764

PEAK FLOW       (cms)=   0.352 (i)
TIME TO PEAK    (hrs)=  12.750
RUNOFF VOLUME    (mm)=  25.646
TOTAL RAINFALL   (mm)=  81.600
RUNOFF COEFFICIENT   =   0.314

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

```
-------------------------------------------------------------------------------------
*************************************************
** SIMULATION:3-25yr 24hr 15min SCS Type II **
*************************************************
---------------------
| CALIB             |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=   0.61

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

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN

```
  hrs    mm/hr |    hrs    mm/hr |'   hrs    mm/hr |    hrs    mm/hr
0.083    0.00 | 6.167    1.70 |12.250  103.84 | 18.33    1.70
0.167    0.00 | 6.250    1.70 |12.333   16.46 | 18.42    1.70
0.250    0.00 | 6.333    1.75 |12.417   16.45 | 18.50    1.70
0.333    0.97 | 6.417    1.75 |12.500   16.45 | 18.58    1.64
0.417    0.97 | 6.500    1.75 |12.583   11.20 | 18.67    1.64
0.500    0.97 | 6.583    1.80 |12.667   11.20 | 18.75    1.64
0.583    1.00 | 6.667    1.80 |12.750   11.20 | 18.83    1.58
0.667    1.00 | 6.750    1.80 |12.833    7.70 | 18.92    1.58
0.750    1.00 | 6.833    1.85 |12.917    7.70 | 19.00    1.58
0.833    1.02 | 6.917    1.85 |13.000    7.70 | 19.08    1.52
0.917    1.02 | 7.000    1.85 |13.083    6.51 | 19.17    1.52
1.000    1.02 | 7.083    1.90 |13.167    6.50 | 19.25    1.52
1.083    1.04 | 7.167    1.90 |13.250    6.50 | 19.33    1.46
1.167    1.04 | 7.250    1.90 |13.333    5.51 | 19.42    1.46
1.250    1.04 | 7.333    1.94 |13.417    5.51 | 19.50    1.46
1.333    1.07 | 7.417    1.94 |13.500    5.51 | 19.58    1.40
1.417    1.07 | 7.500    1.94 |13.583    4.86 | 19.67    1.40
1.500    1.07 | 7.583    1.99 |13.667    4.86 | 19.75    1.40
1.583    1.09 | 7.667    1.99 |13.750    4.86 | 19.83    1.34
1.667    1.09 | 7.750    1.99 |13.833    4.26 | 19.92    1.34
1.750    1.09 | 7.833    2.04 |13.917    4.26 | 20.00    1.34
1.833    1.12 | 7.917    2.04 |14.000    4.26 | 20.08    1.28
1.917    1.12 | 8.000    2.04 |14.083    3.80 | 20.17    1.28
2.000    1.12 | 8.083    2.09 |14.167    3.80 | 20.25    1.28
2.083    1.14 | 8.167    2.09 |14.250    3.80 | 20.33    1.24
2.167    1.14 | 8.250    2.09 |14.333    3.47 | 20.42    1.24
2.250    1.14 | 8.333    2.24 |14.417    3.47 | 20.50    1.24
2.333    1.17 | 8.417    2.24 |14.500    3.47 | 20.58    1.23
2.417    1.17 | 8.500    2.24 |14.583    3.30 | 20.67    1.23
2.500    1.17 | 8.583    2.47 |14.667    3.30 | 20.75    1.23
2.583    1.19 | 8.667    2.47 |14.750    3.30 | 20.83    1.22
2.667    1.19 | 8.750    2.47 |14.833    3.13 | 20.92    1.22
2.750    1.19 | 8.833    2.72 |14.917    3.13 | 21.00    1.22
2.833    1.21 | 8.917    2.72 |15.000    3.13 | 21.08    1.21
2.917    1.21 | 9.000    2.72 |15.083    2.97 | 21.17    1.21
3.000    1.21 | 9.083    2.95 |15.167    2.97 | 21.25    1.21
3.083    1.23 | 9.167    2.95 |15.250    2.97 | 21.33    1.19
3.167    1.23 | 9.250    2.95 |15.333    2.79 | 21.42    1.19
3.250    1.23 | 9.333    3.07 |15.417    2.79 | 21.50    1.19
3.333    1.26 | 9.417    3.07 |15.500    2.79 | 21.58    1.18
3.417    1.26 | 9.500    3.07 |15.583    2.63 | 21.67    1.18
3.500    1.26 | 9.583    3.07 |15.667    2.63 | 21.75    1.18
3.583    1.28 | 9.667    3.07 |15.750    2.63 | 21.83    1.17
3.667    1.28 | 9.750    3.07 |15.833    2.46 | 21.92    1.17
3.750    1.28 | 9.833    3.27 |15.917    2.46 | 22.00    1.17
3.833    1.31 | 9.917    3.27 |16.000    2.46 | 22.08    1.16
3.917    1.31 |10.000    3.27 |16.083    2.29 | 22.17    1.16
4.000    1.31 |10.083    3.64 |16.167    2.29 | 22.25    1.16
4.083    1.33 |10.167    3.64 |16.250    2.29 | 22.33    1.15
4.167    1.33 |10.250    3.64 |16.333    2.18 | 22.42    1.15
4.250    1.33 |10.333    4.14 |16.417    2.18 | 22.50    1.15
4.333    1.37 |10.417    4.14 |16.500    2.18 | 22.58    1.13
4.417    1.37 |10.500    4.14 |16.583    2.12 | 22.67    1.13
4.500    1.37 |10.583    4.69 |16.667    2.12 | 22.75    1.13
4.583    1.42 |10.667    4.69 |16.750    2.12 | 22.83    1.12
4.667    1.42 |10.750    4.69 |16.833    2.06 | 22.92    1.12
4.750    1.42 |10.833    5.49 |16.917    2.06 | 23.00    1.12
4.833    1.46 |10.917    5.49 |17.000    2.06 | 23.08    1.11
4.917    1.46 |11.000    5.49 |17.083    2.00 | 23.17    1.11
5.000    1.46 |11.083    6.41 |17.167    2.00 | 23.25    1.11
5.083    1.51 |11.167    6.41 |17.250    2.00 | 23.33    1.10
5.167    1.51 |11.250    6.41 |17.333    1.94 | 23.42    1.10
5.250    1.51 |11.333    8.11 |17.417    1.94 | 23.50    1.10
5.333    1.56 |11.417    8.11 |17.500    1.94 | 23.58    1.09
5.417    1.56 |11.500    8.11 |17.583    1.88 | 23.67    1.09
5.500    1.56 |11.583   10.32 |17.667    1.88 | 23.75    1.09
5.583    1.61 |11.667   10.32 |17.750    1.88 | 23.83    1.07
5.667    1.61 |11.750   10.32 |17.833    1.82 | 23.92    1.07
5.750    1.61 |11.833   42.07 |17.917    1.82 | 24.00    1.07
5.833    1.66 |11.917   42.08 |18.000    1.82 | 24.08    1.06
5.917    1.66 |12.000   42.08 |18.083    1.76 | 24.17    1.06
6.000    1.66 |12.083  103.84 |18.167    1.76 | 24.25    1.06
6.083    1.70 |12.167  103.84 |18.250    1.76 |

     Unit Hyd Qpeak  (cms)=   0.764

     PEAK FLOW       (cms)=   0.475 (i)
     TIME TO PEAK    (hrs)=  12.750
     RUNOFF VOLUME    (mm)=  34.222
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.356

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

--------------------------------------------------------------------------------
*********************************************
** SIMULATION:3-2yr 24hr 15min SCS Type II **
*********************************************
--------------------
| CALIB              |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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


                        ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    0.00 | 6.167    0.94 |12.250   57.11 | 18.33    0.93
          0.167    0.00 | 6.250    0.94 |12.333    9.05 | 18.42    0.93
          0.250    0.00 | 6.333    0.96 |12.417    9.05 | 18.50    0.93
```

0.333	0.54	6.417	0.96	12.500	9.05	18.58	0.90
0.417	0.54	6.500	0.96	12.583	6.16	18.67	0.90
0.500	0.54	6.583	0.99	12.667	6.16	18.75	0.90
0.583	0.55	6.667	0.99	12.750	6.16	18.83	0.87
0.667	0.55	6.750	0.99	12.833	4.24	18.92	0.87
0.750	0.55	6.833	1.02	12.917	4.24	19.00	0.87
0.833	0.56	6.917	1.02	13.000	4.24	19.08	0.84
0.917	0.56	7.000	1.02	13.083	3.58	19.17	0.84
1.000	0.56	7.083	1.04	13.167	3.58	19.25	0.84
1.083	0.57	7.167	1.04	13.250	3.58	19.33	0.80
1.167	0.57	7.250	1.04	13.333	3.03	19.42	0.80
1.250	0.57	7.333	1.07	13.417	3.03	19.50	0.80
1.333	0.59	7.417	1.07	13.500	3.03	19.58	0.77
1.417	0.59	7.500	1.07	13.583	2.67	19.67	0.77
1.500	0.59	7.583	1.10	13.667	2.67	19.75	0.77
1.583	0.60	7.667	1.10	13.750	2.67	19.83	0.73
1.667	0.60	7.750	1.10	13.833	2.34	19.92	0.73
1.750	0.60	7.833	1.12	13.917	2.34	20.00	0.73
1.833	0.61	7.917	1.12	14.000	2.34	20.08	0.70
1.917	0.61	8.000	1.12	14.083	2.09	20.17	0.70
2.000	0.61	8.083	1.15	14.167	2.09	20.25	0.70
2.083	0.63	8.167	1.15	14.250	2.09	20.33	0.68
2.167	0.63	8.250	1.15	14.333	1.91	20.42	0.68
2.250	0.63	8.333	1.23	14.417	1.91	20.50	0.68
2.333	0.64	8.417	1.23	14.500	1.91	20.58	0.68
2.417	0.64	8.500	1.23	14.583	1.82	20.67	0.68
2.500	0.64	8.583	1.36	14.667	1.82	20.75	0.68
2.583	0.65	8.667	1.36	14.750	1.82	20.83	0.67
2.667	0.65	8.750	1.36	14.833	1.72	20.92	0.67
2.750	0.65	8.833	1.49	14.917	1.72	21.00	0.67
2.833	0.67	8.917	1.49	15.000	1.72	21.08	0.66
2.917	0.67	9.000	1.49	15.083	1.63	21.17	0.66
3.000	0.67	9.083	1.62	15.167	1.63	21.25	0.66
3.083	0.68	9.167	1.62	15.250	1.63	21.33	0.66
3.167	0.68	9.250	1.62	15.333	1.54	21.42	0.66
3.250	0.68	9.333	1.69	15.417	1.54	21.50	0.66
3.333	0.69	9.417	1.69	15.500	1.54	21.58	0.65
3.417	0.69	9.500	1.69	15.583	1.45	21.67	0.65
3.500	0.69	9.583	1.69	15.667	1.45	21.75	0.65
3.583	0.71	9.667	1.69	15.750	1.45	21.83	0.64
3.667	0.71	9.750	1.69	15.833	1.35	21.92	0.64
3.750	0.71	9.833	1.80	15.917	1.35	22.00	0.64
3.833	0.72	9.917	1.80	16.000	1.35	22.08	0.64
3.917	0.72	10.000	1.80	16.083	1.26	22.17	0.64
4.000	0.72	10.083	2.00	16.167	1.26	22.25	0.64
4.083	0.73	10.167	2.00	16.250	1.26	22.33	0.63
4.167	0.73	10.250	2.00	16.333	1.20	22.42	0.63
4.250	0.73	10.333	2.28	16.417	1.20	22.50	0.63
4.333	0.75	10.417	2.28	16.500	1.20	22.58	0.62
4.417	0.75	10.500	2.28	16.583	1.17	22.67	0.62
4.500	0.75	10.583	2.58	16.667	1.17	22.75	0.62
4.583	0.78	10.667	2.58	16.750	1.17	22.83	0.62
4.667	0.78	10.750	2.58	16.833	1.13	22.92	0.62
4.750	0.78	10.833	3.02	16.917	1.13	23.00	0.62
4.833	0.81	10.917	3.02	17.000	1.13	23.08	0.61
4.917	0.81	11.000	3.02	17.083	1.10	23.17	0.61
5.000	0.81	11.083	3.53	17.167	1.10	23.25	0.61
5.083	0.83	11.167	3.53	17.250	1.10	23.33	0.60
5.167	0.83	11.250	3.53	17.333	1.07	23.42	0.60
5.250	0.83	11.333	4.46	17.417	1.07	23.50	0.60
5.333	0.86	11.417	4.46	17.500	1.07	23.58	0.60
5.417	0.86	11.500	4.46	17.583	1.03	23.67	0.60
5.500	0.86	11.583	5.68	17.667	1.03	23.75	0.60
5.583	0.88	11.667	5.68	17.750	1.03	23.83	0.59
5.667	0.88	11.750	5.68	17.833	1.00	23.92	0.59
5.750	0.88	11.833	23.14	17.917	1.00	24.00	0.59
5.833	0.91	11.917	23.14	18.000	1.00	24.08	0.58
5.917	0.91	12.000	23.14	18.083	0.97	24.17	0.58
6.000	0.91	12.083	57.11	18.167	0.97	24.25	0.58
6.083	0.94	12.167	57.11	18.250	0.97		

```
Unit Hyd Qpeak  (cms)=   0.764

PEAK FLOW       (cms)=   0.148 (i)
TIME TO PEAK    (hrs)=  12.750
RUNOFF VOLUME    (mm)=  11.160
TOTAL RAINFALL   (mm)=  52.800
RUNOFF COEFFICIENT  =   0.211

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

```
--------------------------------------------------------------------------------
**********************************************
** SIMULATION:3-50yr 24hr 15min SCS Type II **
**********************************************
--------------------
| CALIB            |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.92	12.250	116.82	18.33	1.91
0.167	0.00	6.250	1.92	12.333	18.52	18.42	1.91
0.250	0.00	6.333	1.97	12.417	18.51	18.50	1.91
0.333	1.10	6.417	1.97	12.500	18.51	18.58	1.84
0.417	1.10	6.500	1.97	12.583	12.60	18.67	1.84
0.500	1.10	6.583	2.02	12.667	12.60	18.75	1.84
0.583	1.12	6.667	2.02	12.750	12.60	18.83	1.77

0.667	1.12	6.750	2.02	12.833	8.67	18.92	1.77
0.750	1.12	6.833	2.08	12.917	8.67	19.00	1.77
0.833	1.15	6.917	2.08	13.000	8.67	19.08	1.71
0.917	1.15	7.000	2.08	13.083	7.32	19.17	1.71
1.000	1.15	7.083	2.13	13.167	7.32	19.25	1.71
1.083	1.17	7.167	2.13	13.250	7.32	19.33	1.64
1.167	1.17	7.250	2.13	13.333	6.20	19.42	1.64
1.250	1.17	7.333	2.19	13.417	6.19	19.50	1.64
1.333	1.20	7.417	2.19	13.500	6.19	19.58	1.57
1.417	1.20	7.500	2.19	13.583	5.47	19.67	1.57
1.500	1.20	7.583	2.24	13.667	5.47	19.75	1.57
1.583	1.23	7.667	2.24	13.750	5.47	19.83	1.50
1.667	1.23	7.750	2.24	13.833	4.80	19.92	1.50
1.750	1.23	7.833	2.30	13.917	4.80	20.00	1.50
1.833	1.25	7.917	2.30	14.000	4.80	20.08	1.44
1.917	1.25	8.000	2.30	14.083	4.28	20.17	1.44
2.000	1.25	8.083	2.35	14.167	4.28	20.25	1.44
2.083	1.28	8.167	2.35	14.250	4.28	20.33	1.40
2.167	1.28	8.250	2.35	14.333	3.90	20.42	1.40
2.250	1.28	8.333	2.52	14.417	3.90	20.50	1.40
2.333	1.31	8.417	2.52	14.500	3.90	20.58	1.38
2.417	1.31	8.500	2.52	14.583	3.72	20.67	1.38
2.500	1.31	8.583	2.78	14.667	3.72	20.75	1.38
2.583	1.34	8.667	2.78	14.750	3.72	20.83	1.37
2.667	1.34	8.750	2.78	14.833	3.52	20.92	1.37
2.750	1.34	8.833	3.06	14.917	3.52	21.00	1.37
2.833	1.36	8.917	3.06	15.000	3.52	21.08	1.36
2.917	1.36	9.000	3.06	15.083	3.34	21.17	1.36
3.000	1.36	9.083	3.32	15.167	3.34	21.25	1.36
3.083	1.39	9.167	3.32	15.250	3.34	21.33	1.34
3.167	1.39	9.250	3.32	15.333	3.14	21.42	1.34
3.250	1.39	9.333	3.46	15.417	3.14	21.50	1.34
3.333	1.42	9.417	3.46	15.500	3.14	21.58	1.33
3.417	1.42	9.500	3.46	15.583	2.96	21.67	1.33
3.500	1.42	9.583	3.46	15.667	2.96	21.75	1.33
3.583	1.45	9.667	3.46	15.750	2.96	21.83	1.32
3.667	1.45	9.750	3.46	15.833	2.76	21.92	1.32
3.750	1.45	9.833	3.68	15.917	2.76	22.00	1.32
3.833	1.47	9.917	3.68	16.000	2.76	22.08	1.30
3.917	1.47	10.000	3.68	16.083	2.58	22.17	1.30
4.000	1.47	10.083	4.10	16.167	2.58	22.25	1.30
4.083	1.50	10.167	4.10	16.250	2.58	22.33	1.29
4.167	1.50	10.250	4.10	16.333	2.45	22.42	1.29
4.250	1.50	10.333	4.66	16.417	2.45	22.50	1.29
4.333	1.54	10.417	4.66	16.500	2.45	22.58	1.28
4.417	1.54	10.500	4.66	16.583	2.38	22.67	1.28
4.500	1.54	10.583	5.28	16.667	2.38	22.75	1.28
4.583	1.59	10.667	5.28	16.750	2.38	22.83	1.26
4.667	1.59	10.750	5.28	16.833	2.31	22.92	1.26
4.750	1.59	10.833	6.18	16.917	2.31	23.00	1.26
4.833	1.65	10.917	6.18	17.000	2.31	23.08	1.25
4.917	1.65	11.000	6.18	17.083	2.25	23.17	1.25
5.000	1.65	11.083	7.21	17.167	2.25	23.25	1.25
5.083	1.70	11.167	7.21	17.250	2.25	23.33	1.24
5.167	1.70	11.250	7.21	17.333	2.18	23.42	1.24
5.250	1.70	11.333	9.12	17.417	2.18	23.50	1.24
5.333	1.76	11.417	9.12	17.500	2.18	23.58	1.22
5.417	1.76	11.500	9.12	17.583	2.11	23.67	1.22
5.500	1.76	11.583	11.61	17.667	2.11	23.75	1.22
5.583	1.81	11.667	11.61	17.750	2.11	23.83	1.21
5.667	1.81	11.750	11.61	17.833	2.04	23.92	1.21
5.750	1.81	11.833	47.33	17.917	2.04	24.00	1.21
5.833	1.86	11.917	47.34	18.000	2.04	24.08	1.19
5.917	1.86	12.000	47.34	18.083	1.98	24.17	1.19
6.000	1.86	12.083	116.82	18.167	1.98	24.25	1.19
6.083	1.92	12.167	116.82	18.250	1.98		

```
Unit Hyd Qpeak  (cms)=   0.764

PEAK FLOW       (cms)=   0.585 (i)
TIME TO PEAK    (hrs)=  12.750
RUNOFF VOLUME    (mm)=  41.894
TOTAL RAINFALL   (mm)= 108.000
RUNOFF COEFFICIENT   =   0.388

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

```
--------------------------------------------------------------------------------
*********************************************
** SIMULATION:3-5yr 24hr 15min SCS Type II **
*********************************************
--------------------
| CALIB              |
| NASHYD   (  0019)|   Area    (ha)=  12.20   Curve Number   (CN)= 64.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   6.90   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.61

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.23	12.250	75.29	18.33	1.23
0.167	0.00	6.250	1.23	12.333	11.93	18.42	1.23
0.250	0.00	6.333	1.27	12.417	11.93	18.50	1.23
0.333	0.71	6.417	1.27	12.500	11.93	18.58	1.19
0.417	0.71	6.500	1.27	12.583	8.12	18.67	1.19
0.500	0.71	6.583	1.30	12.667	8.12	18.75	1.19
0.583	0.72	6.667	1.30	12.750	8.12	18.83	1.14
0.667	0.72	6.750	1.30	12.833	5.59	18.92	1.14
0.750	0.72	6.833	1.34	12.917	5.58	19.00	1.14
0.833	0.74	6.917	1.34	13.000	5.58	19.08	1.10
0.917	0.74	7.000	1.34	13.083	4.72	19.17	1.10

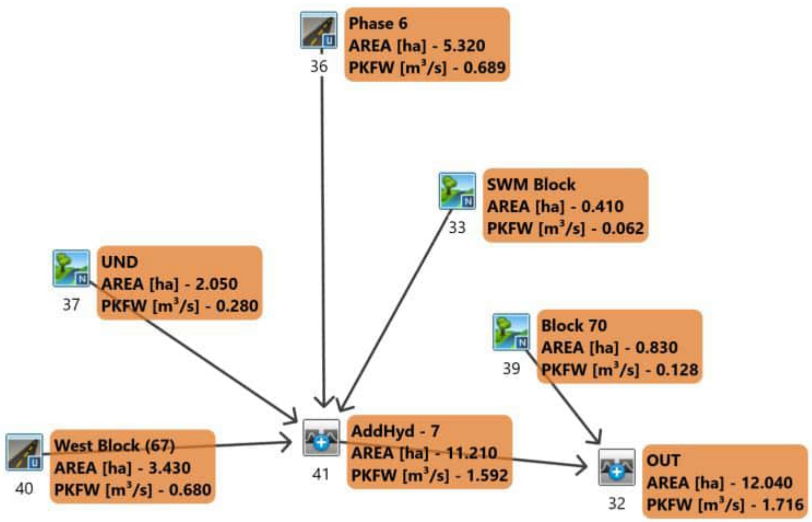
1.000	0.74	7.083	1.37	13.167	4.72	19.25	1.10
1.083	0.76	7.167	1.37	13.250	4.72	19.33	1.06
1.167	0.76	7.250	1.37	13.333	3.99	19.42	1.06
1.250	0.76	7.333	1.41	13.417	3.99	19.50	1.06
1.333	0.78	7.417	1.41	13.500	3.99	19.58	1.01
1.417	0.78	7.500	1.41	13.583	3.52	19.67	1.01
1.500	0.78	7.583	1.44	13.667	3.52	19.75	1.01
1.583	0.79	7.667	1.44	13.750	3.52	19.83	0.97
1.667	0.79	7.750	1.44	13.833	3.09	19.92	0.97
1.750	0.79	7.833	1.48	13.917	3.09	20.00	0.97
1.833	0.81	7.917	1.48	14.000	3.09	20.08	0.93
1.917	0.81	8.000	1.48	14.083	2.76	20.17	0.93
2.000	0.81	8.083	1.51	14.167	2.76	20.25	0.93
2.083	0.83	8.167	1.51	14.250	2.76	20.33	0.90
2.167	0.83	8.250	1.51	14.333	2.51	20.42	0.90
2.250	0.83	8.333	1.62	14.417	2.51	20.50	0.90
2.333	0.84	8.417	1.62	14.500	2.51	20.58	0.89
2.417	0.84	8.500	1.62	14.583	2.40	20.67	0.89
2.500	0.84	8.583	1.79	14.667	2.40	20.75	0.89
2.583	0.86	8.667	1.79	14.750	2.40	20.83	0.88
2.667	0.86	8.750	1.79	14.833	2.27	20.92	0.88
2.750	0.86	8.833	1.97	14.917	2.27	21.00	0.88
2.833	0.88	8.917	1.97	15.000	2.27	21.08	0.87
2.917	0.88	9.000	1.97	15.083	2.15	21.17	0.87
3.000	0.88	9.083	2.14	15.167	2.15	21.25	0.87
3.083	0.90	9.167	2.14	15.250	2.15	21.33	0.87
3.167	0.90	9.250	2.14	15.333	2.03	21.42	0.87
3.250	0.90	9.333	2.23	15.417	2.03	21.50	0.87
3.333	0.91	9.417	2.23	15.500	2.03	21.58	0.86
3.417	0.91	9.500	2.23	15.583	1.91	21.67	0.86
3.500	0.91	9.583	2.23	15.667	1.91	21.75	0.86
3.583	0.93	9.667	2.23	15.750	1.91	21.83	0.85
3.667	0.93	9.750	2.23	15.833	1.78	21.92	0.85
3.750	0.93	9.833	2.37	15.917	1.78	22.00	0.85
3.833	0.95	9.917	2.37	16.000	1.78	22.08	0.84
3.917	0.95	10.000	2.37	16.083	1.66	22.17	0.84
4.000	0.95	10.083	2.64	16.167	1.66	22.25	0.84
4.083	0.96	10.167	2.64	16.250	1.66	22.33	0.83
4.167	0.96	10.250	2.64	16.333	1.58	22.42	0.83
4.250	0.96	10.333	3.00	16.417	1.58	22.50	0.83
4.333	0.99	10.417	3.00	16.500	1.58	22.58	0.82
4.417	0.99	10.500	3.00	16.583	1.54	22.67	0.82
4.500	0.99	10.583	3.40	16.667	1.54	22.75	0.82
4.583	1.03	10.667	3.40	16.750	1.54	22.83	0.81
4.667	1.03	10.750	3.40	16.833	1.49	22.92	0.81
4.750	1.03	10.833	3.98	16.917	1.49	23.00	0.81
4.833	1.06	10.917	3.98	17.000	1.49	23.08	0.80
4.917	1.06	11.000	3.98	17.083	1.45	23.17	0.80
5.000	1.06	11.083	4.65	17.167	1.45	23.25	0.80
5.083	1.10	11.167	4.65	17.250	1.45	23.33	0.80
5.167	1.10	11.250	4.65	17.333	1.40	23.42	0.80
5.250	1.10	11.333	5.88	17.417	1.40	23.50	0.80
5.333	1.13	11.417	5.88	17.500	1.40	23.58	0.79
5.417	1.13	11.500	5.88	17.583	1.36	23.67	0.79
5.500	1.13	11.583	7.48	17.667	1.36	23.75	0.79
5.583	1.17	11.667	7.48	17.750	1.36	23.83	0.78
5.667	1.17	11.750	7.48	17.833	1.32	23.92	0.78
5.750	1.17	11.833	30.50	17.917	1.32	24.00	0.78
5.833	1.20	11.917	30.51	18.000	1.32	24.08	0.77
5.917	1.20	12.000	30.51	18.083	1.28	24.17	0.77
6.000	1.20	12.083	75.28	18.167	1.28	24.25	0.77
6.083	1.23	12.167	75.29	18.250	1.28		

Unit Hyd Qpeak (cms)= 0.764

PEAK FLOW (cms)= 0.259 (i)
TIME TO PEAK (hrs)= 12.750
RUNOFF VOLUME (mm)= 19.123
TOTAL RAINFALL (mm)= 69.600
RUNOFF COEFFICIENT = 0.275

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

VO Model Post-Development Results - Uncontrolled



```
*******************************************
** SIMULATION:1-002yr 4hr 10min Chicago **
*******************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.004 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   4.268
     TOTAL RAINFALL   (mm)=  31.287
     RUNOFF COEFFICIENT   =   0.136

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
```

```
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.015 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   3.927
     TOTAL RAINFALL   (mm)=  31.287
     RUNOFF COEFFICIENT   =   0.126

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.66         2.66
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         1.00
     Length            (m)=    188.33        40.00
     Mannings n          =     0.130        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    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
```

```
           1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Max.Eff.Inten.(mm/hr)=      44.33         5.85
                over (min)       20.00        50.00
     Storage Coeff.  (min)=      20.59 (ii)   47.63 (ii)
     Unit Hyd. Tpeak (min)=      20.00        50.00
     Unit Hyd. peak  (cms)=       0.06         0.02
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.15         0.02         0.153 (iii)
     TIME TO PEAK    (hrs)=       1.58         2.25          1.58
     RUNOFF VOLUME    (mm)=      30.29         4.61         13.59
     TOTAL RAINFALL   (mm)=      31.29        31.29         31.29
     RUNOFF COEFFICIENT   =       0.97         0.15          0.43


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
           0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
           0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
           0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
           0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
           0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
           0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
           0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
           0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
           0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
           0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
           1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16
```

```
     Max.Eff.Inten.(mm/hr)=      71.35         6.44
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       3.75 (ii)   24.89 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=       0.25         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.02         0.228 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.67          1.33
     RUNOFF VOLUME    (mm)=      30.29         4.61         13.60
     TOTAL RAINFALL   (mm)=      31.29        31.29         31.29
     RUNOFF COEFFICIENT   =       0.97         0.15          0.43

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.004     1.58     4.27
      + ID2= 2 (  0036):     5.32   0.153     1.58    13.59
        ==================================================
        ID = 3 (  0041):     5.73   0.156     1.58    12.93

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.156     1.58    12.93
      + ID2= 2 (  0037):     2.05   0.015     1.67     3.93
        ==================================================
        ID = 1 (  0041):     7.78   0.172     1.58    10.56

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.172     1.58    10.56
```

```
      + ID2= 2 (  0040):     3.43   0.228     1.33    13.60
        ==================================================
        ID = 3 (  0041):    11.21   0.315     1.33    11.49

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.007 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   4.266
     TOTAL RAINFALL   (mm)=  31.287
     RUNOFF COEFFICIENT   =   0.136

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.007     1.58     4.27
      + ID2= 2 (  0041):    11.21   0.315     1.33    11.49
        ==================================================
        ID = 3 (  0032):    12.04   0.318     1.33    10.99
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
******************************************
** SIMULATION:1-005yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                 0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                 0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                 0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                 0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                 0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                 0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                 0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                 0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                 0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                 0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                 1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.008 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   8.469
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.205

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

```
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
              0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
              0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
              0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
              0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
              0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
              0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
              0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
              0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
              0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
              0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
              1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.036 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   7.847
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.190

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        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    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
              0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
              0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
              0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
              0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
              0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
              0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
              0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
              0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
```

```
              0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
              0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
              1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Max.Eff.Inten.(mm/hr)=      58.77        13.48
                over (min)       20.00        40.00
     Storage Coeff.  (min)=      18.39 (ii)   37.76 (ii)
     Unit Hyd. Tpeak (min)=      20.00        40.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.21         0.04          0.223 (iii)
     TIME TO PEAK    (hrs)=       1.58         2.00           1.58
     RUNOFF VOLUME    (mm)=      40.38         8.13          19.41
     TOTAL RAINFALL   (mm)=      41.38        41.38          41.38
     RUNOFF COEFFICIENT   =       0.98         0.20           0.47


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
              0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
              0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
              0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
              0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
              0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
              0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
              0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
              0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
              0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
```

```
              0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
              1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Max.Eff.Inten.(mm/hr)=      94.66        15.30
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.35 (ii)   18.30 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.26         0.06
                                                          *TOTALS*
     PEAK FLOW      (cms)=        0.30         0.04          0.315 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.58           1.33
     RUNOFF VOLUME    (mm)=      40.38         8.13          19.41
     TOTAL RAINFALL   (mm)=      41.38        41.38          41.38
     RUNOFF COEFFICIENT   =       0.98         0.20           0.47

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.008     1.50     8.47
      + ID2= 2 (  0036):     5.32   0.223     1.58    19.41
        ==================================================
        ID = 3 (  0041):     5.73   0.231     1.58    18.63

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.231     1.58    18.63
      + ID2= 2 (  0037):     2.05   0.036     1.58     7.85
        ==================================================
        ID = 1 (  0041):     7.78   0.267     1.58    15.79

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.267     1.58    15.79
      + ID2= 2 (  0040):     3.43   0.315     1.33    19.41
        ==================================================
        ID = 3 (  0041):    11.21   0.450     1.33    16.90

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
              0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
              0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
              0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
              0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
              0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
              0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
              0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
              0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
              0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
              0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
              1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW      (cms)=   0.017 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=   8.466
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.205

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.017     1.50     8.47
      + ID2= 2 (  0041):    11.21   0.450     1.33    16.90
        ==================================================
```

```
       ID = 3 (  0032):    12.04   0.459     1.33    16.32

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
******************************************
** SIMULATION:1-010yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
               0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
               0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
               0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
               0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
               0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
               0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
               0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
               0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
               0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
               0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
               1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

    Unit Hyd Qpeak  (cms)=   0.078

    PEAK FLOW       (cms)=   0.012 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=  11.928
    TOTAL RAINFALL   (mm)=  48.343
    RUNOFF COEFFICIENT   =   0.247

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

```
                            ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
               0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
               0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
               0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
               0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
               0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
               0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
               0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
               0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
               0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
               0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
               1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

    Unit Hyd Qpeak  (cms)=   0.356

    PEAK FLOW       (cms)=   0.053 (i)
    TIME TO PEAK    (hrs)=   1.583
    RUNOFF VOLUME    (mm)=  11.099
    TOTAL RAINFALL   (mm)=  48.343
    RUNOFF COEFFICIENT   =   0.230

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66          2.66
    Dep. Storage     (mm)=       1.00          5.00
    Average Slope     (%)=       1.00          1.00
    Length            (m)=     188.33         40.00
    Mannings n          =       0.130         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    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
               0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
               0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
               0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
               0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
               0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
               0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
```

```
           0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
           0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
           0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
           0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
           1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Max.Eff.Inten.(mm/hr)=      82.41        18.48
                over (min)       15.00        35.00
     Storage Coeff.  (min)=      16.07 (ii)   33.14 (ii)
     Unit Hyd. Tpeak (min)=      15.00        35.00
     Unit Hyd. peak  (cms)=       0.07         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.27         0.06         0.292 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.83          1.50
     RUNOFF VOLUME    (mm)=      47.34        10.98         23.71
     TOTAL RAINFALL   (mm)=      48.34        48.34         48.34
     RUNOFF COEFFICIENT   =       0.98         0.23          0.49


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                                 ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
           0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
           0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
           0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
           0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
           0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
           0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
           0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
```

```
           0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
           0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
           0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
           1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Max.Eff.Inten.(mm/hr)=     110.25        21.07
                over (min)       5.00        20.00
     Storage Coeff.  (min)=       3.15 (ii)   16.31 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.27         0.06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.36         0.06         0.374 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.58          1.33
     RUNOFF VOLUME    (mm)=      47.34        10.98         23.71
     TOTAL RAINFALL   (mm)=      48.34        48.34         48.34
     RUNOFF COEFFICIENT   =       0.98         0.23          0.49

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):      0.41   0.012     1.50    11.93
      + ID2= 2 (  0036):      5.32   0.292     1.50    23.71
        ==================================================
        ID = 3 (  0041):      5.73   0.305     1.50    22.86

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):      5.73   0.305     1.50    22.86
      + ID2= 2 (  0037):      2.05   0.053     1.58    11.10
        ==================================================
        ID = 1 (  0041):      7.78   0.357     1.50    19.76

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

--------------------
```

```
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.357     1.50    19.76
      + ID2= 2 (  0040):     3.43   0.374     1.33    23.71
        ===================================================
        ID = 3 (  0041):    11.21   0.592     1.33    20.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                                    ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
                 0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
                 0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
                 0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
                 0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
                 0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
                 0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
                 0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
                 0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
                 0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
                 0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
                 1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.026 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  11.924
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.247

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.026     1.50    11.92
      + ID2= 2 (  0041):    11.21   0.592     1.33    20.97
        ===================================================
        ID = 3 (  0032):    12.04   0.606     1.33    20.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
******************************************
** SIMULATION:1-025yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                    ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
                 0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
                 0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
                 0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
                 0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
                 0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
                 0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
                 0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
                 0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
                 0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
                 0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
                 1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.018 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  16.569
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.292

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

```
                    ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
         0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
         0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
         0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
         0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
         0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
         0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
         0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
         0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
         0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
         0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
         1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.078 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  15.486
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.273

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        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    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
         0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
         0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
         0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
         0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
```

```
         0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
         0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
         0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
         0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
         0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
         0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
         1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Max.Eff.Inten.(mm/hr)=      96.65        28.99
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.07 (ii)   29.33 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.32         0.09         0.368 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.75          1.50
     RUNOFF VOLUME    (mm)=      55.70        14.81         29.12
     TOTAL RAINFALL   (mm)=      56.70        56.70         56.70
     RUNOFF COEFFICIENT   =       0.98         0.26          0.51


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                    ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
         0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
         0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
         0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
         0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
         0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
```

```
              0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
              0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
              0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
              0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
              0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
              1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Max.Eff.Inten.(mm/hr)=     129.30        28.99
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.95 (ii)   14.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.08
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.42         0.09          0.461 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      55.70        14.81          29.12
     TOTAL RAINFALL   (mm)=      56.70        56.70          56.70
     RUNOFF COEFFICIENT   =       0.98         0.26           0.51

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.018     1.50    16.57
      + ID2= 2 (  0036):     5.32   0.368     1.50    29.12
        ====================================================
        ID = 3 (  0041):     5.73   0.386     1.50    28.22

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.386     1.50    28.22
      + ID2= 2 (  0037):     2.05   0.078     1.58    15.49
        ====================================================
        ID = 1 (  0041):     7.78   0.464     1.50    24.86

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

```
--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.464     1.50    24.86
      + ID2= 2 (  0040):     3.43   0.461     1.33    29.12
        ====================================================
        ID = 3 (  0041):    11.21   0.743     1.33    26.17

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
               0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
               0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
               0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
               0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
               0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
               0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
               0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
               0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
               0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
               0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
               1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.038 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  16.562
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.292

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.038     1.50    16.56
      + ID2= 2 (  0041):    11.21   0.743     1.33    26.17
        ====================================================
        ID = 3 (  0032):    12.04   0.765     1.33    25.50

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
******************************************
** SIMULATION:1-050yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                 0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                 0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                 0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                 0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                 0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                 0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                 0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                 0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                 0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                 0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                 1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW      (cms)=   0.023 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  20.437
     TOTAL RAINFALL   (mm)=  63.117
     RUNOFF COEFFICIENT   =   0.324

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                 0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                 0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                 0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                 0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                 0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                 0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                 0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                 0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                 0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                 0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                 1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW      (cms)=   0.100 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  19.159
     TOTAL RAINFALL   (mm)=  63.117
     RUNOFF COEFFICIENT   =   0.304

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66          2.66
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     188.33         40.00
     Mannings n          =      0.130         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    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                 0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                 0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
```

```
           0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
           0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
           0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
           0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
           0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
           0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
           0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
           0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
           1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Max.Eff.Inten.(mm/hr)=     107.30        35.61
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      14.46 (ii)   27.59 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.37         0.11          0.423 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.75           1.50
     RUNOFF VOLUME    (mm)=      62.12        18.01          33.44
     TOTAL RAINFALL   (mm)=      63.12        63.12          63.12
     RUNOFF COEFFICIENT   =       0.98         0.29           0.53


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

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


                             ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
           0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
           0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
           0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
```

```
           0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
           0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
           0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
           0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
           0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
           0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
           0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
           1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Max.Eff.Inten.(mm/hr)=     143.50        45.22
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.83 (ii)   12.53 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.08
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.47         0.12          0.523 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      62.12        18.01          33.45
     TOTAL RAINFALL   (mm)=      63.12        63.12          63.12
     RUNOFF COEFFICIENT   =       0.98         0.29           0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.023     1.50    20.44
      + ID2= 2 (  0036):     5.32   0.423     1.50    33.44
        ====================================================
        ID = 3 (  0041):     5.73   0.446     1.50    32.51

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.446     1.50    32.51
      + ID2= 2 (  0037):     2.05   0.100     1.50    19.16
        ====================================================
        ID = 1 (  0041):     7.78   0.546     1.50    29.00
```

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.546     1.50    29.00
      + ID2= 2 (  0040):     3.43   0.523     1.33    33.45
        ====================================================
        ID = 3 (  0041):    11.21   0.856     1.33    30.36

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
               0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
               0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
               0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
               0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
               0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
               0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
               0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
               0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
               0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
               0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
               1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.048 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  20.429
     TOTAL RAINFALL   (mm)=  63.117
     RUNOFF COEFFICIENT   =   0.324

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.048     1.50    20.43
      + ID2= 2 (  0041):    11.21   0.856     1.33    30.36
        ====================================================
        ID = 3 (  0032):    12.04   0.886     1.33    29.67

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
******************************************
** SIMULATION:1-100yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
               0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
               0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
               0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
               0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
               0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
               0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
               0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
               0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
               0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
               0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
               1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.028 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  24.483
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.352

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
```

```
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.123 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  23.016
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.331

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        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    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
```

```
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Max.Eff.Inten.(mm/hr)=     118.09        42.74
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      13.91 (ii)   26.12 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.41         0.13          0.481 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.75           1.50
     RUNOFF VOLUME    (mm)=      68.46        21.38          37.85
     TOTAL RAINFALL   (mm)=      69.46        69.46          69.46
     RUNOFF COEFFICIENT   =       0.99         0.31           0.54


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
```

```
              0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
              0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
              0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
              0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
              0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
              0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
              0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
              0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
              0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
              1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Max.Eff.Inten.(mm/hr)=     157.92        54.39
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.73 (ii)   11.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.29         0.09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.52         0.14          0.587 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      68.46        21.38          37.85
     TOTAL RAINFALL   (mm)=      69.46        69.46          69.46
     RUNOFF COEFFICIENT   =       0.99         0.31           0.54

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.028     1.50    24.48
      + ID2= 2 (  0036):     5.32   0.481     1.50    37.85
        ====================================================
        ID = 3 (  0041):     5.73   0.510     1.50    36.90

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.510     1.50    36.90
      + ID2= 2 (  0037):     2.05   0.123     1.50    23.02
        ====================================================
        ID = 1 (  0041):     7.78   0.633     1.50    33.24

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.633     1.50    33.24
      + ID2= 2 (  0040):     3.43   0.587     1.33    37.85
        ====================================================
        ID = 3 (  0041):    11.21   0.974     1.33    34.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
               0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
               0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
               0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
               0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
               0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
               0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
               0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
               0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
               0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
               0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
               1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.059 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  24.473
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.352

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

-------------------------------------------------------------------------------
```

```
--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.059     1.50    24.47
      + ID2= 2 (  0041):    11.21   0.974     1.33    34.65
        ==================================================
        ID = 3 (  0032):    12.04   1.012     1.33    33.95

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
***************************************
** SIMULATION:2-025yr 12hr 15min SCS **
***************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.34	6.250	102.96	9.33	2.73
0.167	0.00	3.250	2.34	6.333	14.04	9.42	2.73
0.250	0.00	3.333	3.12	6.417	14.04	9.50	2.73
0.333	1.95	3.417	3.12	6.500	14.04	9.58	2.73
0.417	1.95	3.500	3.12	6.583	14.04	9.67	2.73
0.500	1.95	3.583	3.12	6.667	14.04	9.75	2.73
0.583	1.95	3.667	3.12	6.750	14.04	9.83	2.73
0.667	1.95	3.750	3.12	6.833	6.24	9.92	2.73
0.750	1.95	3.833	3.12	6.917	6.24	10.00	2.73
0.833	1.95	3.917	3.12	7.000	6.24	10.08	2.73
0.917	1.95	4.000	3.12	7.083	6.24	10.17	2.73
1.000	1.95	4.083	3.12	7.167	6.24	10.25	2.73
1.083	1.95	4.167	3.12	7.250	6.24	10.33	1.56
1.167	1.95	4.250	3.12	7.333	4.68	10.42	1.56
1.250	1.95	4.333	4.68	7.417	4.68	10.50	1.56
1.333	1.95	4.417	4.68	7.500	4.68	10.58	1.56
1.417	1.95	4.500	4.68	7.583	4.68	10.67	1.56
1.500	1.95	4.583	4.68	7.667	4.68	10.75	1.56
1.583	1.95	4.667	4.68	7.750	4.68	10.83	1.56
1.667	1.95	4.750	4.68	7.833	4.68	10.92	1.56
1.750	1.95	4.833	6.24	7.917	4.68	11.00	1.56
1.833	1.95	4.917	6.24	8.000	4.68	11.08	1.56
1.917	1.95	5.000	6.24	8.083	4.68	11.17	1.56
2.000	1.95	5.083	6.24	8.167	4.68	11.25	1.56
2.083	1.95	5.167	6.24	8.250	4.68	11.33	1.56
2.167	1.95	5.250	6.24	8.333	2.73	11.42	1.56
2.250	1.95	5.333	9.36	8.417	2.73	11.50	1.56
2.333	2.34	5.417	9.36	8.500	2.73	11.58	1.56
2.417	2.34	5.500	9.36	8.583	2.73	11.67	1.56
2.500	2.34	5.583	9.36	8.667	2.73	11.75	1.56
2.583	2.34	5.667	9.36	8.750	2.73	11.83	1.56
2.667	2.34	5.750	9.36	8.833	2.73	11.92	1.56
2.750	2.34	5.833	37.44	8.917	2.73	12.00	1.56
2.833	2.34	5.917	37.44	9.000	2.73	12.08	1.56
2.917	2.34	6.000	37.44	9.083	2.73	12.17	1.56
3.000	2.34	6.083	102.96	9.167	2.73	12.25	1.56
3.083	2.34	6.167	102.96	9.250	2.73		

```
Unit Hyd Qpeak  (cms)=   0.078

PEAK FLOW       (cms)=   0.037 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  30.229
TOTAL RAINFALL   (mm)=  78.000
RUNOFF COEFFICIENT   =   0.388

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.34	6.250	102.96	9.33	2.73
0.167	0.00	3.250	2.34	6.333	14.04	9.42	2.73
0.250	0.00	3.333	3.12	6.417	14.04	9.50	2.73
0.333	1.95	3.417	3.12	6.500	14.04	9.58	2.73
0.417	1.95	3.500	3.12	6.583	14.04	9.67	2.73
0.500	1.95	3.583	3.12	6.667	14.04	9.75	2.73
0.583	1.95	3.667	3.12	6.750	14.04	9.83	2.73
0.667	1.95	3.750	3.12	6.833	6.24	9.92	2.73
0.750	1.95	3.833	3.12	6.917	6.24	10.00	2.73
0.833	1.95	3.917	3.12	7.000	6.24	10.08	2.73
0.917	1.95	4.000	3.12	7.083	6.24	10.17	2.73
1.000	1.95	4.083	3.12	7.167	6.24	10.25	2.73
1.083	1.95	4.167	3.12	7.250	6.24	10.33	1.56
1.167	1.95	4.250	3.12	7.333	4.68	10.42	1.56
1.250	1.95	4.333	4.68	7.417	4.68	10.50	1.56
1.333	1.95	4.417	4.68	7.500	4.68	10.58	1.56

```
             1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
             1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
             1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
             1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
             1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
             1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
             1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
             2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
             2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
             2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
             2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
             2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
             2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
             2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
             2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
             2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
             2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
             2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
             2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
             3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
             3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.163 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  28.515
     TOTAL RAINFALL   (mm)=  78.000
     RUNOFF COEFFICIENT   =   0.366

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
             0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
             0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
             0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
             0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
             0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
             0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
             0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
             0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
             0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
             0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
             1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
             1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
             1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
             1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
             1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
             1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
             1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
             1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
             1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
             1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
             1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
             1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
             2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
             2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
             2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
             2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
             2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
             2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
             2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
             2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
             2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
             2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
             2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
             2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
             3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
             3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

Max.Eff.Inten.(mm/hr)=     102.96        51.58
           over (min)      15.00        30.00
Storage Coeff.  (min)=      14.70 (ii)   26.02 (ii)
Unit Hyd. Tpeak (min)=      15.00        30.00
Unit Hyd. peak  (cms)=       0.08         0.04
                                                      *TOTALS*
PEAK FLOW       (cms)=       0.34         0.16          0.447 (iii)
TIME TO PEAK    (hrs)=       6.33         6.58           6.33
RUNOFF VOLUME    (mm)=      77.00        26.19          43.97
TOTAL RAINFALL   (mm)=      78.00        78.00          78.00
RUNOFF COEFFICIENT   =       0.99         0.34           0.56


  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
       CN*  =  59.0    Ia = Dep. Storage  (Above)
```

```
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
                0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
                0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
                0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
                0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
                0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
                0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
                0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
                0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
                0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
                0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
                1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
                1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
                1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
                1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
                1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
                1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
                1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
                1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
                1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
                1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
                1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
                1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
                2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
                2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
                2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
                2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
                2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
                2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
                2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
                2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
                2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
                2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
                2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
                2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
                3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
                3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

     Max.Eff.Inten.(mm/hr)=     102.96        55.74
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.24 (ii)   12.15 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.09
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.16          0.481 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33           6.25
     RUNOFF VOLUME    (mm)=      77.00        26.19          43.97
     TOTAL RAINFALL   (mm)=      78.00        78.00          78.00
     RUNOFF COEFFICIENT   =       0.99         0.34           0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.037     6.33    30.23
      + ID2= 2 (  0036):     5.32   0.447     6.33    43.97
        ====================================================
        ID = 3 (  0041):     5.73   0.484     6.33    42.99

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.484     6.33    42.99
      + ID2= 2 (  0037):     2.05   0.163     6.33    28.52
        ====================================================
        ID = 1 (  0041):     7.78   0.647     6.33    39.18
```

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.647     6.33    39.18
      + ID2= 2 (  0040):     3.43   0.481     6.25    43.97
        ====================================================
        ID = 3 (  0041):    11.21   1.051     6.25    40.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.34	6.250	102.96	9.33	2.73
0.167	0.00	3.250	2.34	6.333	14.04	9.42	2.73
0.250	0.00	3.333	3.12	6.417	14.04	9.50	2.73
0.333	1.95	3.417	3.12	6.500	14.04	9.58	2.73
0.417	1.95	3.500	3.12	6.583	14.04	9.67	2.73
0.500	1.95	3.583	3.12	6.667	14.04	9.75	2.73
0.583	1.95	3.667	3.12	6.750	14.04	9.83	2.73
0.667	1.95	3.750	3.12	6.833	6.24	9.92	2.73
0.750	1.95	3.833	3.12	6.917	6.24	10.00	2.73
0.833	1.95	3.917	3.12	7.000	6.24	10.08	2.73
0.917	1.95	4.000	3.12	7.083	6.24	10.17	2.73
1.000	1.95	4.083	3.12	7.167	6.24	10.25	2.73
1.083	1.95	4.167	3.12	7.250	6.24	10.33	1.56
1.167	1.95	4.250	3.12	7.333	4.68	10.42	1.56
1.250	1.95	4.333	4.68	7.417	4.68	10.50	1.56
1.333	1.95	4.417	4.68	7.500	4.68	10.58	1.56
1.417	1.95	4.500	4.68	7.583	4.68	10.67	1.56
1.500	1.95	4.583	4.68	7.667	4.68	10.75	1.56
1.583	1.95	4.667	4.68	7.750	4.68	10.83	1.56
1.667	1.95	4.750	4.68	7.833	4.68	10.92	1.56
1.750	1.95	4.833	6.24	7.917	4.68	11.00	1.56
1.833	1.95	4.917	6.24	8.000	4.68	11.08	1.56
1.917	1.95	5.000	6.24	8.083	4.68	11.17	1.56
2.000	1.95	5.083	6.24	8.167	4.68	11.25	1.56
2.083	1.95	5.167	6.24	8.250	4.68	11.33	1.56
2.167	1.95	5.250	6.24	8.333	2.73	11.42	1.56
2.250	1.95	5.333	9.36	8.417	2.73	11.50	1.56
2.333	2.34	5.417	9.36	8.500	2.73	11.58	1.56
2.417	2.34	5.500	9.36	8.583	2.73	11.67	1.56
2.500	2.34	5.583	9.36	8.667	2.73	11.75	1.56
2.583	2.34	5.667	9.36	8.750	2.73	11.83	1.56
2.667	2.34	5.750	9.36	8.833	2.73	11.92	1.56
2.750	2.34	5.833	37.44	8.917	2.73	12.00	1.56
2.833	2.34	5.917	37.44	9.000	2.73	12.08	1.56
2.917	2.34	6.000	37.44	9.083	2.73	12.17	1.56
3.000	2.34	6.083	102.96	9.167	2.73	12.25	1.56
3.083	2.34	6.167	102.96	9.250	2.73		

```
     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.077 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  30.217
     TOTAL RAINFALL   (mm)=  78.000
     RUNOFF COEFFICIENT   =   0.387

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.077     6.33    30.22
      + ID2= 2 (  0041):    11.21   1.051     6.25    40.64
        ====================================================
        ID = 3 (  0032):    12.04   1.123     6.25    39.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
***************************************
** SIMULATION:2-02yr 12hr 15min SCS **
***************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.30	6.250	57.02	9.33	1.51
0.167	0.00	3.250	1.30	6.333	7.78	9.42	1.51

```
        0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
        0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
        0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
        0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
        0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
        0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
        0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
        0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
        0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
        1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
        1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
        1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
        1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
        1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
        1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
        1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
        1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
        1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
        1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
        1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
        1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
        2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
        2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
        2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
        2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
        2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
        2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
        2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
        2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
        2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
        2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
        2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
        2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
        3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
        3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

  Unit Hyd Qpeak  (cms)=   0.078

  PEAK FLOW       (cms)=   0.011 (i)
  TIME TO PEAK    (hrs)=   6.333
  RUNOFF VOLUME    (mm)=   9.333
  TOTAL RAINFALL   (mm)=  43.200
  RUNOFF COEFFICIENT   =   0.216

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22
```

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

                      ---- TRANSFORMED HYETOGRAPH ----
         TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
        0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
        0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
        0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
        0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
        0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
        0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
        0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
        0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
        0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
        0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
        0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
        1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
        1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
        1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
        1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
        1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
        1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
        1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
        1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
        1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
        1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
        1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
        1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
        2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
        2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
        2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
        2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
        2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
        2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
        2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
        2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
        2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
        2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
        2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
        2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
        3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
        3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

  Unit Hyd Qpeak  (cms)=   0.356

  PEAK FLOW       (cms)=   0.046 (i)
  TIME TO PEAK    (hrs)=   6.333
  RUNOFF VOLUME    (mm)=   8.657
  TOTAL RAINFALL   (mm)=  43.200
  RUNOFF COEFFICIENT   =   0.200
```

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n           =      0.130        0.250

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


                                ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                  0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                  0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                  0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                  0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                  0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
                  0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
                  0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
                  0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
                  0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
                  0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
                  1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
                  1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
                  1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
                  1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
                  1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
                  1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
                  1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
                  1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
                  1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
                  1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
                  1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
                  1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
                  2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
                  2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
                  2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
                  2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
                  2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
                  2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
                  2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
```

```
                  2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
                  2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
                  2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
                  2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
                  2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
                  3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
                  3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Max.Eff.Inten.(mm/hr)=      47.95        13.86
                over (min)       20.00        40.00
     Storage Coeff.  (min)=      19.95 (ii)   39.10 (ii)
     Unit Hyd. Tpeak (min)=      20.00        40.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.04          0.184 (iii)
     TIME TO PEAK    (hrs)=       6.42         6.83           6.42
     RUNOFF VOLUME    (mm)=      42.20         8.84          20.51
     TOTAL RAINFALL   (mm)=      43.20        43.20          43.20
     RUNOFF COEFFICIENT   =       0.98         0.20           0.47


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

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


                                ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                  0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                  0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                  0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                  0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                  0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
```

```
          0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
          0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
          0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
          0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
          0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
          1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
          1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
          1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
          1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
          1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
          1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
          1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
          1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
          1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
          1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
          1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
          1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
          2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
          2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
          2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
          2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
          2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
          2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
          2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
          2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
          2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
          2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
          2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
          2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
          3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
          3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Max.Eff.Inten.(mm/hr)=      57.02        17.16
               over (min)         5.00        20.00
     Storage Coeff.  (min)=       4.10 (ii)   18.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.24         0.06
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.04          0.215 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.42           6.25
     RUNOFF VOLUME    (mm)=      42.20         8.84          20.52
     TOTAL RAINFALL   (mm)=      43.20        43.20          43.20
     RUNOFF COEFFICIENT   =       0.98         0.20           0.47

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.011     6.33     9.33
      + ID2= 2 (  0036):     5.32   0.184     6.42    20.51
        ===================================================
        ID = 3 (  0041):     5.73   0.193     6.42    19.71

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.193     6.42    19.71
      + ID2= 2 (  0037):     2.05   0.046     6.33     8.66
        ===================================================
        ID = 1 (  0041):     7.78   0.237     6.42    16.80

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.237     6.42    16.80
      + ID2= 2 (  0040):     3.43   0.215     6.25    20.52
        ===================================================
        ID = 3 (  0041):    11.21   0.400     6.25    17.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                 0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                 0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
```

```
          0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
          0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
          0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
          0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
          0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
          0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
          0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
          0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
          1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
          1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
          1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
          1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
          1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
          1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
          1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
          1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
          1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
          1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
          1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
          1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
          2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
          2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
          2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
          2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
          2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
          2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
          2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
          2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
          2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
          2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
          2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
          2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
          3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
          3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.022 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=   9.330
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.216

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.022     6.33     9.33
      + ID2= 2 (  0041):    11.21   0.400     6.25    17.94
        ====================================================
        ID = 3 (  0032):    12.04   0.420     6.25    17.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
****************************************
** SIMULATION:2-050yr 12hr 15min SCS **
****************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
              0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
              0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
              0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
              0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
              0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
              0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
              0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
              0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
              0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
              0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
              1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
              1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
              1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
              1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
              1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
              1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
              1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
              1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
              1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
              1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
              1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
              1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
              2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
              2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
              2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
              2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
              2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
              2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
              2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
              2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
```

```
             2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
             2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
             2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
             2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
             3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
             3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

    Unit Hyd Qpeak  (cms)=   0.078

    PEAK FLOW       (cms)=   0.044 (i)
    TIME TO PEAK    (hrs)=   6.333
    RUNOFF VOLUME    (mm)=  36.170
    TOTAL RAINFALL   (mm)=  86.400
    RUNOFF COEFFICIENT   =   0.419

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                           ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
             0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
             0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
             0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
             0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
             0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
             0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
             0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
             0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
             0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
             0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
             1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
             1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
             1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
             1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
             1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
             1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
             1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
             1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
             1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
             1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
             1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
```

```
             1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
             2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
             2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
             2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
             2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
             2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
             2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
             2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
             2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
             2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
             2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
             2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
             2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
             3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
             3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

    Unit Hyd Qpeak  (cms)=   0.356

    PEAK FLOW       (cms)=   0.197 (i)
    TIME TO PEAK    (hrs)=   6.333
    RUNOFF VOLUME    (mm)=  34.220
    TOTAL RAINFALL   (mm)=  86.400
    RUNOFF COEFFICIENT   =   0.396

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66         2.66
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         1.00
    Length            (m)=     188.33        40.00
    Mannings n          =      0.130        0.250

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


                           ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
             0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
             0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
             0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
             0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
             0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
             0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
```

```
      0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
      0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
      0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
      0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
      1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
      1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
      1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
      1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
      1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
      1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
      1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
      1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
      1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
      1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
      1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
      1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
      2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
      2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
      2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
      2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
      2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
      2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
      2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
      2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
      2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
      2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
      2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
      2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
      3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
      3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

 Max.Eff.Inten.(mm/hr)=     114.05        61.59
            over (min)       15.00        25.00
 Storage Coeff.  (min)=      14.11 (ii)   24.66 (ii)
 Unit Hyd. Tpeak (min)=      15.00        25.00
 Unit Hyd. peak  (cms)=       0.08         0.05
                                                     *TOTALS*
 PEAK FLOW       (cms)=       0.39         0.20         0.542 (iii)
 TIME TO PEAK    (hrs)=       6.33         6.50          6.42
 RUNOFF VOLUME    (mm)=      85.40        31.21         50.18
 TOTAL RAINFALL   (mm)=      86.40        86.40         86.40
 RUNOFF COEFFICIENT   =       0.99         0.36          0.58


   (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
        CN*  =  59.0    Ia = Dep. Storage  (Above)
  (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
       THAN THE STORAGE COEFFICIENT.
 (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
```

```
| CALIB              |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
                 0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
                 0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
                 0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
                 0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
                 0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
                 0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
                 0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
                 0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
                 0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
                 0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
                 1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
                 1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
                 1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
                 1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
                 1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
                 1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
                 1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
                 1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
                 1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
                 1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
                 1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
                 1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
                 2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
                 2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
                 2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
                 2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
                 2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
                 2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
                 2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
                 2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
                 2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
                 2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
                 2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
                 2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
```

```
              3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
              3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Max.Eff.Inten.(mm/hr)=     114.05        66.34
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.11 (ii)   11.42 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.38         0.20         0.551 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33          6.25
     RUNOFF VOLUME    (mm)=      85.40        31.21         50.18
     TOTAL RAINFALL   (mm)=      86.40        86.40         86.40
     RUNOFF COEFFICIENT   =       0.99         0.36          0.58

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.044     6.33    36.17
      + ID2= 2 (  0036):     5.32   0.542     6.42    50.18
        ===================================================
        ID = 3 (  0041):     5.73   0.582     6.33    49.17

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.582     6.33    49.17
      + ID2= 2 (  0037):     2.05   0.197     6.33    34.22
        ===================================================
        ID = 1 (  0041):     7.78   0.780     6.33    45.23

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.780     6.33    45.23
      + ID2= 2 (  0040):     3.43   0.551     6.25    50.18
        ===================================================
        ID = 3 (  0041):    11.21   1.237     6.25    46.75

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

--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                              ---- TRANSFORMED HYETOGRAPH ----
                    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                   0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
                   0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
                   0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
                   0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
                   0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
                   0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
                   0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
                   0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
                   0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
                   0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
                   0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
                   1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
                   1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
                   1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
                   1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
                   1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
                   1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
                   1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
                   1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
                   1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
                   1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
                   1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
                   1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
                   2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
                   2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
                   2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
                   2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
                   2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
                   2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
                   2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
                   2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
                   2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
```

```
                2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
                2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
                2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
                3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
                3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.092 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  36.155
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.418

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.092     6.33    36.15
      + ID2= 2 (  0041):    11.21   1.237     6.25    46.75
        ===================================================
        ID = 3 (  0032):    12.04   1.324     6.25    46.02

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
**************************************
** SIMULATION:2-05yr 12hr 15min SCS **
**************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    1.73 | 6.250   76.03 |  9.33    2.02
                0.167    0.00 | 3.250    1.73 | 6.333   10.37 |  9.42    2.02
                0.250    0.00 | 3.333    2.30 | 6.417   10.37 |  9.50    2.02
                0.333    1.44 | 3.417    2.30 | 6.500   10.37 |  9.58    2.02
                0.417    1.44 | 3.500    2.30 | 6.583   10.37 |  9.67    2.02
                0.500    1.44 | 3.583    2.30 | 6.667   10.37 |  9.75    2.02
                0.583    1.44 | 3.667    2.30 | 6.750   10.37 |  9.83    2.02
                0.667    1.44 | 3.750    2.30 | 6.833    4.61 |  9.92    2.02
```

```
                0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
                0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
                0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
                1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
                1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
                1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
                1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
                1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
                1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
                1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
                1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
                1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
                1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
                1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
                1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
                2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
                2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
                2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
                2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
                2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
                2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
                2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
                2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
                2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
                2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
                2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
                2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
                3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
                3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.020 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  17.097
     TOTAL RAINFALL   (mm)=  57.600
     RUNOFF COEFFICIENT   =   0.297

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	3.167	1.73	6.250	76.03	9.33	2.02
0.167	0.00	3.250	1.73	6.333	10.37	9.42	2.02
0.250	0.00	3.333	2.30	6.417	10.37	9.50	2.02
0.333	1.44	3.417	2.30	6.500	10.37	9.58	2.02
0.417	1.44	3.500	2.30	6.583	10.37	9.67	2.02
0.500	1.44	3.583	2.30	6.667	10.37	9.75	2.02
0.583	1.44	3.667	2.30	6.750	10.37	9.83	2.02
0.667	1.44	3.750	2.30	6.833	4.61	9.92	2.02
0.750	1.44	3.833	2.30	6.917	4.61	10.00	2.02
0.833	1.44	3.917	2.30	7.000	4.61	10.08	2.02
0.917	1.44	4.000	2.30	7.083	4.61	10.17	2.02
1.000	1.44	4.083	2.30	7.167	4.61	10.25	2.02
1.083	1.44	4.167	2.30	7.250	4.61	10.33	1.15
1.167	1.44	4.250	2.30	7.333	3.46	10.42	1.15
1.250	1.44	4.333	3.46	7.417	3.46	10.50	1.15
1.333	1.44	4.417	3.46	7.500	3.46	10.58	1.15
1.417	1.44	4.500	3.46	7.583	3.46	10.67	1.15
1.500	1.44	4.583	3.46	7.667	3.46	10.75	1.15
1.583	1.44	4.667	3.46	7.750	3.46	10.83	1.15
1.667	1.44	4.750	3.46	7.833	3.46	10.92	1.15
1.750	1.44	4.833	4.61	7.917	3.46	11.00	1.15
1.833	1.44	4.917	4.61	8.000	3.46	11.08	1.15
1.917	1.44	5.000	4.61	8.083	3.46	11.17	1.15
2.000	1.44	5.083	4.61	8.167	3.46	11.25	1.15
2.083	1.44	5.167	4.61	8.250	3.46	11.33	1.15
2.167	1.44	5.250	4.61	8.333	2.02	11.42	1.15
2.250	1.44	5.333	6.91	8.417	2.02	11.50	1.15
2.333	1.73	5.417	6.91	8.500	2.02	11.58	1.15
2.417	1.73	5.500	6.91	8.583	2.02	11.67	1.15
2.500	1.73	5.583	6.91	8.667	2.02	11.75	1.15
2.583	1.73	5.667	6.91	8.750	2.02	11.83	1.15
2.667	1.73	5.750	6.91	8.833	2.02	11.92	1.15
2.750	1.73	5.833	27.65	8.917	2.02	12.00	1.15
2.833	1.73	5.917	27.65	9.000	2.02	12.08	1.15
2.917	1.73	6.000	27.65	9.083	2.02	12.17	1.15
3.000	1.73	6.083	76.03	9.167	2.02	12.25	1.15
3.083	1.73	6.167	76.03	9.250	2.02		

Unit Hyd Qpeak (cms)= 0.356

PEAK FLOW (cms)= 0.089 (i)
TIME TO PEAK (hrs)= 6.333
RUNOFF VOLUME (mm)= 15.986
TOTAL RAINFALL (mm)= 57.600
RUNOFF COEFFICIENT = 0.278

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

| CALIB |

| STANDHYD (0036)| Area (ha)= 5.32
|ID= 1 DT= 5.0 min | Total Imp(%)= 50.00 Dir. Conn.(%)= 35.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.66	2.66
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	1.00
Length	(m)=	188.33	40.00
Mannings n	=	0.130	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.73	6.250	76.03	9.33	2.02
0.167	0.00	3.250	1.73	6.333	10.37	9.42	2.02
0.250	0.00	3.333	2.30	6.417	10.37	9.50	2.02
0.333	1.44	3.417	2.30	6.500	10.37	9.58	2.02
0.417	1.44	3.500	2.30	6.583	10.37	9.67	2.02
0.500	1.44	3.583	2.30	6.667	10.37	9.75	2.02
0.583	1.44	3.667	2.30	6.750	10.37	9.83	2.02
0.667	1.44	3.750	2.30	6.833	4.61	9.92	2.02
0.750	1.44	3.833	2.30	6.917	4.61	10.00	2.02
0.833	1.44	3.917	2.30	7.000	4.61	10.08	2.02
0.917	1.44	4.000	2.30	7.083	4.61	10.17	2.02
1.000	1.44	4.083	2.30	7.167	4.61	10.25	2.02
1.083	1.44	4.167	2.30	7.250	4.61	10.33	1.15
1.167	1.44	4.250	2.30	7.333	3.46	10.42	1.15
1.250	1.44	4.333	3.46	7.417	3.46	10.50	1.15
1.333	1.44	4.417	3.46	7.500	3.46	10.58	1.15
1.417	1.44	4.500	3.46	7.583	3.46	10.67	1.15
1.500	1.44	4.583	3.46	7.667	3.46	10.75	1.15
1.583	1.44	4.667	3.46	7.750	3.46	10.83	1.15
1.667	1.44	4.750	3.46	7.833	3.46	10.92	1.15
1.750	1.44	4.833	4.61	7.917	3.46	11.00	1.15
1.833	1.44	4.917	4.61	8.000	3.46	11.08	1.15
1.917	1.44	5.000	4.61	8.083	3.46	11.17	1.15
2.000	1.44	5.083	4.61	8.167	3.46	11.25	1.15
2.083	1.44	5.167	4.61	8.250	3.46	11.33	1.15
2.167	1.44	5.250	4.61	8.333	2.02	11.42	1.15
2.250	1.44	5.333	6.91	8.417	2.02	11.50	1.15
2.333	1.73	5.417	6.91	8.500	2.02	11.58	1.15
2.417	1.73	5.500	6.91	8.583	2.02	11.67	1.15
2.500	1.73	5.583	6.91	8.667	2.02	11.75	1.15
2.583	1.73	5.667	6.91	8.750	2.02	11.83	1.15
2.667	1.73	5.750	6.91	8.833	2.02	11.92	1.15
2.750	1.73	5.833	27.65	8.917	2.02	12.00	1.15
2.833	1.73	5.917	27.65	9.000	2.02	12.08	1.15
2.917	1.73	6.000	27.65	9.083	2.02	12.17	1.15
3.000	1.73	6.083	76.03	9.167	2.02	12.25	1.15

```
           3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Max.Eff.Inten.(mm/hr)=      63.94        29.81
                over (min)       20.00        35.00
     Storage Coeff.  (min)=      17.78 (ii)   31.88 (ii)
     Unit Hyd. Tpeak (min)=      20.00        35.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.08         0.278 (iii)
     TIME TO PEAK    (hrs)=       6.42         6.75          6.42
     RUNOFF VOLUME    (mm)=      56.60        15.25         29.72
     TOTAL RAINFALL   (mm)=      57.60        57.60         57.60
     RUNOFF COEFFICIENT   =       0.98         0.26          0.52


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    0.00 | 3.167    1.73 | 6.250   76.03 |  9.33    2.02
           0.167    0.00 | 3.250    1.73 | 6.333   10.37 |  9.42    2.02
           0.250    0.00 | 3.333    2.30 | 6.417   10.37 |  9.50    2.02
           0.333    1.44 | 3.417    2.30 | 6.500   10.37 |  9.58    2.02
           0.417    1.44 | 3.500    2.30 | 6.583   10.37 |  9.67    2.02
           0.500    1.44 | 3.583    2.30 | 6.667   10.37 |  9.75    2.02
           0.583    1.44 | 3.667    2.30 | 6.750   10.37 |  9.83    2.02
           0.667    1.44 | 3.750    2.30 | 6.833    4.61 |  9.92    2.02
           0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
           0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
           0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
           1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
           1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
           1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
           1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
           1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
           1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
           1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
           1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
           1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
           1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
           1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
           1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
           2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
           2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
           2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
           2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
           2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
           2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
           2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
           2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
           2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
           2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
           2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
           2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
           3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
           3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Max.Eff.Inten.(mm/hr)=      76.03        29.81
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.65 (ii)   15.11 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.25         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.08         0.306 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.42          6.25
     RUNOFF VOLUME    (mm)=      56.60        15.25         29.72
     TOTAL RAINFALL   (mm)=      57.60        57.60         57.60
     RUNOFF COEFFICIENT   =       0.98         0.26          0.52

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
```

```
       ID1= 1 (  0033):     0.41   0.020     6.33    17.10
     + ID2= 2 (  0036):     5.32   0.278     6.42    29.72
       ====================================================
       ID = 3 (  0041):     5.73   0.297     6.42    28.81

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0041):     5.73   0.297     6.42    28.81
     + ID2= 2 (  0037):     2.05   0.089     6.33    15.99
       ====================================================
       ID = 1 (  0041):     7.78   0.380     6.42    25.43

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0041):     7.78   0.380     6.42    25.43
     + ID2= 2 (  0040):     3.43   0.306     6.25    29.72
       ====================================================
       ID = 3 (  0041):    11.21   0.608     6.25    26.74

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.73	6.250	76.03	9.33	2.02
0.167	0.00	3.250	1.73	6.333	10.37	9.42	2.02
0.250	0.00	3.333	2.30	6.417	10.37	9.50	2.02
0.333	1.44	3.417	2.30	6.500	10.37	9.58	2.02
0.417	1.44	3.500	2.30	6.583	10.37	9.67	2.02
0.500	1.44	3.583	2.30	6.667	10.37	9.75	2.02
0.583	1.44	3.667	2.30	6.750	10.37	9.83	2.02
0.667	1.44	3.750	2.30	6.833	4.61	9.92	2.02
0.750	1.44	3.833	2.30	6.917	4.61	10.00	2.02
0.833	1.44	3.917	2.30	7.000	4.61	10.08	2.02
0.917	1.44	4.000	2.30	7.083	4.61	10.17	2.02
1.000	1.44	4.083	2.30	7.167	4.61	10.25	2.02
1.083	1.44	4.167	2.30	7.250	4.61	10.33	1.15
1.167	1.44	4.250	2.30	7.333	3.46	10.42	1.15
1.250	1.44	4.333	3.46	7.417	3.46	10.50	1.15
1.333	1.44	4.417	3.46	7.500	3.46	10.58	1.15
1.417	1.44	4.500	3.46	7.583	3.46	10.67	1.15
1.500	1.44	4.583	3.46	7.667	3.46	10.75	1.15
1.583	1.44	4.667	3.46	7.750	3.46	10.83	1.15
1.667	1.44	4.750	3.46	7.833	3.46	10.92	1.15
1.750	1.44	4.833	4.61	7.917	3.46	11.00	1.15
1.833	1.44	4.917	4.61	8.000	3.46	11.08	1.15
1.917	1.44	5.000	4.61	8.083	3.46	11.17	1.15
2.000	1.44	5.083	4.61	8.167	3.46	11.25	1.15
2.083	1.44	5.167	4.61	8.250	3.46	11.33	1.15
2.167	1.44	5.250	4.61	8.333	2.02	11.42	1.15
2.250	1.44	5.333	6.91	8.417	2.02	11.50	1.15
2.333	1.73	5.417	6.91	8.500	2.02	11.58	1.15
2.417	1.73	5.500	6.91	8.583	2.02	11.67	1.15
2.500	1.73	5.583	6.91	8.667	2.02	11.75	1.15
2.583	1.73	5.667	6.91	8.750	2.02	11.83	1.15
2.667	1.73	5.750	6.91	8.833	2.02	11.92	1.15
2.750	1.73	5.833	27.65	8.917	2.02	12.00	1.15
2.833	1.73	5.917	27.65	9.000	2.02	12.08	1.15
2.917	1.73	6.000	27.65	9.083	2.02	12.17	1.15
3.000	1.73	6.083	76.03	9.167	2.02	12.25	1.15
3.083	1.73	6.167	76.03	9.250	2.02		

```
    Unit Hyd Qpeak  (cms)=   0.167

    PEAK FLOW      (cms)=   0.043 (i)
    TIME TO PEAK   (hrs)=   6.333
    RUNOFF VOLUME   (mm)=  17.090
    TOTAL RAINFALL  (mm)=  57.600
    RUNOFF COEFFICIENT  =   0.297

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0039):     0.83   0.043     6.33    17.09
     + ID2= 2 (  0041):    11.21   0.608     6.25    26.74
       ====================================================
       ID = 3 (  0032):    12.04   0.647     6.25    26.08

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

```
***************************************
** SIMULATION:2-100yr 12hr 15min SCS **
***************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.88	6.250	126.72	9.33	3.36
0.167	0.00	3.250	2.88	6.333	17.28	9.42	3.36
0.250	0.00	3.333	3.84	6.417	17.28	9.50	3.36
0.333	2.40	3.417	3.84	6.500	17.28	9.58	3.36
0.417	2.40	3.500	3.84	6.583	17.28	9.67	3.36
0.500	2.40	3.583	3.84	6.667	17.28	9.75	3.36
0.583	2.40	3.667	3.84	6.750	17.28	9.83	3.36
0.667	2.40	3.750	3.84	6.833	7.68	9.92	3.36
0.750	2.40	3.833	3.84	6.917	7.68	10.00	3.36
0.833	2.40	3.917	3.84	7.000	7.68	10.08	3.36
0.917	2.40	4.000	3.84	7.083	7.68	10.17	3.36
1.000	2.40	4.083	3.84	7.167	7.68	10.25	3.36
1.083	2.40	4.167	3.84	7.250	7.68	10.33	1.92
1.167	2.40	4.250	3.84	7.333	5.76	10.42	1.92
1.250	2.40	4.333	5.76	7.417	5.76	10.50	1.92
1.333	2.40	4.417	5.76	7.500	5.76	10.58	1.92
1.417	2.40	4.500	5.76	7.583	5.76	10.67	1.92
1.500	2.40	4.583	5.76	7.667	5.76	10.75	1.92
1.583	2.40	4.667	5.76	7.750	5.76	10.83	1.92
1.667	2.40	4.750	5.76	7.833	5.76	10.92	1.92
1.750	2.40	4.833	7.68	7.917	5.76	11.00	1.92
1.833	2.40	4.917	7.68	8.000	5.76	11.08	1.92
1.917	2.40	5.000	7.68	8.083	5.76	11.17	1.92
2.000	2.40	5.083	7.68	8.167	5.76	11.25	1.92
2.083	2.40	5.167	7.68	8.250	5.76	11.33	1.92
2.167	2.40	5.250	7.68	8.333	3.36	11.42	1.92
2.250	2.40	5.333	11.52	8.417	3.36	11.50	1.92
2.333	2.88	5.417	11.52	8.500	3.36	11.58	1.92
2.417	2.88	5.500	11.52	8.583	3.36	11.67	1.92
2.500	2.88	5.583	11.52	8.667	3.36	11.75	1.92
2.583	2.88	5.667	11.52	8.750	3.36	11.83	1.92
2.667	2.88	5.750	11.52	8.833	3.36	11.92	1.92
2.750	2.88	5.833	46.08	8.917	3.36	12.00	1.92
2.833	2.88	5.917	46.08	9.000	3.36	12.08	1.92
2.917	2.88	6.000	46.08	9.083	3.36	12.17	1.92
3.000	2.88	6.083	126.72	9.167	3.36	12.25	1.92
3.083	2.88	6.167	126.72	9.250	3.36		

```
Unit Hyd Qpeak  (cms)=   0.078

PEAK FLOW       (cms)=   0.053 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  43.252
TOTAL RAINFALL   (mm)=  96.000
RUNOFF COEFFICIENT   =   0.451

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.88	6.250	126.72	9.33	3.36
0.167	0.00	3.250	2.88	6.333	17.28	9.42	3.36
0.250	0.00	3.333	3.84	6.417	17.28	9.50	3.36
0.333	2.40	3.417	3.84	6.500	17.28	9.58	3.36
0.417	2.40	3.500	3.84	6.583	17.28	9.67	3.36
0.500	2.40	3.583	3.84	6.667	17.28	9.75	3.36
0.583	2.40	3.667	3.84	6.750	17.28	9.83	3.36
0.667	2.40	3.750	3.84	6.833	7.68	9.92	3.36
0.750	2.40	3.833	3.84	6.917	7.68	10.00	3.36
0.833	2.40	3.917	3.84	7.000	7.68	10.08	3.36
0.917	2.40	4.000	3.84	7.083	7.68	10.17	3.36
1.000	2.40	4.083	3.84	7.167	7.68	10.25	3.36
1.083	2.40	4.167	3.84	7.250	7.68	10.33	1.92
1.167	2.40	4.250	3.84	7.333	5.76	10.42	1.92
1.250	2.40	4.333	5.76	7.417	5.76	10.50	1.92
1.333	2.40	4.417	5.76	7.500	5.76	10.58	1.92
1.417	2.40	4.500	5.76	7.583	5.76	10.67	1.92
1.500	2.40	4.583	5.76	7.667	5.76	10.75	1.92
1.583	2.40	4.667	5.76	7.750	5.76	10.83	1.92
1.667	2.40	4.750	5.76	7.833	5.76	10.92	1.92
1.750	2.40	4.833	7.68	7.917	5.76	11.00	1.92
1.833	2.40	4.917	7.68	8.000	5.76	11.08	1.92
1.917	2.40	5.000	7.68	8.083	5.76	11.17	1.92
2.000	2.40	5.083	7.68	8.167	5.76	11.25	1.92
2.083	2.40	5.167	7.68	8.250	5.76	11.33	1.92
2.167	2.40	5.250	7.68	8.333	3.36	11.42	1.92
2.250	2.40	5.333	11.52	8.417	3.36	11.50	1.92
2.333	2.88	5.417	11.52	8.500	3.36	11.58	1.92

```
              2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
              2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
              2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
              2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
              2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
              2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
              2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
              3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
              3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.238 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  41.047
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.428

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
              0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
              0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
              0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
              0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
              0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
              0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
              0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
              0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
              0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
              0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
              1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
              1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
```

```
              1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
              1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
              1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
              1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
              1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
              1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
              1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
              1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
              1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
              1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
              2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
              2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
              2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
              2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
              2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
              2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
              2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
              2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
              2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
              2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
              2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
              2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
              3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
              3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Max.Eff.Inten.(mm/hr)=     126.72        79.06
                over (min)      15.00        25.00
     Storage Coeff.  (min)=      13.53 (ii)   23.07 (ii)
     Unit Hyd. Tpeak (min)=      15.00        25.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.44         0.25          0.631 (iii)
     TIME TO PEAK    (hrs)=       6.33         6.50           6.42
     RUNOFF VOLUME    (mm)=      95.00        37.26          57.47
     TOTAL RAINFALL   (mm)=      96.00        96.00          96.00
     RUNOFF COEFFICIENT   =       0.99         0.39           0.60


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
```

```
Dep. Storage     (mm)=       1.00         5.00
Average Slope     (%)=       1.00         2.00
Length            (m)=     151.22        40.00
Mannings n          =      0.013        0.250

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


                          ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
           0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
           0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
           0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
           0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
           0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
           0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
           0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
           0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
           0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
           0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
           1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
           1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
           1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
           1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
           1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
           1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
           1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
           1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
           1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
           1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
           1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
           1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
           2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
           2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
           2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
           2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
           2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
           2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
           2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
           2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
           2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
           2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
           2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
           2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
           3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
           3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

Max.Eff.Inten.(mm/hr)=     126.72        79.06
           over (min)        5.00        15.00
Storage Coeff.  (min)=       2.98 (ii)   10.73 (ii)
```

```
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.09
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.42         0.24           0.634 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33            6.25
     RUNOFF VOLUME    (mm)=      95.00        37.26           57.47
     TOTAL RAINFALL   (mm)=      96.00        96.00           96.00
     RUNOFF COEFFICIENT   =       0.99         0.39            0.60

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.053     6.33    43.25
      + ID2= 2 (  0036):     5.32   0.631     6.42    57.47
        ==================================================
        ID = 3 (  0041):     5.73   0.679     6.33    56.45

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


--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.679     6.33    56.45
      + ID2= 2 (  0037):     2.05   0.238     6.33    41.05
        ==================================================
        ID = 1 (  0041):     7.78   0.917     6.33    52.39

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


--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.917     6.33    52.39
      + ID2= 2 (  0040):     3.43   0.634     6.25    57.47
        ==================================================
        ID = 3 (  0041):    11.21   1.442     6.25    53.94
```

```
     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                                 ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
               0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
               0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
               0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
               0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
               0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
               0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
               0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
               0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
               0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
               0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
               1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
               1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
               1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
               1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
               1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
               1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
               1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
               1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
               1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
               1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
               1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
               1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
               2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
               2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
               2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
               2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
               2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
               2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
               2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
               2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
               2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
               2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
               2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
               2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
               3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
               3.083    2.88 | 6.167  126.72 | 9.250    3.36 |
```

```
     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.110 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  43.235
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.450

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):      0.83   0.110     6.33    43.23
      + ID2= 2 (  0041):     11.21   1.442     6.25    53.94
        ====================================================
        ID = 3 (  0032):     12.04   1.547     6.25    53.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
**************************************
** SIMULATION:2-10yr 12hr 15min SCS **
**************************************
--------------------
| CALIB             |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                 ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
               0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
               0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
               0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
               0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
               0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
               0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
               0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
               0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
               0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
               0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
               1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
               1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
               1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
```

```
            1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
            1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
            1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
            1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
            1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
            1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
            1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
            1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
            1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
            2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
            2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
            2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
            2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
            2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
            2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
            2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
            2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
            2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
            2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
            2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
            2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
            3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
            3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

    Unit Hyd Qpeak  (cms)=   0.078

    PEAK FLOW       (cms)=   0.027 (i)
    TIME TO PEAK    (hrs)=   6.333
    RUNOFF VOLUME    (mm)=  22.250
    TOTAL RAINFALL   (mm)=  66.000
    RUNOFF COEFFICIENT   =   0.337

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                           ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
            0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
            0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
            0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
            0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
```

```
            0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
            0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
            0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
            0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
            0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
            0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
            1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
            1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
            1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
            1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
            1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
            1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
            1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
            1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
            1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
            1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
            1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
            1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
            2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
            2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
            2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
            2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
            2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
            2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
            2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
            2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
            2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
            2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
            2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
            2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
            3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
            3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

    Unit Hyd Qpeak  (cms)=   0.356

    PEAK FLOW       (cms)=   0.118 (i)
    TIME TO PEAK    (hrs)=   6.333
    RUNOFF VOLUME    (mm)=  20.887
    TOTAL RAINFALL   (mm)=  66.000
    RUNOFF COEFFICIENT   =   0.316

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66         2.66
    Dep. Storage     (mm)=       1.00         5.00
```

Average Slope	(%)=	1.00	1.00
Length	(m)=	188.33	40.00
Mannings n	=	0.130	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.98	6.250	87.12	9.33	2.31
0.167	0.00	3.250	1.98	6.333	11.88	9.42	2.31
0.250	0.00	3.333	2.64	6.417	11.88	9.50	2.31
0.333	1.65	3.417	2.64	6.500	11.88	9.58	2.31
0.417	1.65	3.500	2.64	6.583	11.88	9.67	2.31
0.500	1.65	3.583	2.64	6.667	11.88	9.75	2.31
0.583	1.65	3.667	2.64	6.750	11.88	9.83	2.31
0.667	1.65	3.750	2.64	6.833	5.28	9.92	2.31
0.750	1.65	3.833	2.64	6.917	5.28	10.00	2.31
0.833	1.65	3.917	2.64	7.000	5.28	10.08	2.31
0.917	1.65	4.000	2.64	7.083	5.28	10.17	2.31
1.000	1.65	4.083	2.64	7.167	5.28	10.25	2.31
1.083	1.65	4.167	2.64	7.250	5.28	10.33	1.32
1.167	1.65	4.250	2.64	7.333	3.96	10.42	1.32
1.250	1.65	4.333	3.96	7.417	3.96	10.50	1.32
1.333	1.65	4.417	3.96	7.500	3.96	10.58	1.32
1.417	1.65	4.500	3.96	7.583	3.96	10.67	1.32
1.500	1.65	4.583	3.96	7.667	3.96	10.75	1.32
1.583	1.65	4.667	3.96	7.750	3.96	10.83	1.32
1.667	1.65	4.750	3.96	7.833	3.96	10.92	1.32
1.750	1.65	4.833	5.28	7.917	3.96	11.00	1.32
1.833	1.65	4.917	5.28	8.000	3.96	11.08	1.32
1.917	1.65	5.000	5.28	8.083	3.96	11.17	1.32
2.000	1.65	5.083	5.28	8.167	3.96	11.25	1.32
2.083	1.65	5.167	5.28	8.250	3.96	11.33	1.32
2.167	1.65	5.250	5.28	8.333	2.31	11.42	1.32
2.250	1.65	5.333	7.92	8.417	2.31	11.50	1.32
2.333	1.98	5.417	7.92	8.500	2.31	11.58	1.32
2.417	1.98	5.500	7.92	8.583	2.31	11.67	1.32
2.500	1.98	5.583	7.92	8.667	2.31	11.75	1.32
2.583	1.98	5.667	7.92	8.750	2.31	11.83	1.32
2.667	1.98	5.750	7.92	8.833	2.31	11.92	1.32
2.750	1.98	5.833	31.68	8.917	2.31	12.00	1.32
2.833	1.98	5.917	31.68	9.000	2.31	12.08	1.32
2.917	1.98	6.000	31.68	9.083	2.31	12.17	1.32
3.000	1.98	6.083	87.12	9.167	2.31	12.25	1.32
3.083	1.98	6.167	87.12	9.250	2.31		

Max.Eff.Inten.(mm/hr)=	87.12	38.29	
over (min)	15.00	30.00	
Storage Coeff. (min)=	15.71 (ii)	28.47 (ii)	
Unit Hyd. Tpeak (min)=	15.00	30.00	
Unit Hyd. peak (cms)=	0.07	0.04	
			TOTALS
PEAK FLOW (cms)=	0.28	0.11	0.355 (iii)
TIME TO PEAK (hrs)=	6.33	6.58	6.33
RUNOFF VOLUME (mm)=	65.00	19.52	35.43
TOTAL RAINFALL (mm)=	66.00	66.00	66.00
RUNOFF COEFFICIENT =	0.98	0.30	0.54

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD ( 0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.71	1.71
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	151.22	40.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.98	6.250	87.12	9.33	2.31
0.167	0.00	3.250	1.98	6.333	11.88	9.42	2.31
0.250	0.00	3.333	2.64	6.417	11.88	9.50	2.31
0.333	1.65	3.417	2.64	6.500	11.88	9.58	2.31
0.417	1.65	3.500	2.64	6.583	11.88	9.67	2.31
0.500	1.65	3.583	2.64	6.667	11.88	9.75	2.31
0.583	1.65	3.667	2.64	6.750	11.88	9.83	2.31
0.667	1.65	3.750	2.64	6.833	5.28	9.92	2.31
0.750	1.65	3.833	2.64	6.917	5.28	10.00	2.31
0.833	1.65	3.917	2.64	7.000	5.28	10.08	2.31
0.917	1.65	4.000	2.64	7.083	5.28	10.17	2.31
1.000	1.65	4.083	2.64	7.167	5.28	10.25	2.31
1.083	1.65	4.167	2.64	7.250	5.28	10.33	1.32
1.167	1.65	4.250	2.64	7.333	3.96	10.42	1.32
1.250	1.65	4.333	3.96	7.417	3.96	10.50	1.32
1.333	1.65	4.417	3.96	7.500	3.96	10.58	1.32
1.417	1.65	4.500	3.96	7.583	3.96	10.67	1.32
1.500	1.65	4.583	3.96	7.667	3.96	10.75	1.32

```
             1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
             1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
             1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
             1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
             1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
             2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
             2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
             2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
             2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
             2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
             2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
             2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
             2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
             2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
             2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
             2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
             2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
             3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
             3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

     Max.Eff.Inten.(mm/hr)=      87.12        38.29
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.46 (ii)   13.82 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.26         0.08
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.29         0.11          0.384 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33           6.25
     RUNOFF VOLUME    (mm)=      65.00        19.52          35.43
     TOTAL RAINFALL   (mm)=      66.00        66.00          66.00
     RUNOFF COEFFICIENT   =       0.98         0.30           0.54

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.027     6.33    22.25
      + ID2= 2 (  0036):     5.32   0.355     6.33    35.43
        ===================================================
        ID = 3 (  0041):     5.73   0.382     6.33    34.49

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

```
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.382     6.33    34.49
      + ID2= 2 (  0037):     2.05   0.118     6.33    20.89
        ===================================================
        ID = 1 (  0041):     7.78   0.500     6.33    30.91

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.500     6.33    30.91
      + ID2= 2 (  0040):     3.43   0.384     6.25    35.43
        ===================================================
        ID = 3 (  0041):    11.21   0.823     6.25    32.29

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
                0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
                0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
                0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
                0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
                0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
                0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
                0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
                0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
                0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
                0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
                1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
                1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
                1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
                1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
```

1.333	1.65	4.417	3.96	7.500	3.96	10.58	1.32
1.417	1.65	4.500	3.96	7.583	3.96	10.67	1.32
1.500	1.65	4.583	3.96	7.667	3.96	10.75	1.32
1.583	1.65	4.667	3.96	7.750	3.96	10.83	1.32
1.667	1.65	4.750	3.96	7.833	3.96	10.92	1.32
1.750	1.65	4.833	5.28	7.917	3.96	11.00	1.32
1.833	1.65	4.917	5.28	8.000	3.96	11.08	1.32
1.917	1.65	5.000	5.28	8.083	3.96	11.17	1.32
2.000	1.65	5.083	5.28	8.167	3.96	11.25	1.32
2.083	1.65	5.167	5.28	8.250	3.96	11.33	1.32
2.167	1.65	5.250	5.28	8.333	2.31	11.42	1.32
2.250	1.65	5.333	7.92	8.417	2.31	11.50	1.32
2.333	1.98	5.417	7.92	8.500	2.31	11.58	1.32
2.417	1.98	5.500	7.92	8.583	2.31	11.67	1.32
2.500	1.98	5.583	7.92	8.667	2.31	11.75	1.32
2.583	1.98	5.667	7.92	8.750	2.31	11.83	1.32
2.667	1.98	5.750	7.92	8.833	2.31	11.92	1.32
2.750	1.98	5.833	31.68	8.917	2.31	12.00	1.32
2.833	1.98	5.917	31.68	9.000	2.31	12.08	1.32
2.917	1.98	6.000	31.68	9.083	2.31	12.17	1.32
3.000	1.98	6.083	87.12	9.167	2.31	12.25	1.32
3.083	1.98	6.167	87.12	9.250	2.31		

```
Unit Hyd Qpeak  (cms)=   0.167

PEAK FLOW       (cms)=   0.056 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  22.242
TOTAL RAINFALL   (mm)=  66.000
RUNOFF COEFFICIENT   =   0.337

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

```
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.056     6.33    22.24
      + ID2= 2 (  0041):    11.21   0.823     6.25    32.29
        ====================================================
        ID = 3 (  0032):    12.04   0.875     6.25    31.60

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
***********************************************
** SIMULATION:3-100yr 24hr 15min SCS Type II **
***********************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.09	12.250	127.21	18.33	2.08
0.167	0.00	6.250	2.09	12.333	20.17	18.42	2.08
0.250	0.00	6.333	2.15	12.417	20.15	18.50	2.08
0.333	1.19	6.417	2.15	12.500	20.15	18.58	2.01
0.417	1.19	6.500	2.15	12.583	13.72	18.67	2.01
0.500	1.19	6.583	2.20	12.667	13.72	18.75	2.01
0.583	1.22	6.667	2.20	12.750	13.72	18.83	1.93
0.667	1.22	6.750	2.20	12.833	9.44	18.92	1.93
0.750	1.22	6.833	2.26	12.917	9.44	19.00	1.93
0.833	1.25	6.917	2.26	13.000	9.44	19.08	1.86
0.917	1.25	7.000	2.26	13.083	7.97	19.17	1.86
1.000	1.25	7.083	2.32	13.167	7.97	19.25	1.86
1.083	1.28	7.167	2.32	13.250	7.97	19.33	1.79
1.167	1.28	7.250	2.32	13.333	6.75	19.42	1.79
1.250	1.28	7.333	2.38	13.417	6.75	19.50	1.79
1.333	1.31	7.417	2.38	13.500	6.75	19.58	1.71
1.417	1.31	7.500	2.38	13.583	5.96	19.67	1.71
1.500	1.31	7.583	2.44	13.667	5.96	19.75	1.71
1.583	1.34	7.667	2.44	13.750	5.96	19.83	1.64
1.667	1.34	7.750	2.44	13.833	5.22	19.92	1.64
1.750	1.34	7.833	2.50	13.917	5.22	20.00	1.64
1.833	1.37	7.917	2.50	14.000	5.22	20.08	1.57
1.917	1.37	8.000	2.50	14.083	4.66	20.17	1.57
2.000	1.37	8.083	2.56	14.167	4.66	20.25	1.57
2.083	1.39	8.167	2.56	14.250	4.66	20.33	1.52
2.167	1.39	8.250	2.56	14.333	4.25	20.42	1.52
2.250	1.39	8.333	2.74	14.417	4.25	20.50	1.52
2.333	1.43	8.417	2.74	14.500	4.25	20.58	1.51
2.417	1.43	8.500	2.74	14.583	4.05	20.67	1.51
2.500	1.43	8.583	3.02	14.667	4.05	20.75	1.51
2.583	1.46	8.667	3.02	14.750	4.05	20.83	1.49
2.667	1.46	8.750	3.02	14.833	3.83	20.92	1.49
2.750	1.46	8.833	3.33	14.917	3.83	21.00	1.49
2.833	1.48	8.917	3.33	15.000	3.83	21.08	1.48
2.917	1.48	9.000	3.33	15.083	3.63	21.17	1.48
3.000	1.48	9.083	3.61	15.167	3.63	21.25	1.48
3.083	1.51	9.167	3.61	15.250	3.63	21.33	1.46
3.167	1.51	9.250	3.61	15.333	3.42	21.42	1.46
3.250	1.51	9.333	3.76	15.417	3.42	21.50	1.46
3.333	1.55	9.417	3.76	15.500	3.42	21.58	1.45
3.417	1.55	9.500	3.76	15.583	3.22	21.67	1.45
3.500	1.55	9.583	3.76	15.667	3.22	21.75	1.45
3.583	1.57	9.667	3.76	15.750	3.22	21.83	1.43

3.667	1.57	9.750	3.76	15.833	3.01	21.92	1.43
3.750	1.57	9.833	4.01	15.917	3.01	22.00	1.43
3.833	1.60	9.917	4.01	16.000	3.01	22.08	1.42
3.917	1.60	10.000	4.01	16.083	2.81	22.17	1.42
4.000	1.60	10.083	4.46	16.167	2.81	22.25	1.42
4.083	1.63	10.167	4.46	16.250	2.81	22.33	1.40
4.167	1.63	10.250	4.46	16.333	2.67	22.42	1.40
4.250	1.63	10.333	5.07	16.417	2.67	22.50	1.40
4.333	1.68	10.417	5.07	16.500	2.67	22.58	1.39
4.417	1.68	10.500	5.07	16.583	2.60	22.67	1.39
4.500	1.68	10.583	5.75	16.667	2.60	22.75	1.39
4.583	1.73	10.667	5.75	16.750	2.60	22.83	1.37
4.667	1.73	10.750	5.75	16.833	2.52	22.92	1.37
4.750	1.73	10.833	6.73	16.917	2.52	23.00	1.37
4.833	1.79	10.917	6.73	17.000	2.52	23.08	1.36
4.917	1.79	11.000	6.73	17.083	2.45	23.17	1.36
5.000	1.79	11.083	7.86	17.167	2.45	23.25	1.36
5.083	1.85	11.167	7.86	17.250	2.45	23.33	1.35
5.167	1.85	11.250	7.86	17.333	2.37	23.42	1.35
5.250	1.85	11.333	9.93	17.417	2.37	23.50	1.35
5.333	1.91	11.417	9.93	17.500	2.37	23.58	1.33
5.417	1.91	11.500	9.93	17.583	2.30	23.67	1.33
5.500	1.91	11.583	12.64	17.667	2.30	23.75	1.33
5.583	1.97	11.667	12.64	17.750	2.30	23.83	1.31
5.667	1.97	11.750	12.64	17.833	2.23	23.92	1.31
5.750	1.97	11.833	51.54	17.917	2.22	24.00	1.31
5.833	2.03	11.917	51.54	18.000	2.22	24.08	1.30
5.917	2.03	12.000	51.54	18.083	2.15	24.17	1.30
6.000	2.03	12.083	127.20	18.167	2.15	24.25	1.30
6.083	2.09	12.167	127.21	18.250	2.15		

Unit Hyd Qpeak (cms)= 0.078

PEAK FLOW (cms)= 0.062 (i)
TIME TO PEAK (hrs)= 12.333
RUNOFF VOLUME (mm)= 60.101
TOTAL RAINFALL (mm)= 117.600
RUNOFF COEFFICIENT = 0.511

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

```
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.09	12.250	127.21	18.33	2.08
0.167	0.00	6.250	2.09	12.333	20.17	18.42	2.08
0.250	0.00	6.333	2.15	12.417	20.15	18.50	2.08
0.333	1.19	6.417	2.15	12.500	20.15	18.58	2.01
0.417	1.19	6.500	2.15	12.583	13.72	18.67	2.01
0.500	1.19	6.583	2.20	12.667	13.72	18.75	2.01
0.583	1.22	6.667	2.20	12.750	13.72	18.83	1.93
0.667	1.22	6.750	2.20	12.833	9.44	18.92	1.93
0.750	1.22	6.833	2.26	12.917	9.44	19.00	1.93
0.833	1.25	6.917	2.26	13.000	9.44	19.08	1.86
0.917	1.25	7.000	2.26	13.083	7.97	19.17	1.86
1.000	1.25	7.083	2.32	13.167	7.97	19.25	1.86
1.083	1.28	7.167	2.32	13.250	7.97	19.33	1.79
1.167	1.28	7.250	2.32	13.333	6.75	19.42	1.79
1.250	1.28	7.333	2.38	13.417	6.75	19.50	1.79
1.333	1.31	7.417	2.38	13.500	6.75	19.58	1.71
1.417	1.31	7.500	2.38	13.583	5.96	19.67	1.71
1.500	1.31	7.583	2.44	13.667	5.96	19.75	1.71
1.583	1.34	7.667	2.44	13.750	5.96	19.83	1.64
1.667	1.34	7.750	2.44	13.833	5.22	19.92	1.64
1.750	1.34	7.833	2.50	13.917	5.22	20.00	1.64
1.833	1.37	7.917	2.50	14.000	5.22	20.08	1.57
1.917	1.37	8.000	2.50	14.083	4.66	20.17	1.57
2.000	1.37	8.083	2.56	14.167	4.66	20.25	1.57
2.083	1.39	8.167	2.56	14.250	4.66	20.33	1.52
2.167	1.39	8.250	2.56	14.333	4.25	20.42	1.52
2.250	1.39	8.333	2.74	14.417	4.25	20.50	1.52
2.333	1.43	8.417	2.74	14.500	4.25	20.58	1.51
2.417	1.43	8.500	2.74	14.583	4.05	20.67	1.51
2.500	1.43	8.583	3.02	14.667	4.05	20.75	1.51
2.583	1.46	8.667	3.02	14.750	4.05	20.83	1.49
2.667	1.46	8.750	3.02	14.833	3.83	20.92	1.49
2.750	1.46	8.833	3.33	14.917	3.83	21.00	1.49
2.833	1.48	8.917	3.33	15.000	3.83	21.08	1.48
2.917	1.48	9.000	3.33	15.083	3.63	21.17	1.48
3.000	1.48	9.083	3.61	15.167	3.63	21.25	1.48
3.083	1.51	9.167	3.61	15.250	3.63	21.33	1.46
3.167	1.51	9.250	3.61	15.333	3.42	21.42	1.46
3.250	1.51	9.333	3.76	15.417	3.42	21.50	1.46
3.333	1.55	9.417	3.76	15.500	3.42	21.58	1.45
3.417	1.55	9.500	3.76	15.583	3.22	21.67	1.45
3.500	1.55	9.583	3.76	15.667	3.22	21.75	1.45
3.583	1.57	9.667	3.76	15.750	3.22	21.83	1.43
3.667	1.57	9.750	3.76	15.833	3.01	21.92	1.43
3.750	1.57	9.833	4.01	15.917	3.01	22.00	1.43
3.833	1.60	9.917	4.01	16.000	3.01	22.08	1.42
3.917	1.60	10.000	4.01	16.083	2.81	22.17	1.42
4.000	1.60	10.083	4.46	16.167	2.81	22.25	1.42
4.083	1.63	10.167	4.46	16.250	2.81	22.33	1.40
4.167	1.63	10.250	4.46	16.333	2.67	22.42	1.40

4.250	1.63	10.333	5.07	16.417	2.67	22.50	1.40
4.333	1.68	10.417	5.07	16.500	2.67	22.58	1.39
4.417	1.68	10.500	5.07	16.583	2.60	22.67	1.39
4.500	1.68	10.583	5.75	16.667	2.60	22.75	1.39
4.583	1.73	10.667	5.75	16.750	2.60	22.83	1.37
4.667	1.73	10.750	5.75	16.833	2.52	22.92	1.37
4.750	1.73	10.833	6.73	16.917	2.52	23.00	1.37
4.833	1.79	10.917	6.73	17.000	2.52	23.08	1.36
4.917	1.79	11.000	6.73	17.083	2.45	23.17	1.36
5.000	1.79	11.083	7.86	17.167	2.45	23.25	1.36
5.083	1.85	11.167	7.86	17.250	2.45	23.33	1.35
5.167	1.85	11.250	7.86	17.333	2.37	23.42	1.35
5.250	1.85	11.333	9.93	17.417	2.37	23.50	1.35
5.333	1.91	11.417	9.93	17.500	2.37	23.58	1.33
5.417	1.91	11.500	9.93	17.583	2.30	23.67	1.33
5.500	1.91	11.583	12.64	17.667	2.30	23.75	1.33
5.583	1.97	11.667	12.64	17.750	2.30	23.83	1.31
5.667	1.97	11.750	12.64	17.833	2.23	23.92	1.31
5.750	1.97	11.833	51.54	17.917	2.22	24.00	1.31
5.833	2.03	11.917	51.54	18.000	2.22	24.08	1.30
5.917	2.03	12.000	51.54	18.083	2.15	24.17	1.30
6.000	2.03	12.083	127.20	18.167	2.15	24.25	1.30
6.083	2.09	12.167	127.21	18.250	2.15		

Unit Hyd Qpeak (cms)= 0.356

PEAK FLOW (cms)= 0.280 (i)
TIME TO PEAK (hrs)= 12.333
RUNOFF VOLUME (mm)= 57.370
TOTAL RAINFALL (mm)= 117.600
RUNOFF COEFFICIENT = 0.488

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.66	2.66
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	1.00
Length	(m)=	188.33	40.00
Mannings n	=	0.130	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	2.09	12.250	127.21	18.33	2.08
0.167	0.00	6.250	2.09	12.333	20.17	18.42	2.08
0.250	0.00	6.333	2.15	12.417	20.15	18.50	2.08
0.333	1.19	6.417	2.15	12.500	20.15	18.58	2.01
0.417	1.19	6.500	2.15	12.583	13.72	18.67	2.01
0.500	1.19	6.583	2.20	12.667	13.72	18.75	2.01
0.583	1.22	6.667	2.20	12.750	13.72	18.83	1.93
0.667	1.22	6.750	2.20	12.833	9.44	18.92	1.93
0.750	1.22	6.833	2.26	12.917	9.44	19.00	1.93
0.833	1.25	6.917	2.26	13.000	9.44	19.08	1.86
0.917	1.25	7.000	2.26	13.083	7.97	19.17	1.86
1.000	1.25	7.083	2.32	13.167	7.97	19.25	1.86
1.083	1.28	7.167	2.32	13.250	7.97	19.33	1.79
1.167	1.28	7.250	2.32	13.333	6.75	19.42	1.79
1.250	1.28	7.333	2.38	13.417	6.75	19.50	1.79
1.333	1.31	7.417	2.38	13.500	6.75	19.58	1.71
1.417	1.31	7.500	2.38	13.583	5.96	19.67	1.71
1.500	1.31	7.583	2.44	13.667	5.96	19.75	1.71
1.583	1.34	7.667	2.44	13.750	5.96	19.83	1.64
1.667	1.34	7.750	2.44	13.833	5.22	19.92	1.64
1.750	1.34	7.833	2.50	13.917	5.22	20.00	1.64
1.833	1.37	7.917	2.50	14.000	5.22	20.08	1.57
1.917	1.37	8.000	2.50	14.083	4.66	20.17	1.57
2.000	1.37	8.083	2.56	14.167	4.66	20.25	1.57
2.083	1.39	8.167	2.56	14.250	4.66	20.33	1.52
2.167	1.39	8.250	2.56	14.333	4.25	20.42	1.52
2.250	1.39	8.333	2.74	14.417	4.25	20.50	1.52
2.333	1.43	8.417	2.74	14.500	4.25	20.58	1.51
2.417	1.43	8.500	2.74	14.583	4.05	20.67	1.51
2.500	1.43	8.583	3.02	14.667	4.05	20.75	1.51
2.583	1.46	8.667	3.02	14.750	4.05	20.83	1.49
2.667	1.46	8.750	3.02	14.833	3.83	20.92	1.49
2.750	1.46	8.833	3.33	14.917	3.83	21.00	1.49
2.833	1.48	8.917	3.33	15.000	3.83	21.08	1.48
2.917	1.48	9.000	3.33	15.083	3.63	21.17	1.48
3.000	1.48	9.083	3.61	15.167	3.63	21.25	1.48
3.083	1.51	9.167	3.61	15.250	3.63	21.33	1.46
3.167	1.51	9.250	3.61	15.333	3.42	21.42	1.46
3.250	1.51	9.333	3.76	15.417	3.42	21.50	1.46
3.333	1.55	9.417	3.76	15.500	3.42	21.58	1.45
3.417	1.55	9.500	3.76	15.583	3.22	21.67	1.45
3.500	1.55	9.583	3.76	15.667	3.22	21.75	1.45
3.583	1.57	9.667	3.76	15.750	3.22	21.83	1.43
3.667	1.57	9.750	3.76	15.833	3.01	21.92	1.43
3.750	1.57	9.833	4.01	15.917	3.01	22.00	1.43
3.833	1.60	9.917	4.01	16.000	3.01	22.08	1.42
3.917	1.60	10.000	4.01	16.083	2.81	22.17	1.42
4.000	1.60	10.083	4.46	16.167	2.81	22.25	1.42
4.083	1.63	10.167	4.46	16.250	2.81	22.33	1.40
4.167	1.63	10.250	4.46	16.333	2.67	22.42	1.40
4.250	1.63	10.333	5.07	16.417	2.67	22.50	1.40

4.333	1.68	10.417	5.07	16.500	2.67	22.58	1.39
4.417	1.68	10.500	5.07	16.583	2.60	22.67	1.39
4.500	1.68	10.583	5.75	16.667	2.60	22.75	1.39
4.583	1.73	10.667	5.75	16.750	2.60	22.83	1.37
4.667	1.73	10.750	5.75	16.833	2.52	22.92	1.37
4.750	1.73	10.833	6.73	16.917	2.52	23.00	1.37
4.833	1.79	10.917	6.73	17.000	2.52	23.08	1.36
4.917	1.79	11.000	6.73	17.083	2.45	23.17	1.36
5.000	1.79	11.083	7.86	17.167	2.45	23.25	1.36
5.083	1.85	11.167	7.86	17.250	2.45	23.33	1.35
5.167	1.85	11.250	7.86	17.333	2.37	23.42	1.35
5.250	1.85	11.333	9.93	17.417	2.37	23.50	1.35
5.333	1.91	11.417	9.93	17.500	2.37	23.58	1.33
5.417	1.91	11.500	9.93	17.583	2.30	23.67	1.33
5.500	1.91	11.583	12.64	17.667	2.30	23.75	1.33
5.583	1.97	11.667	12.64	17.750	2.30	23.83	1.31
5.667	1.97	11.750	12.64	17.833	2.23	23.92	1.31
5.750	1.97	11.833	51.54	17.917	2.22	24.00	1.31
5.833	2.03	11.917	51.54	18.000	2.22	24.08	1.30
5.917	2.03	12.000	51.54	18.083	2.15	24.17	1.30
6.000	2.03	12.083	127.20	18.167	2.15	24.25	1.30
6.083	2.09	12.167	127.21	18.250	2.15		

```
    Max.Eff.Inten.(mm/hr)=     127.20        88.40
              over (min)       15.00        25.00
    Storage Coeff.  (min)=      13.50 (ii)   22.63 (ii)
    Unit Hyd. Tpeak (min)=      15.00        25.00
    Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.45         0.30          0.689 (iii)
    TIME TO PEAK    (hrs)=      12.33        12.50          12.42
    RUNOFF VOLUME    (mm)=     116.60        51.86          74.51
    TOTAL RAINFALL   (mm)=     117.60       117.60         117.60
    RUNOFF COEFFICIENT   =       0.99         0.44           0.63


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	2.09	12.250	127.21	18.33	2.08
0.167	0.00	6.250	2.09	12.333	20.17	18.42	2.08
0.250	0.00	6.333	2.15	12.417	20.15	18.50	2.08
0.333	1.19	6.417	2.15	12.500	20.15	18.58	2.01
0.417	1.19	6.500	2.15	12.583	13.72	18.67	2.01
0.500	1.19	6.583	2.20	12.667	13.72	18.75	2.01
0.583	1.22	6.667	2.20	12.750	13.72	18.83	1.93
0.667	1.22	6.750	2.20	12.833	9.44	18.92	1.93
0.750	1.22	6.833	2.26	12.917	9.44	19.00	1.93
0.833	1.25	6.917	2.26	13.000	9.44	19.08	1.86
0.917	1.25	7.000	2.26	13.083	7.97	19.17	1.86
1.000	1.25	7.083	2.32	13.167	7.97	19.25	1.86
1.083	1.28	7.167	2.32	13.250	7.97	19.33	1.79
1.167	1.28	7.250	2.32	13.333	6.75	19.42	1.79
1.250	1.28	7.333	2.38	13.417	6.75	19.50	1.79
1.333	1.31	7.417	2.38	13.500	6.75	19.58	1.71
1.417	1.31	7.500	2.38	13.583	5.96	19.67	1.71
1.500	1.31	7.583	2.44	13.667	5.96	19.75	1.71
1.583	1.34	7.667	2.44	13.750	5.96	19.83	1.64
1.667	1.34	7.750	2.44	13.833	5.22	19.92	1.64
1.750	1.34	7.833	2.50	13.917	5.22	20.00	1.64
1.833	1.37	7.917	2.50	14.000	5.22	20.08	1.57
1.917	1.37	8.000	2.50	14.083	4.66	20.17	1.57
2.000	1.37	8.083	2.56	14.167	4.66	20.25	1.57
2.083	1.39	8.167	2.56	14.250	4.66	20.33	1.52
2.167	1.39	8.250	2.56	14.333	4.25	20.42	1.52
2.250	1.39	8.333	2.74	14.417	4.25	20.50	1.52
2.333	1.43	8.417	2.74	14.500	4.25	20.58	1.51
2.417	1.43	8.500	2.74	14.583	4.05	20.67	1.51
2.500	1.43	8.583	3.02	14.667	4.05	20.75	1.51
2.583	1.46	8.667	3.02	14.750	4.05	20.83	1.49
2.667	1.46	8.750	3.02	14.833	3.83	20.92	1.49
2.750	1.46	8.833	3.33	14.917	3.83	21.00	1.49
2.833	1.48	8.917	3.33	15.000	3.83	21.08	1.48
2.917	1.48	9.000	3.33	15.083	3.63	21.17	1.48
3.000	1.48	9.083	3.61	15.167	3.63	21.25	1.48
3.083	1.51	9.167	3.61	15.250	3.63	21.33	1.46
3.167	1.51	9.250	3.61	15.333	3.42	21.42	1.46
3.250	1.51	9.333	3.76	15.417	3.42	21.50	1.46
3.333	1.55	9.417	3.76	15.500	3.42	21.58	1.45
3.417	1.55	9.500	3.76	15.583	3.22	21.67	1.45
3.500	1.55	9.583	3.76	15.667	3.22	21.75	1.45
3.583	1.57	9.667	3.76	15.750	3.22	21.83	1.43

```
                3.667    1.57 | 9.750    3.76 |15.833    3.01 | 21.92    1.43
                3.750    1.57 | 9.833    4.01 |15.917    3.01 | 22.00    1.43
                3.833    1.60 | 9.917    4.01 |16.000    3.01 | 22.08    1.42
                3.917    1.60 |10.000    4.01 |16.083    2.81 | 22.17    1.42
                4.000    1.60 |10.083    4.46 |16.167    2.81 | 22.25    1.42
                4.083    1.63 |10.167    4.46 |16.250    2.81 | 22.33    1.40
                4.167    1.63 |10.250    4.46 |16.333    2.67 | 22.42    1.40
                4.250    1.63 |10.333    5.07 |16.417    2.67 | 22.50    1.40
                4.333    1.68 |10.417    5.07 |16.500    2.67 | 22.58    1.39
                4.417    1.68 |10.500    5.07 |16.583    2.60 | 22.67    1.39
                4.500    1.68 |10.583    5.75 |16.667    2.60 | 22.75    1.39
                4.583    1.73 |10.667    5.75 |16.750    2.60 | 22.83    1.37
                4.667    1.73 |10.750    5.75 |16.833    2.52 | 22.92    1.37
                4.750    1.73 |10.833    6.73 |16.917    2.52 | 23.00    1.37
                4.833    1.79 |10.917    6.73 |17.000    2.52 | 23.08    1.36
                4.917    1.79 |11.000    6.73 |17.083    2.45 | 23.17    1.36
                5.000    1.79 |11.083    7.86 |17.167    2.45 | 23.25    1.36
                5.083    1.85 |11.167    7.86 |17.250    2.45 | 23.33    1.35
                5.167    1.85 |11.250    7.86 |17.333    2.37 | 23.42    1.35
                5.250    1.85 |11.333    9.93 |17.417    2.37 | 23.50    1.35
                5.333    1.91 |11.417    9.93 |17.500    2.37 | 23.58    1.33
                5.417    1.91 |11.500    9.93 |17.583    2.30 | 23.67    1.33
                5.500    1.91 |11.583   12.64 |17.667    2.30 | 23.75    1.33
                5.583    1.97 |11.667   12.64 |17.750    2.30 | 23.83    1.31
                5.667    1.97 |11.750   12.64 |17.833    2.23 | 23.92    1.31
                5.750    1.97 |11.833   51.54 |17.917    2.22 | 24.00    1.31
                5.833    2.03 |11.917   51.54 |18.000    2.22 | 24.08    1.30
                5.917    2.03 |12.000   51.54 |18.083    2.15 | 24.17    1.30
                6.000    2.03 |12.083  127.20 |18.167    2.15 | 24.25    1.30
                6.083    2.09 |12.167  127.21 |18.250    2.15 |

     Max.Eff.Inten.(mm/hr)=     127.21        88.40
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.97 (ii)   10.39 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.09
                                                              *TOTALS*
     PEAK FLOW       (cms)=       0.42         0.29             0.680 (iii)
     TIME TO PEAK    (hrs)=      12.25        12.33            12.25
     RUNOFF VOLUME    (mm)=     116.60        51.86            74.52
     TOTAL RAINFALL   (mm)=     117.60       117.60           117.60
     RUNOFF COEFFICIENT   =       0.99         0.44             0.63

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.062    12.33    60.10
      + ID2= 2 (  0036):     5.32   0.689    12.42    74.51
        ==================================================
        ID = 3 (  0041):     5.73   0.743    12.42    73.48

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.743    12.42    73.48
      + ID2= 2 (  0037):     2.05   0.280    12.33    57.37
        ==================================================
        ID = 1 (  0041):     7.78   1.022    12.33    69.24

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   1.022    12.33    69.24
      + ID2= 2 (  0040):     3.43   0.680    12.25    74.52
        ==================================================
        ID = 3 (  0041):    11.21   1.592    12.25    70.85

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 6.167    2.09 |12.250  127.21 | 18.33    2.08
                0.167    0.00 | 6.250    2.09 |12.333   20.17 | 18.42    2.08
                0.250    0.00 | 6.333    2.15 |12.417   20.15 | 18.50    2.08
                0.333    1.19 | 6.417    2.15 |12.500   20.15 | 18.58    2.01
```

```
0.417    1.19 | 6.500    2.15 |12.583   13.72 | 18.67    2.01
0.500    1.19 | 6.583    2.20 |12.667   13.72 | 18.75    2.01
0.583    1.22 | 6.667    2.20 |12.750   13.72 | 18.83    1.93
0.667    1.22 | 6.750    2.20 |12.833    9.44 | 18.92    1.93
0.750    1.22 | 6.833    2.26 |12.917    9.44 | 19.00    1.93
0.833    1.25 | 6.917    2.26 |13.000    9.44 | 19.08    1.86
0.917    1.25 | 7.000    2.26 |13.083    7.97 | 19.17    1.86
1.000    1.25 | 7.083    2.32 |13.167    7.97 | 19.25    1.86
1.083    1.28 | 7.167    2.32 |13.250    7.97 | 19.33    1.79
1.167    1.28 | 7.250    2.32 |13.333    6.75 | 19.42    1.79
1.250    1.28 | 7.333    2.38 |13.417    6.75 | 19.50    1.79
1.333    1.31 | 7.417    2.38 |13.500    6.75 | 19.58    1.71
1.417    1.31 | 7.500    2.38 |13.583    5.96 | 19.67    1.71
1.500    1.31 | 7.583    2.44 |13.667    5.96 | 19.75    1.71
1.583    1.34 | 7.667    2.44 |13.750    5.96 | 19.83    1.64
1.667    1.34 | 7.750    2.44 |13.833    5.22 | 19.92    1.64
1.750    1.34 | 7.833    2.50 |13.917    5.22 | 20.00    1.64
1.833    1.37 | 7.917    2.50 |14.000    5.22 | 20.08    1.57
1.917    1.37 | 8.000    2.50 |14.083    4.66 | 20.17    1.57
2.000    1.37 | 8.083    2.56 |14.167    4.66 | 20.25    1.57
2.083    1.39 | 8.167    2.56 |14.250    4.66 | 20.33    1.52
2.167    1.39 | 8.250    2.56 |14.333    4.25 | 20.42    1.52
2.250    1.39 | 8.333    2.74 |14.417    4.25 | 20.50    1.52
2.333    1.43 | 8.417    2.74 |14.500    4.25 | 20.58    1.51
2.417    1.43 | 8.500    2.74 |14.583    4.05 | 20.67    1.51
2.500    1.43 | 8.583    3.02 |14.667    4.05 | 20.75    1.51
2.583    1.46 | 8.667    3.02 |14.750    4.05 | 20.83    1.49
2.667    1.46 | 8.750    3.02 |14.833    3.83 | 20.92    1.49
2.750    1.46 | 8.833    3.33 |14.917    3.83 | 21.00    1.49
2.833    1.48 | 8.917    3.33 |15.000    3.83 | 21.08    1.48
2.917    1.48 | 9.000    3.33 |15.083    3.63 | 21.17    1.48
3.000    1.48 | 9.083    3.61 |15.167    3.63 | 21.25    1.48
3.083    1.51 | 9.167    3.61 |15.250    3.63 | 21.33    1.46
3.167    1.51 | 9.250    3.61 |15.333    3.42 | 21.42    1.46
3.250    1.51 | 9.333    3.76 |15.417    3.42 | 21.50    1.46
3.333    1.55 | 9.417    3.76 |15.500    3.42 | 21.58    1.45
3.417    1.55 | 9.500    3.76 |15.583    3.22 | 21.67    1.45
3.500    1.55 | 9.583    3.76 |15.667    3.22 | 21.75    1.45
3.583    1.57 | 9.667    3.76 |15.750    3.22 | 21.83    1.43
3.667    1.57 | 9.750    3.76 |15.833    3.01 | 21.92    1.43
3.750    1.57 | 9.833    4.01 |15.917    3.01 | 22.00    1.43
3.833    1.60 | 9.917    4.01 |16.000    3.01 | 22.08    1.42
3.917    1.60 |10.000    4.01 |16.083    2.81 | 22.17    1.42
4.000    1.60 |10.083    4.46 |16.167    2.81 | 22.25    1.42
4.083    1.63 |10.167    4.46 |16.250    2.81 | 22.33    1.40
4.167    1.63 |10.250    4.46 |16.333    2.67 | 22.42    1.40
4.250    1.63 |10.333    5.07 |16.417    2.67 | 22.50    1.40
4.333    1.68 |10.417    5.07 |16.500    2.67 | 22.58    1.39
4.417    1.68 |10.500    5.07 |16.583    2.60 | 22.67    1.39
4.500    1.68 |10.583    5.75 |16.667    2.60 | 22.75    1.39
4.583    1.73 |10.667    5.75 |16.750    2.60 | 22.83    1.37
4.667    1.73 |10.750    5.75 |16.833    2.52 | 22.92    1.37
4.750    1.73 |10.833    6.73 |16.917    2.52 | 23.00    1.37
4.833    1.79 |10.917    6.73 |17.000    2.52 | 23.08    1.36
4.917    1.79 |11.000    6.73 |17.083    2.45 | 23.17    1.36
5.000    1.79 |11.083    7.86 |17.167    2.45 | 23.25    1.36
5.083    1.85 |11.167    7.86 |17.250    2.45 | 23.33    1.35
5.167    1.85 |11.250    7.86 |17.333    2.37 | 23.42    1.35
5.250    1.85 |11.333    9.93 |17.417    2.37 | 23.50    1.35
5.333    1.91 |11.417    9.93 |17.500    2.37 | 23.58    1.33
5.417    1.91 |11.500    9.93 |17.583    2.30 | 23.67    1.33
5.500    1.91 |11.583   12.64 |17.667    2.30 | 23.75    1.33
5.583    1.97 |11.667   12.64 |17.750    2.30 | 23.83    1.31
5.667    1.97 |11.750   12.64 |17.833    2.23 | 23.92    1.31
5.750    1.97 |11.833   51.54 |17.917    2.22 | 24.00    1.31
5.833    2.03 |11.917   51.54 |18.000    2.22 | 24.08    1.30
5.917    2.03 |12.000   51.54 |18.083    2.15 | 24.17    1.30
6.000    2.03 |12.083  127.20 |18.167    2.15 | 24.25    1.30
6.083    2.09 |12.167  127.21 |18.250    2.15 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.128 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  60.077
     TOTAL RAINFALL   (mm)= 117.600
     RUNOFF COEFFICIENT   =   0.511

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.128    12.33    60.08
      + ID2= 2 (  0041):    11.21   1.592    12.25    70.85
        ==================================================
        ID = 3 (  0032):    12.04   1.716    12.25    70.11

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
**********************************************
** SIMULATION:3-10yr 24hr 15min SCS Type II **
**********************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.45	12.250	88.27	18.33	1.44
0.167	0.00	6.250	1.45	12.333	13.99	18.42	1.44
0.250	0.00	6.333	1.49	12.417	13.98	18.50	1.44
0.333	0.83	6.417	1.49	12.500	13.98	18.58	1.39
0.417	0.83	6.500	1.49	12.583	9.52	18.67	1.39
0.500	0.83	6.583	1.53	12.667	9.52	18.75	1.39
0.583	0.85	6.667	1.53	12.750	9.52	18.83	1.34
0.667	0.85	6.750	1.53	12.833	6.55	18.92	1.34
0.750	0.85	6.833	1.57	12.917	6.55	19.00	1.34
0.833	0.87	6.917	1.57	13.000	6.55	19.08	1.29
0.917	0.87	7.000	1.57	13.083	5.53	19.17	1.29
1.000	0.87	7.083	1.61	13.167	5.53	19.25	1.29
1.083	0.89	7.167	1.61	13.250	5.53	19.33	1.24
1.167	0.89	7.250	1.61	13.333	4.68	19.42	1.24
1.250	0.89	7.333	1.65	13.417	4.68	19.50	1.24
1.333	0.91	7.417	1.65	13.500	4.68	19.58	1.19
1.417	0.91	7.500	1.65	13.583	4.13	19.67	1.19
1.500	0.91	7.583	1.69	13.667	4.13	19.75	1.19
1.583	0.93	7.667	1.69	13.750	4.13	19.83	1.14
1.667	0.93	7.750	1.69	13.833	3.62	19.92	1.14
1.750	0.93	7.833	1.73	13.917	3.62	20.00	1.14
1.833	0.95	7.917	1.73	14.000	3.62	20.08	1.09
1.917	0.95	8.000	1.73	14.083	3.23	20.17	1.09
2.000	0.95	8.083	1.77	14.167	3.23	20.25	1.09
2.083	0.97	8.167	1.77	14.250	3.23	20.33	1.06
2.167	0.97	8.250	1.77	14.333	2.95	20.42	1.06
2.250	0.97	8.333	1.90	14.417	2.95	20.50	1.06
2.333	0.99	8.417	1.90	14.500	2.95	20.58	1.05
2.417	0.99	8.500	1.90	14.583	2.81	20.67	1.05
2.500	0.99	8.583	2.10	14.667	2.81	20.75	1.05
2.583	1.01	8.667	2.10	14.750	2.81	20.83	1.03
2.667	1.01	8.750	2.10	14.833	2.66	20.92	1.03
2.750	1.01	8.833	2.31	14.917	2.66	21.00	1.03
2.833	1.03	8.917	2.31	15.000	2.66	21.08	1.02
2.917	1.03	9.000	2.31	15.083	2.52	21.17	1.02
3.000	1.03	9.083	2.51	15.167	2.52	21.25	1.02
3.083	1.05	9.167	2.51	15.250	2.52	21.33	1.02
3.167	1.05	9.250	2.51	15.333	2.37	21.42	1.02
3.250	1.05	9.333	2.61	15.417	2.37	21.50	1.02
3.333	1.07	9.417	2.61	15.500	2.37	21.58	1.01
3.417	1.07	9.500	2.61	15.583	2.24	21.67	1.01
3.500	1.07	9.583	2.61	15.667	2.24	21.75	1.01
3.583	1.09	9.667	2.61	15.750	2.24	21.83	0.99
3.667	1.09	9.750	2.61	15.833	2.09	21.92	0.99
3.750	1.09	9.833	2.78	15.917	2.09	22.00	0.99
3.833	1.11	9.917	2.78	16.000	2.09	22.08	0.98
3.917	1.11	10.000	2.78	16.083	1.95	22.17	0.98
4.000	1.11	10.083	3.09	16.167	1.95	22.25	0.98
4.083	1.13	10.167	3.09	16.250	1.95	22.33	0.97
4.167	1.13	10.250	3.09	16.333	1.85	22.42	0.97
4.250	1.13	10.333	3.52	16.417	1.85	22.50	0.97
4.333	1.16	10.417	3.52	16.500	1.85	22.58	0.96
4.417	1.16	10.500	3.52	16.583	1.80	22.67	0.96
4.500	1.16	10.583	3.99	16.667	1.80	22.75	0.96
4.583	1.20	10.667	3.99	16.750	1.80	22.83	0.95
4.667	1.20	10.750	3.99	16.833	1.75	22.92	0.95
4.750	1.20	10.833	4.67	16.917	1.75	23.00	0.95
4.833	1.25	10.917	4.67	17.000	1.75	23.08	0.94
4.917	1.25	11.000	4.67	17.083	1.70	23.17	0.94
5.000	1.25	11.083	5.45	17.167	1.70	23.25	0.94
5.083	1.28	11.167	5.45	17.250	1.70	23.33	0.93
5.167	1.28	11.250	5.45	17.333	1.65	23.42	0.93
5.250	1.28	11.333	6.89	17.417	1.65	23.50	0.93
5.333	1.33	11.417	6.89	17.500	1.65	23.58	0.92
5.417	1.33	11.500	6.89	17.583	1.60	23.67	0.92
5.500	1.33	11.583	8.77	17.667	1.60	23.75	0.92
5.583	1.37	11.667	8.77	17.750	1.60	23.83	0.91
5.667	1.37	11.750	8.77	17.833	1.54	23.92	0.91
5.750	1.37	11.833	35.76	17.917	1.54	24.00	0.91
5.833	1.41	11.917	35.77	18.000	1.54	24.08	0.90
5.917	1.41	12.000	35.77	18.083	1.49	24.17	0.90
6.000	1.41	12.083	88.26	18.167	1.49	24.25	0.90
6.083	1.45	12.167	88.27	18.250	1.49		

```
Unit Hyd Qpeak  (cms)=   0.078

PEAK FLOW       (cms)=   0.033 (i)
TIME TO PEAK    (hrs)=  12.333
RUNOFF VOLUME    (mm)=  32.743
TOTAL RAINFALL   (mm)=  81.600
RUNOFF COEFFICIENT   =   0.401

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.45	12.250	88.27	18.33	1.44
0.167	0.00	6.250	1.45	12.333	13.99	18.42	1.44
0.250	0.00	6.333	1.49	12.417	13.98	18.50	1.44

```
  0.333    0.83 | 6.417    1.49 |12.500   13.98 | 18.58    1.39
  0.417    0.83 | 6.500    1.49 |12.583    9.52 | 18.67    1.39
  0.500    0.83 | 6.583    1.53 |12.667    9.52 | 18.75    1.39
  0.583    0.85 | 6.667    1.53 |12.750    9.52 | 18.83    1.34
  0.667    0.85 | 6.750    1.53 |12.833    6.55 | 18.92    1.34
  0.750    0.85 | 6.833    1.57 |12.917    6.55 | 19.00    1.34
  0.833    0.87 | 6.917    1.57 |13.000    6.55 | 19.08    1.29
  0.917    0.87 | 7.000    1.57 |13.083    5.53 | 19.17    1.29
  1.000    0.87 | 7.083    1.61 |13.167    5.53 | 19.25    1.29
  1.083    0.89 | 7.167    1.61 |13.250    5.53 | 19.33    1.24
  1.167    0.89 | 7.250    1.61 |13.333    4.68 | 19.42    1.24
  1.250    0.89 | 7.333    1.65 |13.417    4.68 | 19.50    1.24
  1.333    0.91 | 7.417    1.65 |13.500    4.68 | 19.58    1.19
  1.417    0.91 | 7.500    1.65 |13.583    4.13 | 19.67    1.19
  1.500    0.91 | 7.583    1.69 |13.667    4.13 | 19.75    1.19
  1.583    0.93 | 7.667    1.69 |13.750    4.13 | 19.83    1.14
  1.667    0.93 | 7.750    1.69 |13.833    3.62 | 19.92    1.14
  1.750    0.93 | 7.833    1.73 |13.917    3.62 | 20.00    1.14
  1.833    0.95 | 7.917    1.73 |14.000    3.62 | 20.08    1.09
  1.917    0.95 | 8.000    1.73 |14.083    3.23 | 20.17    1.09
  2.000    0.95 | 8.083    1.77 |14.167    3.23 | 20.25    1.09
  2.083    0.97 | 8.167    1.77 |14.250    3.23 | 20.33    1.06
  2.167    0.97 | 8.250    1.77 |14.333    2.95 | 20.42    1.06
  2.250    0.97 | 8.333    1.90 |14.417    2.95 | 20.50    1.06
  2.333    0.99 | 8.417    1.90 |14.500    2.95 | 20.58    1.05
  2.417    0.99 | 8.500    1.90 |14.583    2.81 | 20.67    1.05
  2.500    0.99 | 8.583    2.10 |14.667    2.81 | 20.75    1.05
  2.583    1.01 | 8.667    2.10 |14.750    2.81 | 20.83    1.03
  2.667    1.01 | 8.750    2.10 |14.833    2.66 | 20.92    1.03
  2.750    1.01 | 8.833    2.31 |14.917    2.66 | 21.00    1.03
  2.833    1.03 | 8.917    2.31 |15.000    2.66 | 21.08    1.02
  2.917    1.03 | 9.000    2.31 |15.083    2.52 | 21.17    1.02
  3.000    1.03 | 9.083    2.51 |15.167    2.52 | 21.25    1.02
  3.083    1.05 | 9.167    2.51 |15.250    2.52 | 21.33    1.02
  3.167    1.05 | 9.250    2.51 |15.333    2.37 | 21.42    1.02
  3.250    1.05 | 9.333    2.61 |15.417    2.37 | 21.50    1.02
  3.333    1.07 | 9.417    2.61 |15.500    2.37 | 21.58    1.01
  3.417    1.07 | 9.500    2.61 |15.583    2.24 | 21.67    1.01
  3.500    1.07 | 9.583    2.61 |15.667    2.24 | 21.75    1.01
  3.583    1.09 | 9.667    2.61 |15.750    2.24 | 21.83    0.99
  3.667    1.09 | 9.750    2.61 |15.833    2.09 | 21.92    0.99
  3.750    1.09 | 9.833    2.78 |15.917    2.09 | 22.00    0.99
  3.833    1.11 | 9.917    2.78 |16.000    2.09 | 22.08    0.98
  3.917    1.11 |10.000    2.78 |16.083    1.95 | 22.17    0.98
  4.000    1.11 |10.083    3.09 |16.167    1.95 | 22.25    0.98
  4.083    1.13 |10.167    3.09 |16.250    1.95 | 22.33    0.97
  4.167    1.13 |10.250    3.09 |16.333    1.85 | 22.42    0.97
  4.250    1.13 |10.333    3.52 |16.417    1.85 | 22.50    0.97
  4.333    1.16 |10.417    3.52 |16.500    1.85 | 22.58    0.96
  4.417    1.16 |10.500    3.52 |16.583    1.80 | 22.67    0.96
  4.500    1.16 |10.583    3.99 |16.667    1.80 | 22.75    0.96
  4.583    1.20 |10.667    3.99 |16.750    1.80 | 22.83    0.95
  4.667    1.20 |10.750    3.99 |16.833    1.75 | 22.92    0.95
  4.750    1.20 |10.833    4.67 |16.917    1.75 | 23.00    0.95
  4.833    1.25 |10.917    4.67 |17.000    1.75 | 23.08    0.94
  4.917    1.25 |11.000    4.67 |17.083    1.70 | 23.17    0.94
  5.000    1.25 |11.083    5.45 |17.167    1.70 | 23.25    0.94
  5.083    1.28 |11.167    5.45 |17.250    1.70 | 23.33    0.93
  5.167    1.28 |11.250    5.45 |17.333    1.65 | 23.42    0.93
  5.250    1.28 |11.333    6.89 |17.417    1.65 | 23.50    0.93
  5.333    1.33 |11.417    6.89 |17.500    1.65 | 23.58    0.92
  5.417    1.33 |11.500    6.89 |17.583    1.60 | 23.67    0.92
  5.500    1.33 |11.583    8.77 |17.667    1.60 | 23.75    0.92
  5.583    1.37 |11.667    8.77 |17.750    1.60 | 23.83    0.91
  5.667    1.37 |11.750    8.77 |17.833    1.54 | 23.92    0.91
  5.750    1.37 |11.833   35.76 |17.917    1.54 | 24.00    0.91
  5.833    1.41 |11.917   35.77 |18.000    1.54 | 24.08    0.90
  5.917    1.41 |12.000   35.77 |18.083    1.49 | 24.17    0.90
  6.000    1.41 |12.083   88.26 |18.167    1.49 | 24.25    0.90
  6.083    1.45 |12.167   88.27 |18.250    1.49 |

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.148 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  30.927
     TOTAL RAINFALL   (mm)=  81.600
     RUNOFF COEFFICIENT   =   0.379

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66          2.66
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     188.33         40.00
     Mannings n           =      0.130         0.250

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


                         ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    0.00 | 6.167    1.45 |12.250   88.27 | 18.33    1.44
          0.167    0.00 | 6.250    1.45 |12.333   13.99 | 18.42    1.44
          0.250    0.00 | 6.333    1.49 |12.417   13.98 | 18.50    1.44
          0.333    0.83 | 6.417    1.49 |12.500   13.98 | 18.58    1.39
```

```
0.417    0.83 | 6.500    1.49 |12.583    9.52 | 18.67    1.39
0.500    0.83 | 6.583    1.53 |12.667    9.52 | 18.75    1.39
0.583    0.85 | 6.667    1.53 |12.750    9.52 | 18.83    1.34
0.667    0.85 | 6.750    1.53 |12.833    6.55 | 18.92    1.34
0.750    0.85 | 6.833    1.57 |12.917    6.55 | 19.00    1.34
0.833    0.87 | 6.917    1.57 |13.000    6.55 | 19.08    1.29
0.917    0.87 | 7.000    1.57 |13.083    5.53 | 19.17    1.29
1.000    0.87 | 7.083    1.61 |13.167    5.53 | 19.25    1.29
1.083    0.89 | 7.167    1.61 |13.250    5.53 | 19.33    1.24
1.167    0.89 | 7.250    1.61 |13.333    4.68 | 19.42    1.24
1.250    0.89 | 7.333    1.65 |13.417    4.68 | 19.50    1.24
1.333    0.91 | 7.417    1.65 |13.500    4.68 | 19.58    1.19
1.417    0.91 | 7.500    1.65 |13.583    4.13 | 19.67    1.19
1.500    0.91 | 7.583    1.69 |13.667    4.13 | 19.75    1.19
1.583    0.93 | 7.667    1.69 |13.750    4.13 | 19.83    1.14
1.667    0.93 | 7.750    1.69 |13.833    3.62 | 19.92    1.14
1.750    0.93 | 7.833    1.73 |13.917    3.62 | 20.00    1.14
1.833    0.95 | 7.917    1.73 |14.000    3.62 | 20.08    1.09
1.917    0.95 | 8.000    1.73 |14.083    3.23 | 20.17    1.09
2.000    0.95 | 8.083    1.77 |14.167    3.23 | 20.25    1.09
2.083    0.97 | 8.167    1.77 |14.250    3.23 | 20.33    1.06
2.167    0.97 | 8.250    1.77 |14.333    2.95 | 20.42    1.06
2.250    0.97 | 8.333    1.90 |14.417    2.95 | 20.50    1.06
2.333    0.99 | 8.417    1.90 |14.500    2.95 | 20.58    1.05
2.417    0.99 | 8.500    1.90 |14.583    2.81 | 20.67    1.05
2.500    0.99 | 8.583    2.10 |14.667    2.81 | 20.75    1.05
2.583    1.01 | 8.667    2.10 |14.750    2.81 | 20.83    1.03
2.667    1.01 | 8.750    2.10 |14.833    2.66 | 20.92    1.03
2.750    1.01 | 8.833    2.31 |14.917    2.66 | 21.00    1.03
2.833    1.03 | 8.917    2.31 |15.000    2.66 | 21.08    1.02
2.917    1.03 | 9.000    2.31 |15.083    2.52 | 21.17    1.02
3.000    1.03 | 9.083    2.51 |15.167    2.52 | 21.25    1.02
3.083    1.05 | 9.167    2.51 |15.250    2.52 | 21.33    1.02
3.167    1.05 | 9.250    2.51 |15.333    2.37 | 21.42    1.02
3.250    1.05 | 9.333    2.61 |15.417    2.37 | 21.50    1.02
3.333    1.07 | 9.417    2.61 |15.500    2.37 | 21.58    1.01
3.417    1.07 | 9.500    2.61 |15.583    2.24 | 21.67    1.01
3.500    1.07 | 9.583    2.61 |15.667    2.24 | 21.75    1.01
3.583    1.09 | 9.667    2.61 |15.750    2.24 | 21.83    0.99
3.667    1.09 | 9.750    2.61 |15.833    2.09 | 21.92    0.99
3.750    1.09 | 9.833    2.78 |15.917    2.09 | 22.00    0.99
3.833    1.11 | 9.917    2.78 |16.000    2.09 | 22.08    0.98
3.917    1.11 |10.000    2.78 |16.083    1.95 | 22.17    0.98
4.000    1.11 |10.083    3.09 |16.167    1.95 | 22.25    0.98
4.083    1.13 |10.167    3.09 |16.250    1.95 | 22.33    0.97
4.167    1.13 |10.250    3.09 |16.333    1.85 | 22.42    0.97
4.250    1.13 |10.333    3.52 |16.417    1.85 | 22.50    0.97
4.333    1.16 |10.417    3.52 |16.500    1.85 | 22.58    0.96
4.417    1.16 |10.500    3.52 |16.583    1.80 | 22.67    0.96
4.500    1.16 |10.583    3.99 |16.667    1.80 | 22.75    0.96
4.583    1.20 |10.667    3.99 |16.750    1.80 | 22.83    0.95
4.667    1.20 |10.750    3.99 |16.833    1.75 | 22.92    0.95
4.750    1.20 |10.833    4.67 |16.917    1.75 | 23.00    0.95
4.833    1.25 |10.917    4.67 |17.000    1.75 | 23.08    0.94
4.917    1.25 |11.000    4.67 |17.083    1.70 | 23.17    0.94
5.000    1.25 |11.083    5.45 |17.167    1.70 | 23.25    0.94
5.083    1.28 |11.167    5.45 |17.250    1.70 | 23.33    0.93
5.167    1.28 |11.250    5.45 |17.333    1.65 | 23.42    0.93
5.250    1.28 |11.333    6.89 |17.417    1.65 | 23.50    0.93
5.333    1.33 |11.417    6.89 |17.500    1.65 | 23.58    0.92
5.417    1.33 |11.500    6.89 |17.583    1.60 | 23.67    0.92
5.500    1.33 |11.583    8.77 |17.667    1.60 | 23.75    0.92
5.583    1.37 |11.667    8.77 |17.750    1.60 | 23.83    0.91
5.667    1.37 |11.750    8.77 |17.833    1.54 | 23.92    0.91
5.750    1.37 |11.833   35.76 |17.917    1.54 | 24.00    0.91
5.833    1.41 |11.917   35.77 |18.000    1.54 | 24.08    0.90
5.917    1.41 |12.000   35.77 |18.083    1.49 | 24.17    0.90
6.000    1.41 |12.083   88.26 |18.167    1.49 | 24.25    0.90
6.083    1.45 |12.167   88.27 |18.250    1.49 |

     Max.Eff.Inten.(mm/hr)=      88.26        45.39
               over (min)        15.00        30.00
     Storage Coeff.  (min)=      15.63 (ii)   27.55 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.29         0.14          0.390 (iii)
     TIME TO PEAK    (hrs)=      12.33        12.58          12.42
     RUNOFF VOLUME    (mm)=      80.60        28.31          46.61
     TOTAL RAINFALL   (mm)=      81.60        81.60          81.60
     RUNOFF COEFFICIENT   =       0.99         0.35           0.57


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.45	12.250	88.27	18.33	1.44
0.167	0.00	6.250	1.45	12.333	13.99	18.42	1.44
0.250	0.00	6.333	1.49	12.417	13.98	18.50	1.44
0.333	0.83	6.417	1.49	12.500	13.98	18.58	1.39
0.417	0.83	6.500	1.49	12.583	9.52	18.67	1.39
0.500	0.83	6.583	1.53	12.667	9.52	18.75	1.39
0.583	0.85	6.667	1.53	12.750	9.52	18.83	1.34
0.667	0.85	6.750	1.53	12.833	6.55	18.92	1.34
0.750	0.85	6.833	1.57	12.917	6.55	19.00	1.34
0.833	0.87	6.917	1.57	13.000	6.55	19.08	1.29
0.917	0.87	7.000	1.57	13.083	5.53	19.17	1.29
1.000	0.87	7.083	1.61	13.167	5.53	19.25	1.29
1.083	0.89	7.167	1.61	13.250	5.53	19.33	1.24
1.167	0.89	7.250	1.61	13.333	4.68	19.42	1.24
1.250	0.89	7.333	1.65	13.417	4.68	19.50	1.24
1.333	0.91	7.417	1.65	13.500	4.68	19.58	1.19
1.417	0.91	7.500	1.65	13.583	4.13	19.67	1.19
1.500	0.91	7.583	1.69	13.667	4.13	19.75	1.19
1.583	0.93	7.667	1.69	13.750	4.13	19.83	1.14
1.667	0.93	7.750	1.69	13.833	3.62	19.92	1.14
1.750	0.93	7.833	1.73	13.917	3.62	20.00	1.14
1.833	0.95	7.917	1.73	14.000	3.62	20.08	1.09
1.917	0.95	8.000	1.73	14.083	3.23	20.17	1.09
2.000	0.95	8.083	1.77	14.167	3.23	20.25	1.09
2.083	0.97	8.167	1.77	14.250	3.23	20.33	1.06
2.167	0.97	8.250	1.77	14.333	2.95	20.42	1.06
2.250	0.97	8.333	1.90	14.417	2.95	20.50	1.06
2.333	0.99	8.417	1.90	14.500	2.95	20.58	1.05
2.417	0.99	8.500	1.90	14.583	2.81	20.67	1.05
2.500	0.99	8.583	2.10	14.667	2.81	20.75	1.05
2.583	1.01	8.667	2.10	14.750	2.81	20.83	1.03
2.667	1.01	8.750	2.10	14.833	2.66	20.92	1.03
2.750	1.01	8.833	2.31	14.917	2.66	21.00	1.03
2.833	1.03	8.917	2.31	15.000	2.66	21.08	1.02
2.917	1.03	9.000	2.31	15.083	2.52	21.17	1.02
3.000	1.03	9.083	2.51	15.167	2.52	21.25	1.02
3.083	1.05	9.167	2.51	15.250	2.52	21.33	1.02
3.167	1.05	9.250	2.51	15.333	2.37	21.42	1.02
3.250	1.05	9.333	2.61	15.417	2.37	21.50	1.02
3.333	1.07	9.417	2.61	15.500	2.37	21.58	1.01
3.417	1.07	9.500	2.61	15.583	2.24	21.67	1.01
3.500	1.07	9.583	2.61	15.667	2.24	21.75	1.01
3.583	1.09	9.667	2.61	15.750	2.24	21.83	0.99
3.667	1.09	9.750	2.61	15.833	2.09	21.92	0.99
3.750	1.09	9.833	2.78	15.917	2.09	22.00	0.99
3.833	1.11	9.917	2.78	16.000	2.09	22.08	0.98
3.917	1.11	10.000	2.78	16.083	1.95	22.17	0.98
4.000	1.11	10.083	3.09	16.167	1.95	22.25	0.98
4.083	1.13	10.167	3.09	16.250	1.95	22.33	0.97
4.167	1.13	10.250	3.09	16.333	1.85	22.42	0.97
4.250	1.13	10.333	3.52	16.417	1.85	22.50	0.97
4.333	1.16	10.417	3.52	16.500	1.85	22.58	0.96
4.417	1.16	10.500	3.52	16.583	1.80	22.67	0.96
4.500	1.16	10.583	3.99	16.667	1.80	22.75	0.96
4.583	1.20	10.667	3.99	16.750	1.80	22.83	0.95
4.667	1.20	10.750	3.99	16.833	1.75	22.92	0.95
4.750	1.20	10.833	4.67	16.917	1.75	23.00	0.95
4.833	1.25	10.917	4.67	17.000	1.75	23.08	0.94
4.917	1.25	11.000	4.67	17.083	1.70	23.17	0.94
5.000	1.25	11.083	5.45	17.167	1.70	23.25	0.94
5.083	1.28	11.167	5.45	17.250	1.70	23.33	0.93
5.167	1.28	11.250	5.45	17.333	1.65	23.42	0.93
5.250	1.28	11.333	6.89	17.417	1.65	23.50	0.93
5.333	1.33	11.417	6.89	17.500	1.65	23.58	0.92
5.417	1.33	11.500	6.89	17.583	1.60	23.67	0.92
5.500	1.33	11.583	8.77	17.667	1.60	23.75	0.92
5.583	1.37	11.667	8.77	17.750	1.60	23.83	0.91
5.667	1.37	11.750	8.77	17.833	1.54	23.92	0.91
5.750	1.37	11.833	35.76	17.917	1.54	24.00	0.91
5.833	1.41	11.917	35.77	18.000	1.54	24.08	0.90
5.917	1.41	12.000	35.77	18.083	1.49	24.17	0.90
6.000	1.41	12.083	88.26	18.167	1.49	24.25	0.90
6.083	1.45	12.167	88.27	18.250	1.49		

Max.Eff.Inten.(mm/hr)=	88.27	48.37	
over (min)	5.00	15.00	
Storage Coeff. (min)=	3.44 (ii)	12.88 (ii)	
Unit Hyd. Tpeak (min)=	5.00	15.00	
Unit Hyd. peak (cms)=	0.26	0.08	
			TOTALS
PEAK FLOW (cms)=	0.29	0.14	0.417 (iii)
TIME TO PEAK (hrs)=	12.25	12.33	12.25
RUNOFF VOLUME (mm)=	80.60	28.31	46.61
TOTAL RAINFALL (mm)=	81.60	81.60	81.60
RUNOFF COEFFICIENT =	0.99	0.35	0.57

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

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. 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 (0041)	AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3	(ha)	(cms)	(hrs)	(mm)

```
        ID1= 1 (  0033):     0.41   0.033    12.33    32.74
      + ID2= 2 (  0036):     5.32   0.390    12.42    46.61
        ====================================================
        ID = 3 (  0041):     5.73   0.422    12.33    45.62

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.422    12.33    45.62
      + ID2= 2 (  0037):     2.05   0.148    12.33    30.93
        ====================================================
        ID = 1 (  0041):     7.78   0.570    12.33    41.75

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.570    12.33    41.75
      + ID2= 2 (  0040):     3.43   0.417    12.25    46.61
        ====================================================
        ID = 3 (  0041):    11.21   0.923    12.25    43.24

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                                ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 6.167    1.45 |12.250   88.27 | 18.33    1.44
                 0.167    0.00 | 6.250    1.45 |12.333   13.99 | 18.42    1.44
                 0.250    0.00 | 6.333    1.49 |12.417   13.98 | 18.50    1.44
                 0.333    0.83 | 6.417    1.49 |12.500   13.98 | 18.58    1.39
                 0.417    0.83 | 6.500    1.49 |12.583    9.52 | 18.67    1.39
                 0.500    0.83 | 6.583    1.53 |12.667    9.52 | 18.75    1.39
                 0.583    0.85 | 6.667    1.53 |12.750    9.52 | 18.83    1.34
                 0.667    0.85 | 6.750    1.53 |12.833    6.55 | 18.92    1.34
                 0.750    0.85 | 6.833    1.57 |12.917    6.55 | 19.00    1.34
                 0.833    0.87 | 6.917    1.57 |13.000    6.55 | 19.08    1.29
                 0.917    0.87 | 7.000    1.57 |13.083    5.53 | 19.17    1.29
                 1.000    0.87 | 7.083    1.61 |13.167    5.53 | 19.25    1.29
                 1.083    0.89 | 7.167    1.61 |13.250    5.53 | 19.33    1.24
                 1.167    0.89 | 7.250    1.61 |13.333    4.68 | 19.42    1.24
                 1.250    0.89 | 7.333    1.65 |13.417    4.68 | 19.50    1.24
                 1.333    0.91 | 7.417    1.65 |13.500    4.68 | 19.58    1.19
                 1.417    0.91 | 7.500    1.65 |13.583    4.13 | 19.67    1.19
                 1.500    0.91 | 7.583    1.69 |13.667    4.13 | 19.75    1.19
                 1.583    0.93 | 7.667    1.69 |13.750    4.13 | 19.83    1.14
                 1.667    0.93 | 7.750    1.69 |13.833    3.62 | 19.92    1.14
                 1.750    0.93 | 7.833    1.73 |13.917    3.62 | 20.00    1.14
                 1.833    0.95 | 7.917    1.73 |14.000    3.62 | 20.08    1.09
                 1.917    0.95 | 8.000    1.73 |14.083    3.23 | 20.17    1.09
                 2.000    0.95 | 8.083    1.77 |14.167    3.23 | 20.25    1.09
                 2.083    0.97 | 8.167    1.77 |14.250    3.23 | 20.33    1.06
                 2.167    0.97 | 8.250    1.77 |14.333    2.95 | 20.42    1.06
                 2.250    0.97 | 8.333    1.90 |14.417    2.95 | 20.50    1.06
                 2.333    0.99 | 8.417    1.90 |14.500    2.95 | 20.58    1.05
                 2.417    0.99 | 8.500    1.90 |14.583    2.81 | 20.67    1.05
                 2.500    0.99 | 8.583    2.10 |14.667    2.81 | 20.75    1.05
                 2.583    1.01 | 8.667    2.10 |14.750    2.81 | 20.83    1.03
                 2.667    1.01 | 8.750    2.10 |14.833    2.66 | 20.92    1.03
                 2.750    1.01 | 8.833    2.31 |14.917    2.66 | 21.00    1.03
                 2.833    1.03 | 8.917    2.31 |15.000    2.66 | 21.08    1.02
                 2.917    1.03 | 9.000    2.31 |15.083    2.52 | 21.17    1.02
                 3.000    1.03 | 9.083    2.51 |15.167    2.52 | 21.25    1.02
                 3.083    1.05 | 9.167    2.51 |15.250    2.52 | 21.33    1.02
                 3.167    1.05 | 9.250    2.51 |15.333    2.37 | 21.42    1.02
                 3.250    1.05 | 9.333    2.61 |15.417    2.37 | 21.50    1.02
                 3.333    1.07 | 9.417    2.61 |15.500    2.37 | 21.58    1.01
                 3.417    1.07 | 9.500    2.61 |15.583    2.24 | 21.67    1.01
                 3.500    1.07 | 9.583    2.61 |15.667    2.24 | 21.75    1.01
                 3.583    1.09 | 9.667    2.61 |15.750    2.24 | 21.83    0.99
                 3.667    1.09 | 9.750    2.61 |15.833    2.09 | 21.92    0.99
                 3.750    1.09 | 9.833    2.78 |15.917    2.09 | 22.00    0.99
                 3.833    1.11 | 9.917    2.78 |16.000    2.09 | 22.08    0.98
                 3.917    1.11 |10.000    2.78 |16.083    1.95 | 22.17    0.98
                 4.000    1.11 |10.083    3.09 |16.167    1.95 | 22.25    0.98
                 4.083    1.13 |10.167    3.09 |16.250    1.95 | 22.33    0.97
                 4.167    1.13 |10.250    3.09 |16.333    1.85 | 22.42    0.97
                 4.250    1.13 |10.333    3.52 |16.417    1.85 | 22.50    0.97
                 4.333    1.16 |10.417    3.52 |16.500    1.85 | 22.58    0.96
                 4.417    1.16 |10.500    3.52 |16.583    1.80 | 22.67    0.96
                 4.500    1.16 |10.583    3.99 |16.667    1.80 | 22.75    0.96
                 4.583    1.20 |10.667    3.99 |16.750    1.80 | 22.83    0.95
                 4.667    1.20 |10.750    3.99 |16.833    1.75 | 22.92    0.95
                 4.750    1.20 |10.833    4.67 |16.917    1.75 | 23.00    0.95
                 4.833    1.25 |10.917    4.67 |17.000    1.75 | 23.08    0.94
                 4.917    1.25 |11.000    4.67 |17.083    1.70 | 23.17    0.94
                 5.000    1.25 |11.083    5.45 |17.167    1.70 | 23.25    0.94
                 5.083    1.28 |11.167    5.45 |17.250    1.70 | 23.33    0.93
```

5.167	1.28	11.250	5.45	17.333	1.65	23.42	0.93
5.250	1.28	11.333	6.89	17.417	1.65	23.50	0.93
5.333	1.33	11.417	6.89	17.500	1.65	23.58	0.92
5.417	1.33	11.500	6.89	17.583	1.60	23.67	0.92
5.500	1.33	11.583	8.77	17.667	1.60	23.75	0.92
5.583	1.37	11.667	8.77	17.750	1.60	23.83	0.91
5.667	1.37	11.750	8.77	17.833	1.54	23.92	0.91
5.750	1.37	11.833	35.76	17.917	1.54	24.00	0.91
5.833	1.41	11.917	35.77	18.000	1.54	24.08	0.90
5.917	1.41	12.000	35.77	18.083	1.49	24.17	0.90
6.000	1.41	12.083	88.26	18.167	1.49	24.25	0.90
6.083	1.45	12.167	88.27	18.250	1.49		

```
    Unit Hyd Qpeak  (cms)=   0.167

    PEAK FLOW       (cms)=   0.069 (i)
    TIME TO PEAK    (hrs)=  12.333
    RUNOFF VOLUME    (mm)=  32.730
    TOTAL RAINFALL   (mm)=  81.600
    RUNOFF COEFFICIENT   =   0.401

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

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


--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0039):     0.83   0.069    12.33    32.73
     + ID2= 2 (  0041):    11.21   0.923    12.25    43.24
       ====================================================
       ID = 3 (  0032):    12.04   0.989    12.25    42.51

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
**********************************************
** SIMULATION:3-25yr 24hr 15min SCS Type II **
**********************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.70	12.250	103.84	18.33	1.70
0.167	0.00	6.250	1.70	12.333	16.46	18.42	1.70
0.250	0.00	6.333	1.75	12.417	16.45	18.50	1.70
0.333	0.97	6.417	1.75	12.500	16.45	18.58	1.64
0.417	0.97	6.500	1.75	12.583	11.20	18.67	1.64
0.500	0.97	6.583	1.80	12.667	11.20	18.75	1.64
0.583	1.00	6.667	1.80	12.750	11.20	18.83	1.58
0.667	1.00	6.750	1.80	12.833	7.70	18.92	1.58
0.750	1.00	6.833	1.85	12.917	7.70	19.00	1.58
0.833	1.02	6.917	1.85	13.000	7.70	19.08	1.52
0.917	1.02	7.000	1.85	13.083	6.51	19.17	1.52
1.000	1.02	7.083	1.90	13.167	6.50	19.25	1.52
1.083	1.04	7.167	1.90	13.250	6.50	19.33	1.46
1.167	1.04	7.250	1.90	13.333	5.51	19.42	1.46
1.250	1.04	7.333	1.94	13.417	5.51	19.50	1.46
1.333	1.07	7.417	1.94	13.500	5.51	19.58	1.40
1.417	1.07	7.500	1.94	13.583	4.86	19.67	1.40
1.500	1.07	7.583	1.99	13.667	4.86	19.75	1.40
1.583	1.09	7.667	1.99	13.750	4.86	19.83	1.34
1.667	1.09	7.750	1.99	13.833	4.26	19.92	1.34
1.750	1.09	7.833	2.04	13.917	4.26	20.00	1.34
1.833	1.12	7.917	2.04	14.000	4.26	20.08	1.28
1.917	1.12	8.000	2.04	14.083	3.80	20.17	1.28
2.000	1.12	8.083	2.09	14.167	3.80	20.25	1.28
2.083	1.14	8.167	2.09	14.250	3.80	20.33	1.24
2.167	1.14	8.250	2.09	14.333	3.47	20.42	1.24
2.250	1.14	8.333	2.24	14.417	3.47	20.50	1.24
2.333	1.17	8.417	2.24	14.500	3.47	20.58	1.23
2.417	1.17	8.500	2.24	14.583	3.30	20.67	1.23
2.500	1.17	8.583	2.47	14.667	3.30	20.75	1.23
2.583	1.19	8.667	2.47	14.750	3.30	20.83	1.22
2.667	1.19	8.750	2.47	14.833	3.13	20.92	1.22
2.750	1.19	8.833	2.72	14.917	3.13	21.00	1.22
2.833	1.21	8.917	2.72	15.000	3.13	21.08	1.21
2.917	1.21	9.000	2.72	15.083	2.97	21.17	1.21
3.000	1.21	9.083	2.95	15.167	2.97	21.25	1.21
3.083	1.23	9.167	2.95	15.250	2.97	21.33	1.19
3.167	1.23	9.250	2.95	15.333	2.79	21.42	1.19
3.250	1.23	9.333	3.07	15.417	2.79	21.50	1.19
3.333	1.26	9.417	3.07	15.500	2.79	21.58	1.18
3.417	1.26	9.500	3.07	15.583	2.63	21.67	1.18
3.500	1.26	9.583	3.07	15.667	2.63	21.75	1.18
3.583	1.28	9.667	3.07	15.750	2.63	21.83	1.17
3.667	1.28	9.750	3.07	15.833	2.46	21.92	1.17
3.750	1.28	9.833	3.27	15.917	2.46	22.00	1.17
3.833	1.31	9.917	3.27	16.000	2.46	22.08	1.16
3.917	1.31	10.000	3.27	16.083	2.29	22.17	1.16
4.000	1.31	10.083	3.64	16.167	2.29	22.25	1.16
4.083	1.33	10.167	3.64	16.250	2.29	22.33	1.15
4.167	1.33	10.250	3.64	16.333	2.18	22.42	1.15
4.250	1.33	10.333	4.14	16.417	2.18	22.50	1.15
4.333	1.37	10.417	4.14	16.500	2.18	22.58	1.13
4.417	1.37	10.500	4.14	16.583	2.12	22.67	1.13

4.500	1.37	10.583	4.69	16.667	2.12	22.75	1.13
4.583	1.42	10.667	4.69	16.750	2.12	22.83	1.12
4.667	1.42	10.750	4.69	16.833	2.06	22.92	1.12
4.750	1.42	10.833	5.49	16.917	2.06	23.00	1.12
4.833	1.46	10.917	5.49	17.000	2.06	23.08	1.11
4.917	1.46	11.000	5.49	17.083	2.00	23.17	1.11
5.000	1.46	11.083	6.41	17.167	2.00	23.25	1.11
5.083	1.51	11.167	6.41	17.250	2.00	23.33	1.10
5.167	1.51	11.250	6.41	17.333	1.94	23.42	1.10
5.250	1.51	11.333	8.11	17.417	1.94	23.50	1.10
5.333	1.56	11.417	8.11	17.500	1.94	23.58	1.09
5.417	1.56	11.500	8.11	17.583	1.88	23.67	1.09
5.500	1.56	11.583	10.32	17.667	1.88	23.75	1.09
5.583	1.61	11.667	10.32	17.750	1.88	23.83	1.07
5.667	1.61	11.750	10.32	17.833	1.82	23.92	1.07
5.750	1.61	11.833	42.07	17.917	1.82	24.00	1.07
5.833	1.66	11.917	42.08	18.000	1.82	24.08	1.06
5.917	1.66	12.000	42.08	18.083	1.76	24.17	1.06
6.000	1.66	12.083	103.84	18.167	1.76	24.25	1.06
6.083	1.70	12.167	103.84	18.250	1.76		

Unit Hyd Qpeak (cms)= 0.078

PEAK FLOW (cms)= 0.044 (i)
TIME TO PEAK (hrs)= 12.333
RUNOFF VOLUME (mm)= 43.253
TOTAL RAINFALL (mm)= 96.000
RUNOFF COEFFICIENT = 0.451

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22
```

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

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	' TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	' hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	1.70	12.250	103.84	18.33	1.70
0.167	0.00	6.250	1.70	12.333	16.46	18.42	1.70
0.250	0.00	6.333	1.75	12.417	16.45	18.50	1.70
0.333	0.97	6.417	1.75	12.500	16.45	18.58	1.64
0.417	0.97	6.500	1.75	12.583	11.20	18.67	1.64
0.500	0.97	6.583	1.80	12.667	11.20	18.75	1.64
0.583	1.00	6.667	1.80	12.750	11.20	18.83	1.58
0.667	1.00	6.750	1.80	12.833	7.70	18.92	1.58
0.750	1.00	6.833	1.85	12.917	7.70	19.00	1.58
0.833	1.02	6.917	1.85	13.000	7.70	19.08	1.52
0.917	1.02	7.000	1.85	13.083	6.51	19.17	1.52
1.000	1.02	7.083	1.90	13.167	6.50	19.25	1.52
1.083	1.04	7.167	1.90	13.250	6.50	19.33	1.46
1.167	1.04	7.250	1.90	13.333	5.51	19.42	1.46
1.250	1.04	7.333	1.94	13.417	5.51	19.50	1.46
1.333	1.07	7.417	1.94	13.500	5.51	19.58	1.40
1.417	1.07	7.500	1.94	13.583	4.86	19.67	1.40
1.500	1.07	7.583	1.99	13.667	4.86	19.75	1.40
1.583	1.09	7.667	1.99	13.750	4.86	19.83	1.34
1.667	1.09	7.750	1.99	13.833	4.26	19.92	1.34
1.750	1.09	7.833	2.04	13.917	4.26	20.00	1.34
1.833	1.12	7.917	2.04	14.000	4.26	20.08	1.28
1.917	1.12	8.000	2.04	14.083	3.80	20.17	1.28
2.000	1.12	8.083	2.09	14.167	3.80	20.25	1.28
2.083	1.14	8.167	2.09	14.250	3.80	20.33	1.24
2.167	1.14	8.250	2.09	14.333	3.47	20.42	1.24
2.250	1.14	8.333	2.24	14.417	3.47	20.50	1.24
2.333	1.17	8.417	2.24	14.500	3.47	20.58	1.23
2.417	1.17	8.500	2.24	14.583	3.30	20.67	1.23
2.500	1.17	8.583	2.47	14.667	3.30	20.75	1.23
2.583	1.19	8.667	2.47	14.750	3.30	20.83	1.22
2.667	1.19	8.750	2.47	14.833	3.13	20.92	1.22
2.750	1.19	8.833	2.72	14.917	3.13	21.00	1.22
2.833	1.21	8.917	2.72	15.000	3.13	21.08	1.21
2.917	1.21	9.000	2.72	15.083	2.97	21.17	1.21
3.000	1.21	9.083	2.95	15.167	2.97	21.25	1.21
3.083	1.23	9.167	2.95	15.250	2.97	21.33	1.19
3.167	1.23	9.250	2.95	15.333	2.79	21.42	1.19
3.250	1.23	9.333	3.07	15.417	2.79	21.50	1.19
3.333	1.26	9.417	3.07	15.500	2.79	21.58	1.18
3.417	1.26	9.500	3.07	15.583	2.63	21.67	1.18
3.500	1.26	9.583	3.07	15.667	2.63	21.75	1.18
3.583	1.28	9.667	3.07	15.750	2.63	21.83	1.17
3.667	1.28	9.750	3.07	15.833	2.46	21.92	1.17
3.750	1.28	9.833	3.27	15.917	2.46	22.00	1.17
3.833	1.31	9.917	3.27	16.000	2.46	22.08	1.16
3.917	1.31	10.000	3.27	16.083	2.29	22.17	1.16
4.000	1.31	10.083	3.64	16.167	2.29	22.25	1.16
4.083	1.33	10.167	3.64	16.250	2.29	22.33	1.15
4.167	1.33	10.250	3.64	16.333	2.18	22.42	1.15
4.250	1.33	10.333	4.14	16.417	2.18	22.50	1.15
4.333	1.37	10.417	4.14	16.500	2.18	22.58	1.13
4.417	1.37	10.500	4.14	16.583	2.12	22.67	1.13
4.500	1.37	10.583	4.69	16.667	2.12	22.75	1.13
4.583	1.42	10.667	4.69	16.750	2.12	22.83	1.12
4.667	1.42	10.750	4.69	16.833	2.06	22.92	1.12
4.750	1.42	10.833	5.49	16.917	2.06	23.00	1.12
4.833	1.46	10.917	5.49	17.000	2.06	23.08	1.11
4.917	1.46	11.000	5.49	17.083	2.00	23.17	1.11
5.000	1.46	11.083	6.41	17.167	2.00	23.25	1.11

```
               5.083    1.51 |11.167    6.41 |17.250    2.00 | 23.33    1.10
               5.167    1.51 |11.250    6.41 |17.333    1.94 | 23.42    1.10
               5.250    1.51 |11.333    8.11 |17.417    1.94 | 23.50    1.10
               5.333    1.56 |11.417    8.11 |17.500    1.94 | 23.58    1.09
               5.417    1.56 |11.500    8.11 |17.583    1.88 | 23.67    1.09
               5.500    1.56 |11.583   10.32 |17.667    1.88 | 23.75    1.09
               5.583    1.61 |11.667   10.32 |17.750    1.88 | 23.83    1.07
               5.667    1.61 |11.750   10.32 |17.833    1.82 | 23.92    1.07
               5.750    1.61 |11.833   42.07 |17.917    1.82 | 24.00    1.07
               5.833    1.66 |11.917   42.08 |18.000    1.82 | 24.08    1.06
               5.917    1.66 |12.000   42.08 |18.083    1.76 | 24.17    1.06
               6.000    1.66 |12.083  103.84 |18.167    1.76 | 24.25    1.06
               6.083    1.70 |12.167  103.84 |18.250    1.76 |

    Unit Hyd Qpeak  (cms)=   0.356

    PEAK FLOW       (cms)=   0.199 (i)
    TIME TO PEAK    (hrs)=  12.333
    RUNOFF VOLUME    (mm)=  41.047
    TOTAL RAINFALL   (mm)=  96.000
    RUNOFF COEFFICIENT   =   0.428

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                           IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66         2.66
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         1.00
    Length            (m)=     188.33        40.00
    Mannings n          =      0.130        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 6.167    1.70 |12.250  103.84 | 18.33    1.70
               0.167    0.00 | 6.250    1.70 |12.333   16.46 | 18.42    1.70
               0.250    0.00 | 6.333    1.75 |12.417   16.45 | 18.50    1.70
               0.333    0.97 | 6.417    1.75 |12.500   16.45 | 18.58    1.64
               0.417    0.97 | 6.500    1.75 |12.583   11.20 | 18.67    1.64
               0.500    0.97 | 6.583    1.80 |12.667   11.20 | 18.75    1.64
               0.583    1.00 | 6.667    1.80 |12.750   11.20 | 18.83    1.58
               0.667    1.00 | 6.750    1.80 |12.833    7.70 | 18.92    1.58
               0.750    1.00 | 6.833    1.85 |12.917    7.70 | 19.00    1.58
```

```
               0.833    1.02 | 6.917    1.85 |13.000    7.70 | 19.08    1.52
               0.917    1.02 | 7.000    1.85 |13.083    6.51 | 19.17    1.52
               1.000    1.02 | 7.083    1.90 |13.167    6.50 | 19.25    1.52
               1.083    1.04 | 7.167    1.90 |13.250    6.50 | 19.33    1.46
               1.167    1.04 | 7.250    1.90 |13.333    5.51 | 19.42    1.46
               1.250    1.04 | 7.333    1.94 |13.417    5.51 | 19.50    1.46
               1.333    1.07 | 7.417    1.94 |13.500    5.51 | 19.58    1.40
               1.417    1.07 | 7.500    1.94 |13.583    4.86 | 19.67    1.40
               1.500    1.07 | 7.583    1.99 |13.667    4.86 | 19.75    1.40
               1.583    1.09 | 7.667    1.99 |13.750    4.86 | 19.83    1.34
               1.667    1.09 | 7.750    1.99 |13.833    4.26 | 19.92    1.34
               1.750    1.09 | 7.833    2.04 |13.917    4.26 | 20.00    1.34
               1.833    1.12 | 7.917    2.04 |14.000    4.26 | 20.08    1.28
               1.917    1.12 | 8.000    2.04 |14.083    3.80 | 20.17    1.28
               2.000    1.12 | 8.083    2.09 |14.167    3.80 | 20.25    1.28
               2.083    1.14 | 8.167    2.09 |14.250    3.80 | 20.33    1.24
               2.167    1.14 | 8.250    2.09 |14.333    3.47 | 20.42    1.24
               2.250    1.14 | 8.333    2.24 |14.417    3.47 | 20.50    1.24
               2.333    1.17 | 8.417    2.24 |14.500    3.47 | 20.58    1.23
               2.417    1.17 | 8.500    2.24 |14.583    3.30 | 20.67    1.23
               2.500    1.17 | 8.583    2.47 |14.667    3.30 | 20.75    1.23
               2.583    1.19 | 8.667    2.47 |14.750    3.30 | 20.83    1.22
               2.667    1.19 | 8.750    2.47 |14.833    3.13 | 20.92    1.22
               2.750    1.19 | 8.833    2.72 |14.917    3.13 | 21.00    1.22
               2.833    1.21 | 8.917    2.72 |15.000    3.13 | 21.08    1.21
               2.917    1.21 | 9.000    2.72 |15.083    2.97 | 21.17    1.21
               3.000    1.21 | 9.083    2.95 |15.167    2.97 | 21.25    1.21
               3.083    1.23 | 9.167    2.95 |15.250    2.97 | 21.33    1.19
               3.167    1.23 | 9.250    2.95 |15.333    2.79 | 21.42    1.19
               3.250    1.23 | 9.333    3.07 |15.417    2.79 | 21.50    1.19
               3.333    1.26 | 9.417    3.07 |15.500    2.79 | 21.58    1.18
               3.417    1.26 | 9.500    3.07 |15.583    2.63 | 21.67    1.18
               3.500    1.26 | 9.583    3.07 |15.667    2.63 | 21.75    1.18
               3.583    1.28 | 9.667    3.07 |15.750    2.63 | 21.83    1.17
               3.667    1.28 | 9.750    3.07 |15.833    2.46 | 21.92    1.17
               3.750    1.28 | 9.833    3.27 |15.917    2.46 | 22.00    1.17
               3.833    1.31 | 9.917    3.27 |16.000    2.46 | 22.08    1.16
               3.917    1.31 |10.000    3.27 |16.083    2.29 | 22.17    1.16
               4.000    1.31 |10.083    3.64 |16.167    2.29 | 22.25    1.16
               4.083    1.33 |10.167    3.64 |16.250    2.29 | 22.33    1.15
               4.167    1.33 |10.250    3.64 |16.333    2.18 | 22.42    1.15
               4.250    1.33 |10.333    4.14 |16.417    2.18 | 22.50    1.15
               4.333    1.37 |10.417    4.14 |16.500    2.18 | 22.58    1.13
               4.417    1.37 |10.500    4.14 |16.583    2.12 | 22.67    1.13
               4.500    1.37 |10.583    4.69 |16.667    2.12 | 22.75    1.13
               4.583    1.42 |10.667    4.69 |16.750    2.12 | 22.83    1.12
               4.667    1.42 |10.750    4.69 |16.833    2.06 | 22.92    1.12
               4.750    1.42 |10.833    5.49 |16.917    2.06 | 23.00    1.12
               4.833    1.46 |10.917    5.49 |17.000    2.06 | 23.08    1.11
               4.917    1.46 |11.000    5.49 |17.083    2.00 | 23.17    1.11
               5.000    1.46 |11.083    6.41 |17.167    2.00 | 23.25    1.11
               5.083    1.51 |11.167    6.41 |17.250    2.00 | 23.33    1.10
```

```
            5.167    1.51 |11.250    6.41 |17.333    1.94 | 23.42    1.10
            5.250    1.51 |11.333    8.11 |17.417    1.94 | 23.50    1.10
            5.333    1.56 |11.417    8.11 |17.500    1.94 | 23.58    1.09
            5.417    1.56 |11.500    8.11 |17.583    1.88 | 23.67    1.09
            5.500    1.56 |11.583   10.32 |17.667    1.88 | 23.75    1.09
            5.583    1.61 |11.667   10.32 |17.750    1.88 | 23.83    1.07
            5.667    1.61 |11.750   10.32 |17.833    1.82 | 23.92    1.07
            5.750    1.61 |11.833   42.07 |17.917    1.82 | 24.00    1.07
            5.833    1.66 |11.917   42.08 |18.000    1.82 | 24.08    1.06
            5.917    1.66 |12.000   42.08 |18.083    1.76 | 24.17    1.06
            6.000    1.66 |12.083  103.84 |18.167    1.76 | 24.25    1.06
            6.083    1.70 |12.167  103.84 |18.250    1.76 |

     Max.Eff.Inten.(mm/hr)=     103.84        59.97
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      14.65 (ii)   25.31 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.35         0.19          0.490 (iii)
     TIME TO PEAK    (hrs)=      12.33        12.58          12.42
     RUNOFF VOLUME    (mm)=      95.00        37.26          57.47
     TOTAL RAINFALL   (mm)=      96.00        96.00          96.00
     RUNOFF COEFFICIENT   =       0.99         0.39           0.60


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    0.00 | 6.167    1.70 |12.250  103.84 | 18.33    1.70
```

```
            0.167    0.00 | 6.250    1.70 |12.333   16.46 | 18.42    1.70
            0.250    0.00 | 6.333    1.75 |12.417   16.45 | 18.50    1.70
            0.333    0.97 | 6.417    1.75 |12.500   16.45 | 18.58    1.64
            0.417    0.97 | 6.500    1.75 |12.583   11.20 | 18.67    1.64
            0.500    0.97 | 6.583    1.80 |12.667   11.20 | 18.75    1.64
            0.583    1.00 | 6.667    1.80 |12.750   11.20 | 18.83    1.58
            0.667    1.00 | 6.750    1.80 |12.833    7.70 | 18.92    1.58
            0.750    1.00 | 6.833    1.85 |12.917    7.70 | 19.00    1.58
            0.833    1.02 | 6.917    1.85 |13.000    7.70 | 19.08    1.52
            0.917    1.02 | 7.000    1.85 |13.083    6.51 | 19.17    1.52
            1.000    1.02 | 7.083    1.90 |13.167    6.50 | 19.25    1.52
            1.083    1.04 | 7.167    1.90 |13.250    6.50 | 19.33    1.46
            1.167    1.04 | 7.250    1.90 |13.333    5.51 | 19.42    1.46
            1.250    1.04 | 7.333    1.94 |13.417    5.51 | 19.50    1.46
            1.333    1.07 | 7.417    1.94 |13.500    5.51 | 19.58    1.40
            1.417    1.07 | 7.500    1.94 |13.583    4.86 | 19.67    1.40
            1.500    1.07 | 7.583    1.99 |13.667    4.86 | 19.75    1.40
            1.583    1.09 | 7.667    1.99 |13.750    4.86 | 19.83    1.34
            1.667    1.09 | 7.750    1.99 |13.833    4.26 | 19.92    1.34
            1.750    1.09 | 7.833    2.04 |13.917    4.26 | 20.00    1.34
            1.833    1.12 | 7.917    2.04 |14.000    4.26 | 20.08    1.28
            1.917    1.12 | 8.000    2.04 |14.083    3.80 | 20.17    1.28
            2.000    1.12 | 8.083    2.09 |14.167    3.80 | 20.25    1.28
            2.083    1.14 | 8.167    2.09 |14.250    3.80 | 20.33    1.24
            2.167    1.14 | 8.250    2.09 |14.333    3.47 | 20.42    1.24
            2.250    1.14 | 8.333    2.24 |14.417    3.47 | 20.50    1.24
            2.333    1.17 | 8.417    2.24 |14.500    3.47 | 20.58    1.23
            2.417    1.17 | 8.500    2.24 |14.583    3.30 | 20.67    1.23
            2.500    1.17 | 8.583    2.47 |14.667    3.30 | 20.75    1.23
            2.583    1.19 | 8.667    2.47 |14.750    3.30 | 20.83    1.22
            2.667    1.19 | 8.750    2.47 |14.833    3.13 | 20.92    1.22
            2.750    1.19 | 8.833    2.72 |14.917    3.13 | 21.00    1.22
            2.833    1.21 | 8.917    2.72 |15.000    3.13 | 21.08    1.21
            2.917    1.21 | 9.000    2.72 |15.083    2.97 | 21.17    1.21
            3.000    1.21 | 9.083    2.95 |15.167    2.97 | 21.25    1.21
            3.083    1.23 | 9.167    2.95 |15.250    2.97 | 21.33    1.19
            3.167    1.23 | 9.250    2.95 |15.333    2.79 | 21.42    1.19
            3.250    1.23 | 9.333    3.07 |15.417    2.79 | 21.50    1.19
            3.333    1.26 | 9.417    3.07 |15.500    2.79 | 21.58    1.18
            3.417    1.26 | 9.500    3.07 |15.583    2.63 | 21.67    1.18
            3.500    1.26 | 9.583    3.07 |15.667    2.63 | 21.75    1.18
            3.583    1.28 | 9.667    3.07 |15.750    2.63 | 21.83    1.17
            3.667    1.28 | 9.750    3.07 |15.833    2.46 | 21.92    1.17
            3.750    1.28 | 9.833    3.27 |15.917    2.46 | 22.00    1.17
            3.833    1.31 | 9.917    3.27 |16.000    2.46 | 22.08    1.16
            3.917    1.31 |10.000    3.27 |16.083    2.29 | 22.17    1.16
            4.000    1.31 |10.083    3.64 |16.167    2.29 | 22.25    1.16
            4.083    1.33 |10.167    3.64 |16.250    2.29 | 22.33    1.15
            4.167    1.33 |10.250    3.64 |16.333    2.18 | 22.42    1.15
            4.250    1.33 |10.333    4.14 |16.417    2.18 | 22.50    1.15
            4.333    1.37 |10.417    4.14 |16.500    2.18 | 22.58    1.13
            4.417    1.37 |10.500    4.14 |16.583    2.12 | 22.67    1.13
```

```
                4.500    1.37 |10.583    4.69 |16.667    2.12 | 22.75    1.13
                4.583    1.42 |10.667    4.69 |16.750    2.12 | 22.83    1.12
                4.667    1.42 |10.750    4.69 |16.833    2.06 | 22.92    1.12
                4.750    1.42 |10.833    5.49 |16.917    2.06 | 23.00    1.12
                4.833    1.46 |10.917    5.49 |17.000    2.06 | 23.08    1.11
                4.917    1.46 |11.000    5.49 |17.083    2.00 | 23.17    1.11
                5.000    1.46 |11.083    6.41 |17.167    2.00 | 23.25    1.11
                5.083    1.51 |11.167    6.41 |17.250    2.00 | 23.33    1.10
                5.167    1.51 |11.250    6.41 |17.333    1.94 | 23.42    1.10
                5.250    1.51 |11.333    8.11 |17.417    1.94 | 23.50    1.10
                5.333    1.56 |11.417    8.11 |17.500    1.94 | 23.58    1.09
                5.417    1.56 |11.500    8.11 |17.583    1.88 | 23.67    1.09
                5.500    1.56 |11.583   10.32 |17.667    1.88 | 23.75    1.09
                5.583    1.61 |11.667   10.32 |17.750    1.88 | 23.83    1.07
                5.667    1.61 |11.750   10.32 |17.833    1.82 | 23.92    1.07
                5.750    1.61 |11.833   42.07 |17.917    1.82 | 24.00    1.07
                5.833    1.66 |11.917   42.08 |18.000    1.82 | 24.08    1.06
                5.917    1.66 |12.000   42.08 |18.083    1.76 | 24.17    1.06
                6.000    1.66 |12.083  103.84 |18.167    1.76 | 24.25    1.06
                6.083    1.70 |12.167  103.84 |18.250    1.76 |

     Max.Eff.Inten.(mm/hr)=     103.84        63.62
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.23 (ii)   11.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.20         0.518 (iii)
     TIME TO PEAK    (hrs)=      12.25        12.33         12.25
     RUNOFF VOLUME    (mm)=      95.00        37.26         57.47
     TOTAL RAINFALL   (mm)=      96.00        96.00         96.00
     RUNOFF COEFFICIENT   =       0.99         0.39          0.60

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.044    12.33    43.25
      + ID2= 2 (  0036):     5.32   0.490    12.42    57.47
        ===================================================
        ID = 3 (  0041):     5.73   0.531    12.33    56.45
```

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.531    12.33    56.45
      + ID2= 2 (  0037):     2.05   0.199    12.33    41.05
        ===================================================
        ID = 1 (  0041):     7.78   0.730    12.33    52.39

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.730    12.33    52.39
      + ID2= 2 (  0040):     3.43   0.518    12.25    57.47
        ===================================================
        ID = 3 (  0041):    11.21   1.168    12.25    53.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 6.167    1.70 |12.250  103.84 | 18.33    1.70
                 0.167    0.00 | 6.250    1.70 |12.333   16.46 | 18.42    1.70
                 0.250    0.00 | 6.333    1.75 |12.417   16.45 | 18.50    1.70
                 0.333    0.97 | 6.417    1.75 |12.500   16.45 | 18.58    1.64
                 0.417    0.97 | 6.500    1.75 |12.583   11.20 | 18.67    1.64
                 0.500    0.97 | 6.583    1.80 |12.667   11.20 | 18.75    1.64
                 0.583    1.00 | 6.667    1.80 |12.750   11.20 | 18.83    1.58
                 0.667    1.00 | 6.750    1.80 |12.833    7.70 | 18.92    1.58
                 0.750    1.00 | 6.833    1.85 |12.917    7.70 | 19.00    1.58
                 0.833    1.02 | 6.917    1.85 |13.000    7.70 | 19.08    1.52
                 0.917    1.02 | 7.000    1.85 |13.083    6.51 | 19.17    1.52
                 1.000    1.02 | 7.083    1.90 |13.167    6.50 | 19.25    1.52
                 1.083    1.04 | 7.167    1.90 |13.250    6.50 | 19.33    1.46
                 1.167    1.04 | 7.250    1.90 |13.333    5.51 | 19.42    1.46
```

```
1.250    1.04 | 7.333    1.94 |13.417    5.51 | 19.50    1.46
1.333    1.07 | 7.417    1.94 |13.500    5.51 | 19.58    1.40
1.417    1.07 | 7.500    1.94 |13.583    4.86 | 19.67    1.40
1.500    1.07 | 7.583    1.99 |13.667    4.86 | 19.75    1.40
1.583    1.09 | 7.667    1.99 |13.750    4.86 | 19.83    1.34
1.667    1.09 | 7.750    1.99 |13.833    4.26 | 19.92    1.34
1.750    1.09 | 7.833    2.04 |13.917    4.26 | 20.00    1.34
1.833    1.12 | 7.917    2.04 |14.000    4.26 | 20.08    1.28
1.917    1.12 | 8.000    2.04 |14.083    3.80 | 20.17    1.28
2.000    1.12 | 8.083    2.09 |14.167    3.80 | 20.25    1.28
2.083    1.14 | 8.167    2.09 |14.250    3.80 | 20.33    1.24
2.167    1.14 | 8.250    2.09 |14.333    3.47 | 20.42    1.24
2.250    1.14 | 8.333    2.24 |14.417    3.47 | 20.50    1.24
2.333    1.17 | 8.417    2.24 |14.500    3.47 | 20.58    1.23
2.417    1.17 | 8.500    2.24 |14.583    3.30 | 20.67    1.23
2.500    1.17 | 8.583    2.47 |14.667    3.30 | 20.75    1.23
2.583    1.19 | 8.667    2.47 |14.750    3.30 | 20.83    1.22
2.667    1.19 | 8.750    2.47 |14.833    3.13 | 20.92    1.22
2.750    1.19 | 8.833    2.72 |14.917    3.13 | 21.00    1.22
2.833    1.21 | 8.917    2.72 |15.000    3.13 | 21.08    1.21
2.917    1.21 | 9.000    2.72 |15.083    2.97 | 21.17    1.21
3.000    1.21 | 9.083    2.95 |15.167    2.97 | 21.25    1.21
3.083    1.23 | 9.167    2.95 |15.250    2.97 | 21.33    1.19
3.167    1.23 | 9.250    2.95 |15.333    2.79 | 21.42    1.19
3.250    1.23 | 9.333    3.07 |15.417    2.79 | 21.50    1.19
3.333    1.26 | 9.417    3.07 |15.500    2.79 | 21.58    1.18
3.417    1.26 | 9.500    3.07 |15.583    2.63 | 21.67    1.18
3.500    1.26 | 9.583    3.07 |15.667    2.63 | 21.75    1.18
3.583    1.28 | 9.667    3.07 |15.750    2.63 | 21.83    1.17
3.667    1.28 | 9.750    3.07 |15.833    2.46 | 21.92    1.17
3.750    1.28 | 9.833    3.27 |15.917    2.46 | 22.00    1.17
3.833    1.31 | 9.917    3.27 |16.000    2.46 | 22.08    1.16
3.917    1.31 |10.000    3.27 |16.083    2.29 | 22.17    1.16
4.000    1.31 |10.083    3.64 |16.167    2.29 | 22.25    1.16
4.083    1.33 |10.167    3.64 |16.250    2.29 | 22.33    1.15
4.167    1.33 |10.250    3.64 |16.333    2.18 | 22.42    1.15
4.250    1.33 |10.333    4.14 |16.417    2.18 | 22.50    1.15
4.333    1.37 |10.417    4.14 |16.500    2.18 | 22.58    1.13
4.417    1.37 |10.500    4.14 |16.583    2.12 | 22.67    1.13
4.500    1.37 |10.583    4.69 |16.667    2.12 | 22.75    1.13
4.583    1.42 |10.667    4.69 |16.750    2.12 | 22.83    1.12
4.667    1.42 |10.750    4.69 |16.833    2.06 | 22.92    1.12
4.750    1.42 |10.833    5.49 |16.917    2.06 | 23.00    1.12
4.833    1.46 |10.917    5.49 |17.000    2.06 | 23.08    1.11
4.917    1.46 |11.000    5.49 |17.083    2.00 | 23.17    1.11
5.000    1.46 |11.083    6.41 |17.167    2.00 | 23.25    1.11
5.083    1.51 |11.167    6.41 |17.250    2.00 | 23.33    1.10
5.167    1.51 |11.250    6.41 |17.333    1.94 | 23.42    1.10
5.250    1.51 |11.333    8.11 |17.417    1.94 | 23.50    1.10
5.333    1.56 |11.417    8.11 |17.500    1.94 | 23.58    1.09
5.417    1.56 |11.500    8.11 |17.583    1.88 | 23.67    1.09
5.500    1.56 |11.583   10.32 |17.667    1.88 | 23.75    1.09
```

```
             5.583    1.61 |11.667   10.32 |17.750    1.88 | 23.83    1.07
             5.667    1.61 |11.750   10.32 |17.833    1.82 | 23.92    1.07
             5.750    1.61 |11.833   42.07 |17.917    1.82 | 24.00    1.07
             5.833    1.66 |11.917   42.08 |18.000    1.82 | 24.08    1.06
             5.917    1.66 |12.000   42.08 |18.083    1.76 | 24.17    1.06
             6.000    1.66 |12.083  103.84 |18.167    1.76 | 24.25    1.06
             6.083    1.70 |12.167  103.84 |18.250    1.76 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.092 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  43.235
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.450

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

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

--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.092    12.33    43.23
      + ID2= 2 (  0041):    11.21   1.168    12.25    53.94
        ====================================================
        ID = 3 (  0032):    12.04   1.257    12.25    53.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*********************************************
** SIMULATION:3-2yr 24hr 15min SCS Type II **
*********************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                          ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 6.167    0.94 |12.250   57.11 | 18.33    0.93
             0.167    0.00 | 6.250    0.94 |12.333    9.05 | 18.42    0.93
             0.250    0.00 | 6.333    0.96 |12.417    9.05 | 18.50    0.93
             0.333    0.54 | 6.417    0.96 |12.500    9.05 | 18.58    0.90
             0.417    0.54 | 6.500    0.96 |12.583    6.16 | 18.67    0.90
             0.500    0.54 | 6.583    0.99 |12.667    6.16 | 18.75    0.90
```

0.583	0.55	6.667	0.99	12.750	6.16	18.83	0.87
0.667	0.55	6.750	0.99	12.833	4.24	18.92	0.87
0.750	0.55	6.833	1.02	12.917	4.24	19.00	0.87
0.833	0.56	6.917	1.02	13.000	4.24	19.08	0.84
0.917	0.56	7.000	1.02	13.083	3.58	19.17	0.84
1.000	0.56	7.083	1.04	13.167	3.58	19.25	0.84
1.083	0.57	7.167	1.04	13.250	3.58	19.33	0.80
1.167	0.57	7.250	1.04	13.333	3.03	19.42	0.80
1.250	0.57	7.333	1.07	13.417	3.03	19.50	0.80
1.333	0.59	7.417	1.07	13.500	3.03	19.58	0.77
1.417	0.59	7.500	1.07	13.583	2.67	19.67	0.77
1.500	0.59	7.583	1.10	13.667	2.67	19.75	0.77
1.583	0.60	7.667	1.10	13.750	2.67	19.83	0.73
1.667	0.60	7.750	1.10	13.833	2.34	19.92	0.73
1.750	0.60	7.833	1.12	13.917	2.34	20.00	0.73
1.833	0.61	7.917	1.12	14.000	2.34	20.08	0.70
1.917	0.61	8.000	1.12	14.083	2.09	20.17	0.70
2.000	0.61	8.083	1.15	14.167	2.09	20.25	0.70
2.083	0.63	8.167	1.15	14.250	2.09	20.33	0.68
2.167	0.63	8.250	1.15	14.333	1.91	20.42	0.68
2.250	0.63	8.333	1.23	14.417	1.91	20.50	0.68
2.333	0.64	8.417	1.23	14.500	1.91	20.58	0.68
2.417	0.64	8.500	1.23	14.583	1.82	20.67	0.68
2.500	0.64	8.583	1.36	14.667	1.82	20.75	0.68
2.583	0.65	8.667	1.36	14.750	1.82	20.83	0.67
2.667	0.65	8.750	1.36	14.833	1.72	20.92	0.67
2.750	0.65	8.833	1.49	14.917	1.72	21.00	0.67
2.833	0.67	8.917	1.49	15.000	1.72	21.08	0.66
2.917	0.67	9.000	1.49	15.083	1.63	21.17	0.66
3.000	0.67	9.083	1.62	15.167	1.63	21.25	0.66
3.083	0.68	9.167	1.62	15.250	1.63	21.33	0.66
3.167	0.68	9.250	1.62	15.333	1.54	21.42	0.66
3.250	0.68	9.333	1.69	15.417	1.54	21.50	0.66
3.333	0.69	9.417	1.69	15.500	1.54	21.58	0.65
3.417	0.69	9.500	1.69	15.583	1.45	21.67	0.65
3.500	0.69	9.583	1.69	15.667	1.45	21.75	0.65
3.583	0.71	9.667	1.69	15.750	1.45	21.83	0.64
3.667	0.71	9.750	1.69	15.833	1.35	21.92	0.64
3.750	0.71	9.833	1.80	15.917	1.35	22.00	0.64
3.833	0.72	9.917	1.80	16.000	1.35	22.08	0.64
3.917	0.72	10.000	1.80	16.083	1.26	22.17	0.64
4.000	0.72	10.083	2.00	16.167	1.26	22.25	0.64
4.083	0.73	10.167	2.00	16.250	1.26	22.33	0.63
4.167	0.73	10.250	2.00	16.333	1.20	22.42	0.63
4.250	0.73	10.333	2.28	16.417	1.20	22.50	0.63
4.333	0.75	10.417	2.28	16.500	1.20	22.58	0.62
4.417	0.75	10.500	2.28	16.583	1.17	22.67	0.62
4.500	0.75	10.583	2.58	16.667	1.17	22.75	0.62
4.583	0.78	10.667	2.58	16.750	1.17	22.83	0.62
4.667	0.78	10.750	2.58	16.833	1.13	22.92	0.62
4.750	0.78	10.833	3.02	16.917	1.13	23.00	0.62
4.833	0.81	10.917	3.02	17.000	1.13	23.08	0.61
4.917	0.81	11.000	3.02	17.083	1.10	23.17	0.61
5.000	0.81	11.083	3.53	17.167	1.10	23.25	0.61
5.083	0.83	11.167	3.53	17.250	1.10	23.33	0.60
5.167	0.83	11.250	3.53	17.333	1.07	23.42	0.60
5.250	0.83	11.333	4.46	17.417	1.07	23.50	0.60
5.333	0.86	11.417	4.46	17.500	1.07	23.58	0.60
5.417	0.86	11.500	4.46	17.583	1.03	23.67	0.60
5.500	0.86	11.583	5.68	17.667	1.03	23.75	0.60
5.583	0.88	11.667	5.68	17.750	1.03	23.83	0.59
5.667	0.88	11.750	5.68	17.833	1.00	23.92	0.59
5.750	0.88	11.833	23.14	17.917	1.00	24.00	0.59
5.833	0.91	11.917	23.14	18.000	1.00	24.08	0.58
5.917	0.91	12.000	23.14	18.083	0.97	24.17	0.58
6.000	0.91	12.083	57.11	18.167	0.97	24.25	0.58
6.083	0.94	12.167	57.11	18.250	0.97		

```
Unit Hyd Qpeak  (cms)=   0.078

PEAK FLOW       (cms)=   0.014 (i)
TIME TO PEAK    (hrs)=  12.333
RUNOFF VOLUME    (mm)=  14.343
TOTAL RAINFALL   (mm)=  52.800
RUNOFF COEFFICIENT   =   0.272

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	0.94	12.250	57.11	18.33	0.93
0.167	0.00	6.250	0.94	12.333	9.05	18.42	0.93
0.250	0.00	6.333	0.96	12.417	9.05	18.50	0.93
0.333	0.54	6.417	0.96	12.500	9.05	18.58	0.90
0.417	0.54	6.500	0.96	12.583	6.16	18.67	0.90
0.500	0.54	6.583	0.99	12.667	6.16	18.75	0.90
0.583	0.55	6.667	0.99	12.750	6.16	18.83	0.87
0.667	0.55	6.750	0.99	12.833	4.24	18.92	0.87
0.750	0.55	6.833	1.02	12.917	4.24	19.00	0.87
0.833	0.56	6.917	1.02	13.000	4.24	19.08	0.84
0.917	0.56	7.000	1.02	13.083	3.58	19.17	0.84
1.000	0.56	7.083	1.04	13.167	3.58	19.25	0.84
1.083	0.57	7.167	1.04	13.250	3.58	19.33	0.80

1.167	0.57	7.250	1.04	13.333	3.03	19.42	0.80
1.250	0.57	7.333	1.07	13.417	3.03	19.50	0.80
1.333	0.59	7.417	1.07	13.500	3.03	19.58	0.77
1.417	0.59	7.500	1.07	13.583	2.67	19.67	0.77
1.500	0.59	7.583	1.10	13.667	2.67	19.75	0.77
1.583	0.60	7.667	1.10	13.750	2.67	19.83	0.73
1.667	0.60	7.750	1.10	13.833	2.34	19.92	0.73
1.750	0.60	7.833	1.12	13.917	2.34	20.00	0.73
1.833	0.61	7.917	1.12	14.000	2.34	20.08	0.70
1.917	0.61	8.000	1.12	14.083	2.09	20.17	0.70
2.000	0.61	8.083	1.15	14.167	2.09	20.25	0.70
2.083	0.63	8.167	1.15	14.250	2.09	20.33	0.68
2.167	0.63	8.250	1.15	14.333	1.91	20.42	0.68
2.250	0.63	8.333	1.23	14.417	1.91	20.50	0.68
2.333	0.64	8.417	1.23	14.500	1.91	20.58	0.68
2.417	0.64	8.500	1.23	14.583	1.82	20.67	0.68
2.500	0.64	8.583	1.36	14.667	1.82	20.75	0.68
2.583	0.65	8.667	1.36	14.750	1.82	20.83	0.67
2.667	0.65	8.750	1.36	14.833	1.72	20.92	0.67
2.750	0.65	8.833	1.49	14.917	1.72	21.00	0.67
2.833	0.67	8.917	1.49	15.000	1.72	21.08	0.66
2.917	0.67	9.000	1.49	15.083	1.63	21.17	0.66
3.000	0.67	9.083	1.62	15.167	1.63	21.25	0.66
3.083	0.68	9.167	1.62	15.250	1.63	21.33	0.66
3.167	0.68	9.250	1.62	15.333	1.54	21.42	0.66
3.250	0.68	9.333	1.69	15.417	1.54	21.50	0.66
3.333	0.69	9.417	1.69	15.500	1.54	21.58	0.65
3.417	0.69	9.500	1.69	15.583	1.45	21.67	0.65
3.500	0.69	9.583	1.69	15.667	1.45	21.75	0.65
3.583	0.71	9.667	1.69	15.750	1.45	21.83	0.64
3.667	0.71	9.750	1.69	15.833	1.35	21.92	0.64
3.750	0.71	9.833	1.80	15.917	1.35	22.00	0.64
3.833	0.72	9.917	1.80	16.000	1.35	22.08	0.64
3.917	0.72	10.000	1.80	16.083	1.26	22.17	0.64
4.000	0.72	10.083	2.00	16.167	1.26	22.25	0.64
4.083	0.73	10.167	2.00	16.250	1.26	22.33	0.63
4.167	0.73	10.250	2.00	16.333	1.20	22.42	0.63
4.250	0.73	10.333	2.28	16.417	1.20	22.50	0.63
4.333	0.75	10.417	2.28	16.500	1.20	22.58	0.62
4.417	0.75	10.500	2.28	16.583	1.17	22.67	0.62
4.500	0.75	10.583	2.58	16.667	1.17	22.75	0.62
4.583	0.78	10.667	2.58	16.750	1.17	22.83	0.62
4.667	0.78	10.750	2.58	16.833	1.13	22.92	0.62
4.750	0.78	10.833	3.02	16.917	1.13	23.00	0.62
4.833	0.81	10.917	3.02	17.000	1.13	23.08	0.61
4.917	0.81	11.000	3.02	17.083	1.10	23.17	0.61
5.000	0.81	11.083	3.53	17.167	1.10	23.25	0.61
5.083	0.83	11.167	3.53	17.250	1.10	23.33	0.60
5.167	0.83	11.250	3.53	17.333	1.07	23.42	0.60
5.250	0.83	11.333	4.46	17.417	1.07	23.50	0.60
5.333	0.86	11.417	4.46	17.500	1.07	23.58	0.60
5.417	0.86	11.500	4.46	17.583	1.03	23.67	0.60
5.500	0.86	11.583	5.68	17.667	1.03	23.75	0.60
5.583	0.88	11.667	5.68	17.750	1.03	23.83	0.59
5.667	0.88	11.750	5.68	17.833	1.00	23.92	0.59
5.750	0.88	11.833	23.14	17.917	1.00	24.00	0.59
5.833	0.91	11.917	23.14	18.000	1.00	24.08	0.58
5.917	0.91	12.000	23.14	18.083	0.97	24.17	0.58
6.000	0.91	12.083	57.11	18.167	0.97	24.25	0.58
6.083	0.94	12.167	57.11	18.250	0.97		

```
Unit Hyd Qpeak  (cms)=   0.356

PEAK FLOW       (cms)=   0.061 (i)
TIME TO PEAK    (hrs)=  12.333
RUNOFF VOLUME    (mm)=  13.378
TOTAL RAINFALL   (mm)=  52.800
RUNOFF COEFFICIENT   =   0.253

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	0.94	12.250	57.11	18.33	0.93
0.167	0.00	6.250	0.94	12.333	9.05	18.42	0.93
0.250	0.00	6.333	0.96	12.417	9.05	18.50	0.93
0.333	0.54	6.417	0.96	12.500	9.05	18.58	0.90
0.417	0.54	6.500	0.96	12.583	6.16	18.67	0.90
0.500	0.54	6.583	0.99	12.667	6.16	18.75	0.90
0.583	0.55	6.667	0.99	12.750	6.16	18.83	0.87
0.667	0.55	6.750	0.99	12.833	4.24	18.92	0.87
0.750	0.55	6.833	1.02	12.917	4.24	19.00	0.87
0.833	0.56	6.917	1.02	13.000	4.24	19.08	0.84
0.917	0.56	7.000	1.02	13.083	3.58	19.17	0.84
1.000	0.56	7.083	1.04	13.167	3.58	19.25	0.84
1.083	0.57	7.167	1.04	13.250	3.58	19.33	0.80
1.167	0.57	7.250	1.04	13.333	3.03	19.42	0.80

1.250	0.57	7.333	1.07	13.417	3.03	19.50	0.80
1.333	0.59	7.417	1.07	13.500	3.03	19.58	0.77
1.417	0.59	7.500	1.07	13.583	2.67	19.67	0.77
1.500	0.59	7.583	1.10	13.667	2.67	19.75	0.77
1.583	0.60	7.667	1.10	13.750	2.67	19.83	0.73
1.667	0.60	7.750	1.10	13.833	2.34	19.92	0.73
1.750	0.60	7.833	1.12	13.917	2.34	20.00	0.73
1.833	0.61	7.917	1.12	14.000	2.34	20.08	0.70
1.917	0.61	8.000	1.12	14.083	2.09	20.17	0.70
2.000	0.61	8.083	1.15	14.167	2.09	20.25	0.70
2.083	0.63	8.167	1.15	14.250	2.09	20.33	0.68
2.167	0.63	8.250	1.15	14.333	1.91	20.42	0.68
2.250	0.63	8.333	1.23	14.417	1.91	20.50	0.68
2.333	0.64	8.417	1.23	14.500	1.91	20.58	0.68
2.417	0.64	8.500	1.23	14.583	1.82	20.67	0.68
2.500	0.64	8.583	1.36	14.667	1.82	20.75	0.68
2.583	0.65	8.667	1.36	14.750	1.82	20.83	0.67
2.667	0.65	8.750	1.36	14.833	1.72	20.92	0.67
2.750	0.65	8.833	1.49	14.917	1.72	21.00	0.67
2.833	0.67	8.917	1.49	15.000	1.72	21.08	0.66
2.917	0.67	9.000	1.49	15.083	1.63	21.17	0.66
3.000	0.67	9.083	1.62	15.167	1.63	21.25	0.66
3.083	0.68	9.167	1.62	15.250	1.63	21.33	0.66
3.167	0.68	9.250	1.62	15.333	1.54	21.42	0.66
3.250	0.68	9.333	1.69	15.417	1.54	21.50	0.66
3.333	0.69	9.417	1.69	15.500	1.54	21.58	0.65
3.417	0.69	9.500	1.69	15.583	1.45	21.67	0.65
3.500	0.69	9.583	1.69	15.667	1.45	21.75	0.65
3.583	0.71	9.667	1.69	15.750	1.45	21.83	0.64
3.667	0.71	9.750	1.69	15.833	1.35	21.92	0.64
3.750	0.71	9.833	1.80	15.917	1.35	22.00	0.64
3.833	0.72	9.917	1.80	16.000	1.35	22.08	0.64
3.917	0.72	10.000	1.80	16.083	1.26	22.17	0.64
4.000	0.72	10.083	2.00	16.167	1.26	22.25	0.64
4.083	0.73	10.167	2.00	16.250	1.26	22.33	0.63
4.167	0.73	10.250	2.00	16.333	1.20	22.42	0.63
4.250	0.73	10.333	2.28	16.417	1.20	22.50	0.63
4.333	0.75	10.417	2.28	16.500	1.20	22.58	0.62
4.417	0.75	10.500	2.28	16.583	1.17	22.67	0.62
4.500	0.75	10.583	2.58	16.667	1.17	22.75	0.62
4.583	0.78	10.667	2.58	16.750	1.17	22.83	0.62
4.667	0.78	10.750	2.58	16.833	1.13	22.92	0.62
4.750	0.78	10.833	3.02	16.917	1.13	23.00	0.62
4.833	0.81	10.917	3.02	17.000	1.13	23.08	0.61
4.917	0.81	11.000	3.02	17.083	1.10	23.17	0.61
5.000	0.81	11.083	3.53	17.167	1.10	23.25	0.61
5.083	0.83	11.167	3.53	17.250	1.10	23.33	0.60
5.167	0.83	11.250	3.53	17.333	1.07	23.42	0.60
5.250	0.83	11.333	4.46	17.417	1.07	23.50	0.60
5.333	0.86	11.417	4.46	17.500	1.07	23.58	0.60
5.417	0.86	11.500	4.46	17.583	1.03	23.67	0.60
5.500	0.86	11.583	5.68	17.667	1.03	23.75	0.60
5.583	0.88	11.667	5.68	17.750	1.03	23.83	0.59
5.667	0.88	11.750	5.68	17.833	1.00	23.92	0.59
5.750	0.88	11.833	23.14	17.917	1.00	24.00	0.59
5.833	0.91	11.917	23.14	18.000	1.00	24.08	0.58
5.917	0.91	12.000	23.14	18.083	0.97	24.17	0.58
6.000	0.91	12.083	57.11	18.167	0.97	24.25	0.58
6.083	0.94	12.167	57.11	18.250	0.97		

Max.Eff.Inten.(mm/hr)=	48.62	16.90	
over (min)	20.00	40.00	
Storage Coeff. (min)=	19.84 (ii)	37.54 (ii)	
Unit Hyd. Tpeak (min)=	20.00	40.00	
Unit Hyd. peak (cms)=	0.06	0.03	
			TOTALS
PEAK FLOW (cms)=	0.16	0.05	0.197 (iii)
TIME TO PEAK (hrs)=	12.42	12.75	12.42
RUNOFF VOLUME (mm)=	51.80	12.97	26.56
TOTAL RAINFALL (mm)=	52.80	52.80	52.80
RUNOFF COEFFICIENT =	0.98	0.25	0.50

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
```

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.71	1.71
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	151.22	40.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	0.94	12.250	57.11	18.33	0.93
0.167	0.00	6.250	0.94	12.333	9.05	18.42	0.93
0.250	0.00	6.333	0.96	12.417	9.05	18.50	0.93
0.333	0.54	6.417	0.96	12.500	9.05	18.58	0.90
0.417	0.54	6.500	0.96	12.583	6.16	18.67	0.90
0.500	0.54	6.583	0.99	12.667	6.16	18.75	0.90

0.583	0.55	6.667	0.99	12.750	6.16	18.83	0.87
0.667	0.55	6.750	0.99	12.833	4.24	18.92	0.87
0.750	0.55	6.833	1.02	12.917	4.24	19.00	0.87
0.833	0.56	6.917	1.02	13.000	4.24	19.08	0.84
0.917	0.56	7.000	1.02	13.083	3.58	19.17	0.84
1.000	0.56	7.083	1.04	13.167	3.58	19.25	0.84
1.083	0.57	7.167	1.04	13.250	3.58	19.33	0.80
1.167	0.57	7.250	1.04	13.333	3.03	19.42	0.80
1.250	0.57	7.333	1.07	13.417	3.03	19.50	0.80
1.333	0.59	7.417	1.07	13.500	3.03	19.58	0.77
1.417	0.59	7.500	1.07	13.583	2.67	19.67	0.77
1.500	0.59	7.583	1.10	13.667	2.67	19.75	0.77
1.583	0.60	7.667	1.10	13.750	2.67	19.83	0.73
1.667	0.60	7.750	1.10	13.833	2.34	19.92	0.73
1.750	0.60	7.833	1.12	13.917	2.34	20.00	0.73
1.833	0.61	7.917	1.12	14.000	2.34	20.08	0.70
1.917	0.61	8.000	1.12	14.083	2.09	20.17	0.70
2.000	0.61	8.083	1.15	14.167	2.09	20.25	0.70
2.083	0.63	8.167	1.15	14.250	2.09	20.33	0.68
2.167	0.63	8.250	1.15	14.333	1.91	20.42	0.68
2.250	0.63	8.333	1.23	14.417	1.91	20.50	0.68
2.333	0.64	8.417	1.23	14.500	1.91	20.58	0.68
2.417	0.64	8.500	1.23	14.583	1.82	20.67	0.68
2.500	0.64	8.583	1.36	14.667	1.82	20.75	0.68
2.583	0.65	8.667	1.36	14.750	1.82	20.83	0.67
2.667	0.65	8.750	1.36	14.833	1.72	20.92	0.67
2.750	0.65	8.833	1.49	14.917	1.72	21.00	0.67
2.833	0.67	8.917	1.49	15.000	1.72	21.08	0.66
2.917	0.67	9.000	1.49	15.083	1.63	21.17	0.66
3.000	0.67	9.083	1.62	15.167	1.63	21.25	0.66
3.083	0.68	9.167	1.62	15.250	1.63	21.33	0.66
3.167	0.68	9.250	1.62	15.333	1.54	21.42	0.66
3.250	0.68	9.333	1.69	15.417	1.54	21.50	0.66
3.333	0.69	9.417	1.69	15.500	1.54	21.58	0.65
3.417	0.69	9.500	1.69	15.583	1.45	21.67	0.65
3.500	0.69	9.583	1.69	15.667	1.45	21.75	0.65
3.583	0.71	9.667	1.69	15.750	1.45	21.83	0.64
3.667	0.71	9.750	1.69	15.833	1.35	21.92	0.64
3.750	0.71	9.833	1.80	15.917	1.35	22.00	0.64
3.833	0.72	9.917	1.80	16.000	1.35	22.08	0.64
3.917	0.72	10.000	1.80	16.083	1.26	22.17	0.64
4.000	0.72	10.083	2.00	16.167	1.26	22.25	0.64
4.083	0.73	10.167	2.00	16.250	1.26	22.33	0.63
4.167	0.73	10.250	2.00	16.333	1.20	22.42	0.63
4.250	0.73	10.333	2.28	16.417	1.20	22.50	0.63
4.333	0.75	10.417	2.28	16.500	1.20	22.58	0.62
4.417	0.75	10.500	2.28	16.583	1.17	22.67	0.62
4.500	0.75	10.583	2.58	16.667	1.17	22.75	0.62
4.583	0.78	10.667	2.58	16.750	1.17	22.83	0.62
4.667	0.78	10.750	2.58	16.833	1.13	22.92	0.62
4.750	0.78	10.833	3.02	16.917	1.13	23.00	0.62
4.833	0.81	10.917	3.02	17.000	1.13	23.08	0.61
4.917	0.81	11.000	3.02	17.083	1.10	23.17	0.61
5.000	0.81	11.083	3.53	17.167	1.10	23.25	0.61
5.083	0.83	11.167	3.53	17.250	1.10	23.33	0.60
5.167	0.83	11.250	3.53	17.333	1.07	23.42	0.60
5.250	0.83	11.333	4.46	17.417	1.07	23.50	0.60
5.333	0.86	11.417	4.46	17.500	1.07	23.58	0.60
5.417	0.86	11.500	4.46	17.583	1.03	23.67	0.60
5.500	0.86	11.583	5.68	17.667	1.03	23.75	0.60
5.583	0.88	11.667	5.68	17.750	1.03	23.83	0.59
5.667	0.88	11.750	5.68	17.833	1.00	23.92	0.59
5.750	0.88	11.833	23.14	17.917	1.00	24.00	0.59
5.833	0.91	11.917	23.14	18.000	1.00	24.08	0.58
5.917	0.91	12.000	23.14	18.083	0.97	24.17	0.58
6.000	0.91	12.083	57.11	18.167	0.97	24.25	0.58
6.083	0.94	12.167	57.11	18.250	0.97		

```
     Max.Eff.Inten.(mm/hr)=      57.11        20.54
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.10 (ii)   17.39 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.24         0.06
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.05           0.225 (iii)
     TIME TO PEAK    (hrs)=      12.25        12.42          12.25
     RUNOFF VOLUME    (mm)=      51.80        12.97          26.56
     TOTAL RAINFALL   (mm)=      52.80        52.80          52.80
     RUNOFF COEFFICIENT   =       0.98         0.25           0.50

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|  1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.014    12.33    14.34
      + ID2= 2 (  0036):     5.32   0.197    12.42    26.56
        ==================================================
        ID = 3 (  0041):     5.73   0.209    12.42    25.68

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

--------------------
| ADD HYD  (  0041)|
```

```
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.209    12.42    25.68
      + ID2= 2 (  0037):     2.05   0.061    12.33    13.38
        ==================================================
        ID = 1 (  0041):     7.78   0.267    12.42    22.44

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.267    12.42    22.44
      + ID2= 2 (  0040):     3.43   0.225    12.25    26.56
        ==================================================
        ID = 3 (  0041):    11.21   0.440    12.25    23.70

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 6.167    0.94 |12.250   57.11 | 18.33    0.93
                0.167    0.00 | 6.250    0.94 |12.333    9.05 | 18.42    0.93
                0.250    0.00 | 6.333    0.96 |12.417    9.05 | 18.50    0.93
                0.333    0.54 | 6.417    0.96 |12.500    9.05 | 18.58    0.90
                0.417    0.54 | 6.500    0.96 |12.583    6.16 | 18.67    0.90
                0.500    0.54 | 6.583    0.99 |12.667    6.16 | 18.75    0.90
                0.583    0.55 | 6.667    0.99 |12.750    6.16 | 18.83    0.87
                0.667    0.55 | 6.750    0.99 |12.833    4.24 | 18.92    0.87
                0.750    0.55 | 6.833    1.02 |12.917    4.24 | 19.00    0.87
                0.833    0.56 | 6.917    1.02 |13.000    4.24 | 19.08    0.84
                0.917    0.56 | 7.000    1.02 |13.083    3.58 | 19.17    0.84
                1.000    0.56 | 7.083    1.04 |13.167    3.58 | 19.25    0.84
                1.083    0.57 | 7.167    1.04 |13.250    3.58 | 19.33    0.80
                1.167    0.57 | 7.250    1.04 |13.333    3.03 | 19.42    0.80
                1.250    0.57 | 7.333    1.07 |13.417    3.03 | 19.50    0.80
                1.333    0.59 | 7.417    1.07 |13.500    3.03 | 19.58    0.77
                1.417    0.59 | 7.500    1.07 |13.583    2.67 | 19.67    0.77
                1.500    0.59 | 7.583    1.10 |13.667    2.67 | 19.75    0.77
                1.583    0.60 | 7.667    1.10 |13.750    2.67 | 19.83    0.73
                1.667    0.60 | 7.750    1.10 |13.833    2.34 | 19.92    0.73
                1.750    0.60 | 7.833    1.12 |13.917    2.34 | 20.00    0.73
                1.833    0.61 | 7.917    1.12 |14.000    2.34 | 20.08    0.70
                1.917    0.61 | 8.000    1.12 |14.083    2.09 | 20.17    0.70
                2.000    0.61 | 8.083    1.15 |14.167    2.09 | 20.25    0.70
                2.083    0.63 | 8.167    1.15 |14.250    2.09 | 20.33    0.68
                2.167    0.63 | 8.250    1.15 |14.333    1.91 | 20.42    0.68
                2.250    0.63 | 8.333    1.23 |14.417    1.91 | 20.50    0.68
                2.333    0.64 | 8.417    1.23 |14.500    1.91 | 20.58    0.68
                2.417    0.64 | 8.500    1.23 |14.583    1.82 | 20.67    0.68
                2.500    0.64 | 8.583    1.36 |14.667    1.82 | 20.75    0.68
                2.583    0.65 | 8.667    1.36 |14.750    1.82 | 20.83    0.67
                2.667    0.65 | 8.750    1.36 |14.833    1.72 | 20.92    0.67
                2.750    0.65 | 8.833    1.49 |14.917    1.72 | 21.00    0.67
                2.833    0.67 | 8.917    1.49 |15.000    1.72 | 21.08    0.66
                2.917    0.67 | 9.000    1.49 |15.083    1.63 | 21.17    0.66
                3.000    0.67 | 9.083    1.62 |15.167    1.63 | 21.25    0.66
                3.083    0.68 | 9.167    1.62 |15.250    1.63 | 21.33    0.66
                3.167    0.68 | 9.250    1.62 |15.333    1.54 | 21.42    0.66
                3.250    0.68 | 9.333    1.69 |15.417    1.54 | 21.50    0.66
                3.333    0.69 | 9.417    1.69 |15.500    1.54 | 21.58    0.65
                3.417    0.69 | 9.500    1.69 |15.583    1.45 | 21.67    0.65
                3.500    0.69 | 9.583    1.69 |15.667    1.45 | 21.75    0.65
                3.583    0.71 | 9.667    1.69 |15.750    1.45 | 21.83    0.64
                3.667    0.71 | 9.750    1.69 |15.833    1.35 | 21.92    0.64
                3.750    0.71 | 9.833    1.80 |15.917    1.35 | 22.00    0.64
                3.833    0.72 | 9.917    1.80 |16.000    1.35 | 22.08    0.64
                3.917    0.72 |10.000    1.80 |16.083    1.26 | 22.17    0.64
                4.000    0.72 |10.083    2.00 |16.167    1.26 | 22.25    0.64
                4.083    0.73 |10.167    2.00 |16.250    1.26 | 22.33    0.63
                4.167    0.73 |10.250    2.00 |16.333    1.20 | 22.42    0.63
                4.250    0.73 |10.333    2.28 |16.417    1.20 | 22.50    0.63
                4.333    0.75 |10.417    2.28 |16.500    1.20 | 22.58    0.62
                4.417    0.75 |10.500    2.28 |16.583    1.17 | 22.67    0.62
                4.500    0.75 |10.583    2.58 |16.667    1.17 | 22.75    0.62
                4.583    0.78 |10.667    2.58 |16.750    1.17 | 22.83    0.62
                4.667    0.78 |10.750    2.58 |16.833    1.13 | 22.92    0.62
                4.750    0.78 |10.833    3.02 |16.917    1.13 | 23.00    0.62
                4.833    0.81 |10.917    3.02 |17.000    1.13 | 23.08    0.61
                4.917    0.81 |11.000    3.02 |17.083    1.10 | 23.17    0.61
                5.000    0.81 |11.083    3.53 |17.167    1.10 | 23.25    0.61
                5.083    0.83 |11.167    3.53 |17.250    1.10 | 23.33    0.60
                5.167    0.83 |11.250    3.53 |17.333    1.07 | 23.42    0.60
                5.250    0.83 |11.333    4.46 |17.417    1.07 | 23.50    0.60
                5.333    0.86 |11.417    4.46 |17.500    1.07 | 23.58    0.60
                5.417    0.86 |11.500    4.46 |17.583    1.03 | 23.67    0.60
                5.500    0.86 |11.583    5.68 |17.667    1.03 | 23.75    0.60
                5.583    0.88 |11.667    5.68 |17.750    1.03 | 23.83    0.59
                5.667    0.88 |11.750    5.68 |17.833    1.00 | 23.92    0.59
                5.750    0.88 |11.833   23.14 |17.917    1.00 | 24.00    0.59
                5.833    0.91 |11.917   23.14 |18.000    1.00 | 24.08    0.58
                5.917    0.91 |12.000   23.14 |18.083    0.97 | 24.17    0.58
```

```
              6.000    0.91 |12.083   57.11 |18.167    0.97 | 24.25    0.58
              6.083    0.94 |12.167   57.11 |18.250    0.97 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.029 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  14.337
     TOTAL RAINFALL   (mm)=  52.800
     RUNOFF COEFFICIENT   =   0.272

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

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


--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.029    12.33    14.34
      + ID2= 2 (  0041):    11.21   0.440    12.25    23.70
        ==================================================
        ID = 3 (  0032):    12.04   0.467    12.25    23.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
**********************************************
** SIMULATION:3-50yr 24hr 15min SCS Type II **
**********************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.00 | 6.167    1.92 |12.250  116.82 | 18.33    1.91
              0.167    0.00 | 6.250    1.92 |12.333   18.52 | 18.42    1.91
              0.250    0.00 | 6.333    1.97 |12.417   18.51 | 18.50    1.91
              0.333    1.10 | 6.417    1.97 |12.500   18.51 | 18.58    1.84
              0.417    1.10 | 6.500    1.97 |12.583   12.60 | 18.67    1.84
              0.500    1.10 | 6.583    2.02 |12.667   12.60 | 18.75    1.84
              0.583    1.12 | 6.667    2.02 |12.750   12.60 | 18.83    1.77
              0.667    1.12 | 6.750    2.02 |12.833    8.67 | 18.92    1.77
              0.750    1.12 | 6.833    2.08 |12.917    8.67 | 19.00    1.77
              0.833    1.15 | 6.917    2.08 |13.000    8.67 | 19.08    1.71
              0.917    1.15 | 7.000    2.08 |13.083    7.32 | 19.17    1.71
```

```
              1.000    1.15 | 7.083    2.13 |13.167    7.32 | 19.25    1.71
              1.083    1.17 | 7.167    2.13 |13.250    7.32 | 19.33    1.64
              1.167    1.17 | 7.250    2.13 |13.333    6.20 | 19.42    1.64
              1.250    1.17 | 7.333    2.19 |13.417    6.19 | 19.50    1.64
              1.333    1.20 | 7.417    2.19 |13.500    6.19 | 19.58    1.57
              1.417    1.20 | 7.500    2.19 |13.583    5.47 | 19.67    1.57
              1.500    1.20 | 7.583    2.24 |13.667    5.47 | 19.75    1.57
              1.583    1.23 | 7.667    2.24 |13.750    5.47 | 19.83    1.50
              1.667    1.23 | 7.750    2.24 |13.833    4.80 | 19.92    1.50
              1.750    1.23 | 7.833    2.30 |13.917    4.80 | 20.00    1.50
              1.833    1.25 | 7.917    2.30 |14.000    4.80 | 20.08    1.44
              1.917    1.25 | 8.000    2.30 |14.083    4.28 | 20.17    1.44
              2.000    1.25 | 8.083    2.35 |14.167    4.28 | 20.25    1.44
              2.083    1.28 | 8.167    2.35 |14.250    4.28 | 20.33    1.40
              2.167    1.28 | 8.250    2.35 |14.333    3.90 | 20.42    1.40
              2.250    1.28 | 8.333    2.52 |14.417    3.90 | 20.50    1.40
              2.333    1.31 | 8.417    2.52 |14.500    3.90 | 20.58    1.38
              2.417    1.31 | 8.500    2.52 |14.583    3.72 | 20.67    1.38
              2.500    1.31 | 8.583    2.78 |14.667    3.72 | 20.75    1.38
              2.583    1.34 | 8.667    2.78 |14.750    3.72 | 20.83    1.37
              2.667    1.34 | 8.750    2.78 |14.833    3.52 | 20.92    1.37
              2.750    1.34 | 8.833    3.06 |14.917    3.52 | 21.00    1.37
              2.833    1.36 | 8.917    3.06 |15.000    3.52 | 21.08    1.36
              2.917    1.36 | 9.000    3.06 |15.083    3.34 | 21.17    1.36
              3.000    1.36 | 9.083    3.32 |15.167    3.34 | 21.25    1.36
              3.083    1.39 | 9.167    3.32 |15.250    3.34 | 21.33    1.34
              3.167    1.39 | 9.250    3.32 |15.333    3.14 | 21.42    1.34
              3.250    1.39 | 9.333    3.46 |15.417    3.14 | 21.50    1.34
              3.333    1.42 | 9.417    3.46 |15.500    3.14 | 21.58    1.33
              3.417    1.42 | 9.500    3.46 |15.583    2.96 | 21.67    1.33
              3.500    1.42 | 9.583    3.46 |15.667    2.96 | 21.75    1.33
              3.583    1.45 | 9.667    3.46 |15.750    2.96 | 21.83    1.32
              3.667    1.45 | 9.750    3.46 |15.833    2.76 | 21.92    1.32
              3.750    1.45 | 9.833    3.68 |15.917    2.76 | 22.00    1.32
              3.833    1.47 | 9.917    3.68 |16.000    2.76 | 22.08    1.30
              3.917    1.47 |10.000    3.68 |16.083    2.58 | 22.17    1.30
              4.000    1.47 |10.083    4.10 |16.167    2.58 | 22.25    1.30
              4.083    1.50 |10.167    4.10 |16.250    2.58 | 22.33    1.29
              4.167    1.50 |10.250    4.10 |16.333    2.45 | 22.42    1.29
              4.250    1.50 |10.333    4.66 |16.417    2.45 | 22.50    1.29
              4.333    1.54 |10.417    4.66 |16.500    2.45 | 22.58    1.28
              4.417    1.54 |10.500    4.66 |16.583    2.38 | 22.67    1.28
              4.500    1.54 |10.583    5.28 |16.667    2.38 | 22.75    1.28
              4.583    1.59 |10.667    5.28 |16.750    2.38 | 22.83    1.26
              4.667    1.59 |10.750    5.28 |16.833    2.31 | 22.92    1.26
              4.750    1.59 |10.833    6.18 |16.917    2.31 | 23.00    1.26
              4.833    1.65 |10.917    6.18 |17.000    2.31 | 23.08    1.25
              4.917    1.65 |11.000    6.18 |17.083    2.25 | 23.17    1.25
              5.000    1.65 |11.083    7.21 |17.167    2.25 | 23.25    1.25
              5.083    1.70 |11.167    7.21 |17.250    2.25 | 23.33    1.24
              5.167    1.70 |11.250    7.21 |17.333    2.18 | 23.42    1.24
              5.250    1.70 |11.333    9.12 |17.417    2.18 | 23.50    1.24
```

5.333	1.76	11.417	9.12	17.500	2.18	23.58	1.22
5.417	1.76	11.500	9.12	17.583	2.11	23.67	1.22
5.500	1.76	11.583	11.61	17.667	2.11	23.75	1.22
5.583	1.81	11.667	11.61	17.750	2.11	23.83	1.21
5.667	1.81	11.750	11.61	17.833	2.04	23.92	1.21
5.750	1.81	11.833	47.33	17.917	2.04	24.00	1.21
5.833	1.86	11.917	47.34	18.000	2.04	24.08	1.19
5.917	1.86	12.000	47.34	18.083	1.98	24.17	1.19
6.000	1.86	12.083	116.82	18.167	1.98	24.25	1.19
6.083	1.92	12.167	116.82	18.250	1.98		

```
    Unit Hyd Qpeak  (cms)=   0.078

    PEAK FLOW       (cms)=   0.054 (i)
    TIME TO PEAK    (hrs)=  12.333
    RUNOFF VOLUME    (mm)=  52.476
    TOTAL RAINFALL   (mm)= 108.000
    RUNOFF COEFFICIENT   =   0.486

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.92	12.250	116.82	18.33	1.91
0.167	0.00	6.250	1.92	12.333	18.52	18.42	1.91
0.250	0.00	6.333	1.97	12.417	18.51	18.50	1.91
0.333	1.10	6.417	1.97	12.500	18.51	18.58	1.84
0.417	1.10	6.500	1.97	12.583	12.60	18.67	1.84
0.500	1.10	6.583	2.02	12.667	12.60	18.75	1.84
0.583	1.12	6.667	2.02	12.750	12.60	18.83	1.77
0.667	1.12	6.750	2.02	12.833	8.67	18.92	1.77
0.750	1.12	6.833	2.08	12.917	8.67	19.00	1.77
0.833	1.15	6.917	2.08	13.000	8.67	19.08	1.71
0.917	1.15	7.000	2.08	13.083	7.32	19.17	1.71
1.000	1.15	7.083	2.13	13.167	7.32	19.25	1.71
1.083	1.17	7.167	2.13	13.250	7.32	19.33	1.64
1.167	1.17	7.250	2.13	13.333	6.20	19.42	1.64
1.250	1.17	7.333	2.19	13.417	6.19	19.50	1.64
1.333	1.20	7.417	2.19	13.500	6.19	19.58	1.57
1.417	1.20	7.500	2.19	13.583	5.47	19.67	1.57
1.500	1.20	7.583	2.24	13.667	5.47	19.75	1.57
1.583	1.23	7.667	2.24	13.750	5.47	19.83	1.50
1.667	1.23	7.750	2.24	13.833	4.80	19.92	1.50
1.750	1.23	7.833	2.30	13.917	4.80	20.00	1.50
1.833	1.25	7.917	2.30	14.000	4.80	20.08	1.44
1.917	1.25	8.000	2.30	14.083	4.28	20.17	1.44
2.000	1.25	8.083	2.35	14.167	4.28	20.25	1.44
2.083	1.28	8.167	2.35	14.250	4.28	20.33	1.40
2.167	1.28	8.250	2.35	14.333	3.90	20.42	1.40
2.250	1.28	8.333	2.52	14.417	3.90	20.50	1.40
2.333	1.31	8.417	2.52	14.500	3.90	20.58	1.38
2.417	1.31	8.500	2.52	14.583	3.72	20.67	1.38
2.500	1.31	8.583	2.78	14.667	3.72	20.75	1.38
2.583	1.34	8.667	2.78	14.750	3.72	20.83	1.37
2.667	1.34	8.750	2.78	14.833	3.52	20.92	1.37
2.750	1.34	8.833	3.06	14.917	3.52	21.00	1.37
2.833	1.36	8.917	3.06	15.000	3.52	21.08	1.36
2.917	1.36	9.000	3.06	15.083	3.34	21.17	1.36
3.000	1.36	9.083	3.32	15.167	3.34	21.25	1.36
3.083	1.39	9.167	3.32	15.250	3.34	21.33	1.34
3.167	1.39	9.250	3.32	15.333	3.14	21.42	1.34
3.250	1.39	9.333	3.46	15.417	3.14	21.50	1.34
3.333	1.42	9.417	3.46	15.500	3.14	21.58	1.33
3.417	1.42	9.500	3.46	15.583	2.96	21.67	1.33
3.500	1.42	9.583	3.46	15.667	2.96	21.75	1.33
3.583	1.45	9.667	3.46	15.750	2.96	21.83	1.32
3.667	1.45	9.750	3.46	15.833	2.76	21.92	1.32
3.750	1.45	9.833	3.68	15.917	2.76	22.00	1.32
3.833	1.47	9.917	3.68	16.000	2.76	22.08	1.30
3.917	1.47	10.000	3.68	16.083	2.58	22.17	1.30
4.000	1.47	10.083	4.10	16.167	2.58	22.25	1.30
4.083	1.50	10.167	4.10	16.250	2.58	22.33	1.29
4.167	1.50	10.250	4.10	16.333	2.45	22.42	1.29
4.250	1.50	10.333	4.66	16.417	2.45	22.50	1.29
4.333	1.54	10.417	4.66	16.500	2.45	22.58	1.28
4.417	1.54	10.500	4.66	16.583	2.38	22.67	1.28
4.500	1.54	10.583	5.28	16.667	2.38	22.75	1.28
4.583	1.59	10.667	5.28	16.750	2.38	22.83	1.26
4.667	1.59	10.750	5.28	16.833	2.31	22.92	1.26
4.750	1.59	10.833	6.18	16.917	2.31	23.00	1.26
4.833	1.65	10.917	6.18	17.000	2.31	23.08	1.25
4.917	1.65	11.000	6.18	17.083	2.25	23.17	1.25
5.000	1.65	11.083	7.21	17.167	2.25	23.25	1.25
5.083	1.70	11.167	7.21	17.250	2.25	23.33	1.24
5.167	1.70	11.250	7.21	17.333	2.18	23.42	1.24
5.250	1.70	11.333	9.12	17.417	2.18	23.50	1.24
5.333	1.76	11.417	9.12	17.500	2.18	23.58	1.22
5.417	1.76	11.500	9.12	17.583	2.11	23.67	1.22
5.500	1.76	11.583	11.61	17.667	2.11	23.75	1.22
5.583	1.81	11.667	11.61	17.750	2.11	23.83	1.21
5.667	1.81	11.750	11.61	17.833	2.04	23.92	1.21
5.750	1.81	11.833	47.33	17.917	2.04	24.00	1.21
5.833	1.86	11.917	47.34	18.000	2.04	24.08	1.19

5.917	1.86	12.000	47.34	18.083	1.98	24.17	1.19
6.000	1.86	12.083	116.82	18.167	1.98	24.25	1.19
6.083	1.92	12.167	116.82	18.250	1.98		

Unit Hyd Qpeak (cms)= 0.356

PEAK FLOW (cms)= 0.243 (i)
TIME TO PEAK (hrs)= 12.333
RUNOFF VOLUME (mm)= 49.969
TOTAL RAINFALL (mm)= 108.000
RUNOFF COEFFICIENT = 0.463

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

| CALIB |
| STANDHYD (0036)| Area (ha)= 5.32
|ID= 1 DT= 5.0 min | Total Imp(%)= 50.00 Dir. Conn.(%)= 35.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.66	2.66
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	1.00
Length	(m)=	188.33	40.00
Mannings n	=	0.130	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.92	12.250	116.82	18.33	1.91
0.167	0.00	6.250	1.92	12.333	18.52	18.42	1.91
0.250	0.00	6.333	1.97	12.417	18.51	18.50	1.91
0.333	1.10	6.417	1.97	12.500	18.51	18.58	1.84
0.417	1.10	6.500	1.97	12.583	12.60	18.67	1.84
0.500	1.10	6.583	2.02	12.667	12.60	18.75	1.84
0.583	1.12	6.667	2.02	12.750	12.60	18.83	1.77
0.667	1.12	6.750	2.02	12.833	8.67	18.92	1.77
0.750	1.12	6.833	2.08	12.917	8.67	19.00	1.77
0.833	1.15	6.917	2.08	13.000	8.67	19.08	1.71
0.917	1.15	7.000	2.08	13.083	7.32	19.17	1.71
1.000	1.15	7.083	2.13	13.167	7.32	19.25	1.71
1.083	1.17	7.167	2.13	13.250	7.32	19.33	1.64
1.167	1.17	7.250	2.13	13.333	6.20	19.42	1.64
1.250	1.17	7.333	2.19	13.417	6.19	19.50	1.64
1.333	1.20	7.417	2.19	13.500	6.19	19.58	1.57
1.417	1.20	7.500	2.19	13.583	5.47	19.67	1.57
1.500	1.20	7.583	2.24	13.667	5.47	19.75	1.57
1.583	1.23	7.667	2.24	13.750	5.47	19.83	1.50
1.667	1.23	7.750	2.24	13.833	4.80	19.92	1.50
1.750	1.23	7.833	2.30	13.917	4.80	20.00	1.50
1.833	1.25	7.917	2.30	14.000	4.80	20.08	1.44
1.917	1.25	8.000	2.30	14.083	4.28	20.17	1.44
2.000	1.25	8.083	2.35	14.167	4.28	20.25	1.44
2.083	1.28	8.167	2.35	14.250	4.28	20.33	1.40
2.167	1.28	8.250	2.35	14.333	3.90	20.42	1.40
2.250	1.28	8.333	2.52	14.417	3.90	20.50	1.40
2.333	1.31	8.417	2.52	14.500	3.90	20.58	1.38
2.417	1.31	8.500	2.52	14.583	3.72	20.67	1.38
2.500	1.31	8.583	2.78	14.667	3.72	20.75	1.38
2.583	1.34	8.667	2.78	14.750	3.72	20.83	1.37
2.667	1.34	8.750	2.78	14.833	3.52	20.92	1.37
2.750	1.34	8.833	3.06	14.917	3.52	21.00	1.37
2.833	1.36	8.917	3.06	15.000	3.52	21.08	1.36
2.917	1.36	9.000	3.06	15.083	3.34	21.17	1.36
3.000	1.36	9.083	3.32	15.167	3.34	21.25	1.36
3.083	1.39	9.167	3.32	15.250	3.34	21.33	1.34
3.167	1.39	9.250	3.32	15.333	3.14	21.42	1.34
3.250	1.39	9.333	3.46	15.417	3.14	21.50	1.34
3.333	1.42	9.417	3.46	15.500	3.14	21.58	1.33
3.417	1.42	9.500	3.46	15.583	2.96	21.67	1.33
3.500	1.42	9.583	3.46	15.667	2.96	21.75	1.33
3.583	1.45	9.667	3.46	15.750	2.96	21.83	1.32
3.667	1.45	9.750	3.46	15.833	2.76	21.92	1.32
3.750	1.45	9.833	3.68	15.917	2.76	22.00	1.32
3.833	1.47	9.917	3.68	16.000	2.76	22.08	1.30
3.917	1.47	10.000	3.68	16.083	2.58	22.17	1.30
4.000	1.47	10.083	4.10	16.167	2.58	22.25	1.30
4.083	1.50	10.167	4.10	16.250	2.58	22.33	1.29
4.167	1.50	10.250	4.10	16.333	2.45	22.42	1.29
4.250	1.50	10.333	4.66	16.417	2.45	22.50	1.29
4.333	1.54	10.417	4.66	16.500	2.45	22.58	1.28
4.417	1.54	10.500	4.66	16.583	2.38	22.67	1.28
4.500	1.54	10.583	5.28	16.667	2.38	22.75	1.28
4.583	1.59	10.667	5.28	16.750	2.38	22.83	1.26
4.667	1.59	10.750	5.28	16.833	2.31	22.92	1.26
4.750	1.59	10.833	6.18	16.917	2.31	23.00	1.26
4.833	1.65	10.917	6.18	17.000	2.31	23.08	1.25
4.917	1.65	11.000	6.18	17.083	2.25	23.17	1.25
5.000	1.65	11.083	7.21	17.167	2.25	23.25	1.25
5.083	1.70	11.167	7.21	17.250	2.25	23.33	1.24
5.167	1.70	11.250	7.21	17.333	2.18	23.42	1.24
5.250	1.70	11.333	9.12	17.417	2.18	23.50	1.24
5.333	1.76	11.417	9.12	17.500	2.18	23.58	1.22
5.417	1.76	11.500	9.12	17.583	2.11	23.67	1.22
5.500	1.76	11.583	11.61	17.667	2.11	23.75	1.22
5.583	1.81	11.667	11.61	17.750	2.11	23.83	1.21
5.667	1.81	11.750	11.61	17.833	2.04	23.92	1.21
5.750	1.81	11.833	47.33	17.917	2.04	24.00	1.21
5.833	1.86	11.917	47.34	18.000	2.04	24.08	1.19
5.917	1.86	12.000	47.34	18.083	1.98	24.17	1.19

6.000	1.86	12.083	116.82	18.167	1.98	24.25	1.19
6.083	1.92	12.167	116.82	18.250	1.98		

```
    Max.Eff.Inten.(mm/hr)=     116.82        77.14
              over (min)       15.00        25.00
    Storage Coeff.  (min)=      13.97 (ii)   23.61 (ii)
    Unit Hyd. Tpeak (min)=      15.00        25.00
    Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.41         0.25          0.611 (iii)
    TIME TO PEAK    (hrs)=      12.33        12.50          12.42
    RUNOFF VOLUME    (mm)=     107.00        45.21          66.84
    TOTAL RAINFALL   (mm)=     108.00       108.00         108.00
    RUNOFF COEFFICIENT   =       0.99         0.42           0.62


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0040)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.92	12.250	116.82	18.33	1.91
0.167	0.00	6.250	1.92	12.333	18.52	18.42	1.91
0.250	0.00	6.333	1.97	12.417	18.51	18.50	1.91
0.333	1.10	6.417	1.97	12.500	18.51	18.58	1.84
0.417	1.10	6.500	1.97	12.583	12.60	18.67	1.84
0.500	1.10	6.583	2.02	12.667	12.60	18.75	1.84
0.583	1.12	6.667	2.02	12.750	12.60	18.83	1.77
0.667	1.12	6.750	2.02	12.833	8.67	18.92	1.77
0.750	1.12	6.833	2.08	12.917	8.67	19.00	1.77
0.833	1.15	6.917	2.08	13.000	8.67	19.08	1.71
0.917	1.15	7.000	2.08	13.083	7.32	19.17	1.71
1.000	1.15	7.083	2.13	13.167	7.32	19.25	1.71
1.083	1.17	7.167	2.13	13.250	7.32	19.33	1.64
1.167	1.17	7.250	2.13	13.333	6.20	19.42	1.64
1.250	1.17	7.333	2.19	13.417	6.19	19.50	1.64
1.333	1.20	7.417	2.19	13.500	6.19	19.58	1.57
1.417	1.20	7.500	2.19	13.583	5.47	19.67	1.57
1.500	1.20	7.583	2.24	13.667	5.47	19.75	1.57
1.583	1.23	7.667	2.24	13.750	5.47	19.83	1.50
1.667	1.23	7.750	2.24	13.833	4.80	19.92	1.50
1.750	1.23	7.833	2.30	13.917	4.80	20.00	1.50
1.833	1.25	7.917	2.30	14.000	4.80	20.08	1.44
1.917	1.25	8.000	2.30	14.083	4.28	20.17	1.44
2.000	1.25	8.083	2.35	14.167	4.28	20.25	1.44
2.083	1.28	8.167	2.35	14.250	4.28	20.33	1.40
2.167	1.28	8.250	2.35	14.333	3.90	20.42	1.40
2.250	1.28	8.333	2.52	14.417	3.90	20.50	1.40
2.333	1.31	8.417	2.52	14.500	3.90	20.58	1.38
2.417	1.31	8.500	2.52	14.583	3.72	20.67	1.38
2.500	1.31	8.583	2.78	14.667	3.72	20.75	1.38
2.583	1.34	8.667	2.78	14.750	3.72	20.83	1.37
2.667	1.34	8.750	2.78	14.833	3.52	20.92	1.37
2.750	1.34	8.833	3.06	14.917	3.52	21.00	1.37
2.833	1.36	8.917	3.06	15.000	3.52	21.08	1.36
2.917	1.36	9.000	3.06	15.083	3.34	21.17	1.36
3.000	1.36	9.083	3.32	15.167	3.34	21.25	1.36
3.083	1.39	9.167	3.32	15.250	3.34	21.33	1.34
3.167	1.39	9.250	3.32	15.333	3.14	21.42	1.34
3.250	1.39	9.333	3.46	15.417	3.14	21.50	1.34
3.333	1.42	9.417	3.46	15.500	3.14	21.58	1.33
3.417	1.42	9.500	3.46	15.583	2.96	21.67	1.33
3.500	1.42	9.583	3.46	15.667	2.96	21.75	1.33
3.583	1.45	9.667	3.46	15.750	2.96	21.83	1.32
3.667	1.45	9.750	3.46	15.833	2.76	21.92	1.32
3.750	1.45	9.833	3.68	15.917	2.76	22.00	1.32
3.833	1.47	9.917	3.68	16.000	2.76	22.08	1.30
3.917	1.47	10.000	3.68	16.083	2.58	22.17	1.30
4.000	1.47	10.083	4.10	16.167	2.58	22.25	1.30
4.083	1.50	10.167	4.10	16.250	2.58	22.33	1.29
4.167	1.50	10.250	4.10	16.333	2.45	22.42	1.29
4.250	1.50	10.333	4.66	16.417	2.45	22.50	1.29
4.333	1.54	10.417	4.66	16.500	2.45	22.58	1.28
4.417	1.54	10.500	4.66	16.583	2.38	22.67	1.28
4.500	1.54	10.583	5.28	16.667	2.38	22.75	1.28
4.583	1.59	10.667	5.28	16.750	2.38	22.83	1.26
4.667	1.59	10.750	5.28	16.833	2.31	22.92	1.26
4.750	1.59	10.833	6.18	16.917	2.31	23.00	1.26
4.833	1.65	10.917	6.18	17.000	2.31	23.08	1.25
4.917	1.65	11.000	6.18	17.083	2.25	23.17	1.25
5.000	1.65	11.083	7.21	17.167	2.25	23.25	1.25
5.083	1.70	11.167	7.21	17.250	2.25	23.33	1.24
5.167	1.70	11.250	7.21	17.333	2.18	23.42	1.24
5.250	1.70	11.333	9.12	17.417	2.18	23.50	1.24

```
              5.333    1.76 |11.417    9.12 |17.500    2.18 | 23.58    1.22
              5.417    1.76 |11.500    9.12 |17.583    2.11 | 23.67    1.22
              5.500    1.76 |11.583   11.61 |17.667    2.11 | 23.75    1.22
              5.583    1.81 |11.667   11.61 |17.750    2.11 | 23.83    1.21
              5.667    1.81 |11.750   11.61 |17.833    2.04 | 23.92    1.21
              5.750    1.81 |11.833   47.33 |17.917    2.04 | 24.00    1.21
              5.833    1.86 |11.917   47.34 |18.000    2.04 | 24.08    1.19
              5.917    1.86 |12.000   47.34 |18.083    1.98 | 24.17    1.19
              6.000    1.86 |12.083  116.82 |18.167    1.98 | 24.25    1.19
              6.083    1.92 |12.167  116.82 |18.250    1.98 |

     Max.Eff.Inten.(mm/hr)=     116.82        77.14
               over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.08 (ii)   10.91 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.39         0.25         0.606 (iii)
     TIME TO PEAK    (hrs)=      12.25        12.33         12.25
     RUNOFF VOLUME    (mm)=     107.00        45.21         66.84
     TOTAL RAINFALL   (mm)=     108.00       108.00        108.00
     RUNOFF COEFFICIENT   =       0.99         0.42          0.62

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.054    12.33    52.48
      + ID2= 2 (  0036):     5.32   0.611    12.42    66.84
        ====================================================
        ID = 3 (  0041):     5.73   0.658    12.42    65.81

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.658    12.42    65.81
      + ID2= 2 (  0037):     2.05   0.243    12.33    49.97
        ====================================================
        ID = 1 (  0041):     7.78   0.900    12.33    61.64

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

--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.900    12.33    61.64
      + ID2= 2 (  0040):     3.43   0.606    12.25    66.84
        ====================================================
        ID = 3 (  0041):    11.21   1.408    12.25    63.23

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83  Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00  # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.00 | 6.167    1.92 |12.250  116.82 | 18.33    1.91
              0.167    0.00 | 6.250    1.92 |12.333   18.52 | 18.42    1.91
              0.250    0.00 | 6.333    1.97 |12.417   18.51 | 18.50    1.91
              0.333    1.10 | 6.417    1.97 |12.500   18.51 | 18.58    1.84
              0.417    1.10 | 6.500    1.97 |12.583   12.60 | 18.67    1.84
              0.500    1.10 | 6.583    2.02 |12.667   12.60 | 18.75    1.84
              0.583    1.12 | 6.667    2.02 |12.750   12.60 | 18.83    1.77
              0.667    1.12 | 6.750    2.02 |12.833    8.67 | 18.92    1.77
              0.750    1.12 | 6.833    2.08 |12.917    8.67 | 19.00    1.77
              0.833    1.15 | 6.917    2.08 |13.000    8.67 | 19.08    1.71
              0.917    1.15 | 7.000    2.08 |13.083    7.32 | 19.17    1.71
              1.000    1.15 | 7.083    2.13 |13.167    7.32 | 19.25    1.71
              1.083    1.17 | 7.167    2.13 |13.250    7.32 | 19.33    1.64
              1.167    1.17 | 7.250    2.13 |13.333    6.20 | 19.42    1.64
              1.250    1.17 | 7.333    2.19 |13.417    6.19 | 19.50    1.64
              1.333    1.20 | 7.417    2.19 |13.500    6.19 | 19.58    1.57
              1.417    1.20 | 7.500    2.19 |13.583    5.47 | 19.67    1.57
              1.500    1.20 | 7.583    2.24 |13.667    5.47 | 19.75    1.57
              1.583    1.23 | 7.667    2.24 |13.750    5.47 | 19.83    1.50
              1.667    1.23 | 7.750    2.24 |13.833    4.80 | 19.92    1.50
              1.750    1.23 | 7.833    2.30 |13.917    4.80 | 20.00    1.50
              1.833    1.25 | 7.917    2.30 |14.000    4.80 | 20.08    1.44
              1.917    1.25 | 8.000    2.30 |14.083    4.28 | 20.17    1.44
              2.000    1.25 | 8.083    2.35 |14.167    4.28 | 20.25    1.44
```

```
      2.083    1.28 | 8.167    2.35 |14.250    4.28 | 20.33    1.40
      2.167    1.28 | 8.250    2.35 |14.333    3.90 | 20.42    1.40
      2.250    1.28 | 8.333    2.52 |14.417    3.90 | 20.50    1.40
      2.333    1.31 | 8.417    2.52 |14.500    3.90 | 20.58    1.38
      2.417    1.31 | 8.500    2.52 |14.583    3.72 | 20.67    1.38
      2.500    1.31 | 8.583    2.78 |14.667    3.72 | 20.75    1.38
      2.583    1.34 | 8.667    2.78 |14.750    3.72 | 20.83    1.37
      2.667    1.34 | 8.750    2.78 |14.833    3.52 | 20.92    1.37
      2.750    1.34 | 8.833    3.06 |14.917    3.52 | 21.00    1.37
      2.833    1.36 | 8.917    3.06 |15.000    3.52 | 21.08    1.36
      2.917    1.36 | 9.000    3.06 |15.083    3.34 | 21.17    1.36
      3.000    1.36 | 9.083    3.32 |15.167    3.34 | 21.25    1.36
      3.083    1.39 | 9.167    3.32 |15.250    3.34 | 21.33    1.34
      3.167    1.39 | 9.250    3.32 |15.333    3.14 | 21.42    1.34
      3.250    1.39 | 9.333    3.46 |15.417    3.14 | 21.50    1.34
      3.333    1.42 | 9.417    3.46 |15.500    3.14 | 21.58    1.33
      3.417    1.42 | 9.500    3.46 |15.583    2.96 | 21.67    1.33
      3.500    1.42 | 9.583    3.46 |15.667    2.96 | 21.75    1.33
      3.583    1.45 | 9.667    3.46 |15.750    2.96 | 21.83    1.32
      3.667    1.45 | 9.750    3.46 |15.833    2.76 | 21.92    1.32
      3.750    1.45 | 9.833    3.68 |15.917    2.76 | 22.00    1.32
      3.833    1.47 | 9.917    3.68 |16.000    2.76 | 22.08    1.30
      3.917    1.47 |10.000    3.68 |16.083    2.58 | 22.17    1.30
      4.000    1.47 |10.083    4.10 |16.167    2.58 | 22.25    1.30
      4.083    1.50 |10.167    4.10 |16.250    2.58 | 22.33    1.29
      4.167    1.50 |10.250    4.10 |16.333    2.45 | 22.42    1.29
      4.250    1.50 |10.333    4.66 |16.417    2.45 | 22.50    1.29
      4.333    1.54 |10.417    4.66 |16.500    2.45 | 22.58    1.28
      4.417    1.54 |10.500    4.66 |16.583    2.38 | 22.67    1.28
      4.500    1.54 |10.583    5.28 |16.667    2.38 | 22.75    1.28
      4.583    1.59 |10.667    5.28 |16.750    2.38 | 22.83    1.26
      4.667    1.59 |10.750    5.28 |16.833    2.31 | 22.92    1.26
      4.750    1.59 |10.833    6.18 |16.917    2.31 | 23.00    1.26
      4.833    1.65 |10.917    6.18 |17.000    2.31 | 23.08    1.25
      4.917    1.65 |11.000    6.18 |17.083    2.25 | 23.17    1.25
      5.000    1.65 |11.083    7.21 |17.167    2.25 | 23.25    1.25
      5.083    1.70 |11.167    7.21 |17.250    2.25 | 23.33    1.24
      5.167    1.70 |11.250    7.21 |17.333    2.18 | 23.42    1.24
      5.250    1.70 |11.333    9.12 |17.417    2.18 | 23.50    1.24
      5.333    1.76 |11.417    9.12 |17.500    2.18 | 23.58    1.22
      5.417    1.76 |11.500    9.12 |17.583    2.11 | 23.67    1.22
      5.500    1.76 |11.583   11.61 |17.667    2.11 | 23.75    1.22
      5.583    1.81 |11.667   11.61 |17.750    2.11 | 23.83    1.21
      5.667    1.81 |11.750   11.61 |17.833    2.04 | 23.92    1.21
      5.750    1.81 |11.833   47.33 |17.917    2.04 | 24.00    1.21
      5.833    1.86 |11.917   47.34 |18.000    2.04 | 24.08    1.19
      5.917    1.86 |12.000   47.34 |18.083    1.98 | 24.17    1.19
      6.000    1.86 |12.083  116.82 |18.167    1.98 | 24.25    1.19
      6.083    1.92 |12.167  116.82 |18.250    1.98 |

Unit Hyd Qpeak  (cms)=   0.167
```

```
     PEAK FLOW       (cms)=   0.111 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  52.454
     TOTAL RAINFALL   (mm)= 108.000
     RUNOFF COEFFICIENT   =   0.486

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

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


--------------------
| ADD HYD  (  0032)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0039):     0.83   0.111    12.33    52.45
      + ID2= 2 (  0041):    11.21   1.408    12.25    63.23
        ====================================================
        ID = 3 (  0032):    12.04   1.516    12.25    62.48

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*********************************************
** SIMULATION:3-5yr 24hr 15min SCS Type II **
*********************************************
--------------------
| CALIB            |
| NASHYD   (  0033)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                               ---- TRANSFORMED HYETOGRAPH ----
                    TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                     hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                   0.083    0.00 | 6.167    1.23 |12.250   75.29 | 18.33    1.23
                   0.167    0.00 | 6.250    1.23 |12.333   11.93 | 18.42    1.23
                   0.250    0.00 | 6.333    1.27 |12.417   11.93 | 18.50    1.23
                   0.333    0.71 | 6.417    1.27 |12.500   11.93 | 18.58    1.19
                   0.417    0.71 | 6.500    1.27 |12.583    8.12 | 18.67    1.19
                   0.500    0.71 | 6.583    1.30 |12.667    8.12 | 18.75    1.19
                   0.583    0.72 | 6.667    1.30 |12.750    8.12 | 18.83    1.14
                   0.667    0.72 | 6.750    1.30 |12.833    5.59 | 18.92    1.14
                   0.750    0.72 | 6.833    1.34 |12.917    5.58 | 19.00    1.14
                   0.833    0.74 | 6.917    1.34 |13.000    5.58 | 19.08    1.10
                   0.917    0.74 | 7.000    1.34 |13.083    4.72 | 19.17    1.10
                   1.000    0.74 | 7.083    1.37 |13.167    4.72 | 19.25    1.10
                   1.083    0.76 | 7.167    1.37 |13.250    4.72 | 19.33    1.06
                   1.167    0.76 | 7.250    1.37 |13.333    3.99 | 19.42    1.06
                   1.250    0.76 | 7.333    1.41 |13.417    3.99 | 19.50    1.06
                   1.333    0.78 | 7.417    1.41 |13.500    3.99 | 19.58    1.01
```

```
 1.417    0.78 | 7.500    1.41 |13.583    3.52 | 19.67    1.01
 1.500    0.78 | 7.583    1.44 |13.667    3.52 | 19.75    1.01
 1.583    0.79 | 7.667    1.44 |13.750    3.52 | 19.83    0.97
 1.667    0.79 | 7.750    1.44 |13.833    3.09 | 19.92    0.97
 1.750    0.79 | 7.833    1.48 |13.917    3.09 | 20.00    0.97
 1.833    0.81 | 7.917    1.48 |14.000    3.09 | 20.08    0.93
 1.917    0.81 | 8.000    1.48 |14.083    2.76 | 20.17    0.93
 2.000    0.81 | 8.083    1.51 |14.167    2.76 | 20.25    0.93
 2.083    0.83 | 8.167    1.51 |14.250    2.76 | 20.33    0.90
 2.167    0.83 | 8.250    1.51 |14.333    2.51 | 20.42    0.90
 2.250    0.83 | 8.333    1.62 |14.417    2.51 | 20.50    0.90
 2.333    0.84 | 8.417    1.62 |14.500    2.51 | 20.58    0.89
 2.417    0.84 | 8.500    1.62 |14.583    2.40 | 20.67    0.89
 2.500    0.84 | 8.583    1.79 |14.667    2.40 | 20.75    0.89
 2.583    0.86 | 8.667    1.79 |14.750    2.40 | 20.83    0.88
 2.667    0.86 | 8.750    1.79 |14.833    2.27 | 20.92    0.88
 2.750    0.86 | 8.833    1.97 |14.917    2.27 | 21.00    0.88
 2.833    0.88 | 8.917    1.97 |15.000    2.27 | 21.08    0.87
 2.917    0.88 | 9.000    1.97 |15.083    2.15 | 21.17    0.87
 3.000    0.88 | 9.083    2.14 |15.167    2.15 | 21.25    0.87
 3.083    0.90 | 9.167    2.14 |15.250    2.15 | 21.33    0.87
 3.167    0.90 | 9.250    2.14 |15.333    2.03 | 21.42    0.87
 3.250    0.90 | 9.333    2.23 |15.417    2.03 | 21.50    0.87
 3.333    0.91 | 9.417    2.23 |15.500    2.03 | 21.58    0.86
 3.417    0.91 | 9.500    2.23 |15.583    1.91 | 21.67    0.86
 3.500    0.91 | 9.583    2.23 |15.667    1.91 | 21.75    0.86
 3.583    0.93 | 9.667    2.23 |15.750    1.91 | 21.83    0.85
 3.667    0.93 | 9.750    2.23 |15.833    1.78 | 21.92    0.85
 3.750    0.93 | 9.833    2.37 |15.917    1.78 | 22.00    0.85
 3.833    0.95 | 9.917    2.37 |16.000    1.78 | 22.08    0.84
 3.917    0.95 |10.000    2.37 |16.083    1.66 | 22.17    0.84
 4.000    0.95 |10.083    2.64 |16.167    1.66 | 22.25    0.84
 4.083    0.96 |10.167    2.64 |16.250    1.66 | 22.33    0.83
 4.167    0.96 |10.250    2.64 |16.333    1.58 | 22.42    0.83
 4.250    0.96 |10.333    3.00 |16.417    1.58 | 22.50    0.83
 4.333    0.99 |10.417    3.00 |16.500    1.58 | 22.58    0.82
 4.417    0.99 |10.500    3.00 |16.583    1.54 | 22.67    0.82
 4.500    0.99 |10.583    3.40 |16.667    1.54 | 22.75    0.82
 4.583    1.03 |10.667    3.40 |16.750    1.54 | 22.83    0.81
 4.667    1.03 |10.750    3.40 |16.833    1.49 | 22.92    0.81
 4.750    1.03 |10.833    3.98 |16.917    1.49 | 23.00    0.81
 4.833    1.06 |10.917    3.98 |17.000    1.49 | 23.08    0.80
 4.917    1.06 |11.000    3.98 |17.083    1.45 | 23.17    0.80
 5.000    1.06 |11.083    4.65 |17.167    1.45 | 23.25    0.80
 5.083    1.10 |11.167    4.65 |17.250    1.45 | 23.33    0.80
 5.167    1.10 |11.250    4.65 |17.333    1.40 | 23.42    0.80
 5.250    1.10 |11.333    5.88 |17.417    1.40 | 23.50    0.80
 5.333    1.13 |11.417    5.88 |17.500    1.40 | 23.58    0.79
 5.417    1.13 |11.500    5.88 |17.583    1.36 | 23.67    0.79
 5.500    1.13 |11.583    7.48 |17.667    1.36 | 23.75    0.79
 5.583    1.17 |11.667    7.48 |17.750    1.36 | 23.83    0.78
 5.667    1.17 |11.750    7.48 |17.833    1.32 | 23.92    0.78
 5.750    1.17 |11.833   30.50 |17.917    1.32 | 24.00    0.78
 5.833    1.20 |11.917   30.51 |18.000    1.32 | 24.08    0.77
 5.917    1.20 |12.000   30.51 |18.083    1.28 | 24.17    0.77
 6.000    1.20 |12.083   75.28 |18.167    1.28 | 24.25    0.77
 6.083    1.23 |12.167   75.29 |18.250    1.28 |
```

```
     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.025 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  24.574
     TOTAL RAINFALL   (mm)=  69.600
     RUNOFF COEFFICIENT   =   0.353

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0037)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                            ---- TRANSFORMED HYETOGRAPH ----
              TIME     RAIN |   TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
               hrs    mm/hr |    hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
             0.083     0.00 | 6.167     1.23 |12.250    75.29 | 18.33     1.23
             0.167     0.00 | 6.250     1.23 |12.333    11.93 | 18.42     1.23
             0.250     0.00 | 6.333     1.27 |12.417    11.93 | 18.50     1.23
             0.333     0.71 | 6.417     1.27 |12.500    11.93 | 18.58     1.19
             0.417     0.71 | 6.500     1.27 |12.583     8.12 | 18.67     1.19
             0.500     0.71 | 6.583     1.30 |12.667     8.12 | 18.75     1.19
             0.583     0.72 | 6.667     1.30 |12.750     8.12 | 18.83     1.14
             0.667     0.72 | 6.750     1.30 |12.833     5.59 | 18.92     1.14
             0.750     0.72 | 6.833     1.34 |12.917     5.58 | 19.00     1.14
             0.833     0.74 | 6.917     1.34 |13.000     5.58 | 19.08     1.10
             0.917     0.74 | 7.000     1.34 |13.083     4.72 | 19.17     1.10
             1.000     0.74 | 7.083     1.37 |13.167     4.72 | 19.25     1.10
             1.083     0.76 | 7.167     1.37 |13.250     4.72 | 19.33     1.06
             1.167     0.76 | 7.250     1.37 |13.333     3.99 | 19.42     1.06
             1.250     0.76 | 7.333     1.41 |13.417     3.99 | 19.50     1.06
             1.333     0.78 | 7.417     1.41 |13.500     3.99 | 19.58     1.01
             1.417     0.78 | 7.500     1.41 |13.583     3.52 | 19.67     1.01
             1.500     0.78 | 7.583     1.44 |13.667     3.52 | 19.75     1.01
             1.583     0.79 | 7.667     1.44 |13.750     3.52 | 19.83     0.97
             1.667     0.79 | 7.750     1.44 |13.833     3.09 | 19.92     0.97
             1.750     0.79 | 7.833     1.48 |13.917     3.09 | 20.00     0.97
             1.833     0.81 | 7.917     1.48 |14.000     3.09 | 20.08     0.93
             1.917     0.81 | 8.000     1.48 |14.083     2.76 | 20.17     0.93
```

```
         2.000    0.81 | 8.083    1.51 |14.167    2.76 | 20.25    0.93
         2.083    0.83 | 8.167    1.51 |14.250    2.76 | 20.33    0.90
         2.167    0.83 | 8.250    1.51 |14.333    2.51 | 20.42    0.90
         2.250    0.83 | 8.333    1.62 |14.417    2.51 | 20.50    0.90
         2.333    0.84 | 8.417    1.62 |14.500    2.51 | 20.58    0.89
         2.417    0.84 | 8.500    1.62 |14.583    2.40 | 20.67    0.89
         2.500    0.84 | 8.583    1.79 |14.667    2.40 | 20.75    0.89
         2.583    0.86 | 8.667    1.79 |14.750    2.40 | 20.83    0.88
         2.667    0.86 | 8.750    1.79 |14.833    2.27 | 20.92    0.88
         2.750    0.86 | 8.833    1.97 |14.917    2.27 | 21.00    0.88
         2.833    0.88 | 8.917    1.97 |15.000    2.27 | 21.08    0.87
         2.917    0.88 | 9.000    1.97 |15.083    2.15 | 21.17    0.87
         3.000    0.88 | 9.083    2.14 |15.167    2.15 | 21.25    0.87
         3.083    0.90 | 9.167    2.14 |15.250    2.15 | 21.33    0.87
         3.167    0.90 | 9.250    2.14 |15.333    2.03 | 21.42    0.87
         3.250    0.90 | 9.333    2.23 |15.417    2.03 | 21.50    0.87
         3.333    0.91 | 9.417    2.23 |15.500    2.03 | 21.58    0.86
         3.417    0.91 | 9.500    2.23 |15.583    1.91 | 21.67    0.86
         3.500    0.91 | 9.583    2.23 |15.667    1.91 | 21.75    0.86
         3.583    0.93 | 9.667    2.23 |15.750    1.91 | 21.83    0.85
         3.667    0.93 | 9.750    2.23 |15.833    1.78 | 21.92    0.85
         3.750    0.93 | 9.833    2.37 |15.917    1.78 | 22.00    0.85
         3.833    0.95 | 9.917    2.37 |16.000    1.78 | 22.08    0.84
         3.917    0.95 |10.000    2.37 |16.083    1.66 | 22.17    0.84
         4.000    0.95 |10.083    2.64 |16.167    1.66 | 22.25    0.84
         4.083    0.96 |10.167    2.64 |16.250    1.66 | 22.33    0.83
         4.167    0.96 |10.250    2.64 |16.333    1.58 | 22.42    0.83
         4.250    0.96 |10.333    3.00 |16.417    1.58 | 22.50    0.83
         4.333    0.99 |10.417    3.00 |16.500    1.58 | 22.58    0.82
         4.417    0.99 |10.500    3.00 |16.583    1.54 | 22.67    0.82
         4.500    0.99 |10.583    3.40 |16.667    1.54 | 22.75    0.82
         4.583    1.03 |10.667    3.40 |16.750    1.54 | 22.83    0.81
         4.667    1.03 |10.750    3.40 |16.833    1.49 | 22.92    0.81
         4.750    1.03 |10.833    3.98 |16.917    1.49 | 23.00    0.81
         4.833    1.06 |10.917    3.98 |17.000    1.49 | 23.08    0.80
         4.917    1.06 |11.000    3.98 |17.083    1.45 | 23.17    0.80
         5.000    1.06 |11.083    4.65 |17.167    1.45 | 23.25    0.80
         5.083    1.10 |11.167    4.65 |17.250    1.45 | 23.33    0.80
         5.167    1.10 |11.250    4.65 |17.333    1.40 | 23.42    0.80
         5.250    1.10 |11.333    5.88 |17.417    1.40 | 23.50    0.80
         5.333    1.13 |11.417    5.88 |17.500    1.40 | 23.58    0.79
         5.417    1.13 |11.500    5.88 |17.583    1.36 | 23.67    0.79
         5.500    1.13 |11.583    7.48 |17.667    1.36 | 23.75    0.79
         5.583    1.17 |11.667    7.48 |17.750    1.36 | 23.83    0.78
         5.667    1.17 |11.750    7.48 |17.833    1.32 | 23.92    0.78
         5.750    1.17 |11.833   30.50 |17.917    1.32 | 24.00    0.78
         5.833    1.20 |11.917   30.51 |18.000    1.32 | 24.08    0.77
         5.917    1.20 |12.000   30.51 |18.083    1.28 | 24.17    0.77
         6.000    1.20 |12.083   75.28 |18.167    1.28 | 24.25    0.77
         6.083    1.23 |12.167   75.29 |18.250    1.28 |

 Unit Hyd Qpeak  (cms)=   0.356
```

```
     PEAK FLOW       (cms)=   0.109 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  23.104
     TOTAL RAINFALL   (mm)=  69.600
     RUNOFF COEFFICIENT   =   0.332

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

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0036)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n           =      0.130        0.250

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


                             ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    0.00 | 6.167    1.23 |12.250   75.29 | 18.33    1.23
                  0.167    0.00 | 6.250    1.23 |12.333   11.93 | 18.42    1.23
                  0.250    0.00 | 6.333    1.27 |12.417   11.93 | 18.50    1.23
                  0.333    0.71 | 6.417    1.27 |12.500   11.93 | 18.58    1.19
                  0.417    0.71 | 6.500    1.27 |12.583    8.12 | 18.67    1.19
                  0.500    0.71 | 6.583    1.30 |12.667    8.12 | 18.75    1.19
                  0.583    0.72 | 6.667    1.30 |12.750    8.12 | 18.83    1.14
                  0.667    0.72 | 6.750    1.30 |12.833    5.59 | 18.92    1.14
                  0.750    0.72 | 6.833    1.34 |12.917    5.58 | 19.00    1.14
                  0.833    0.74 | 6.917    1.34 |13.000    5.58 | 19.08    1.10
                  0.917    0.74 | 7.000    1.34 |13.083    4.72 | 19.17    1.10
                  1.000    0.74 | 7.083    1.37 |13.167    4.72 | 19.25    1.10
                  1.083    0.76 | 7.167    1.37 |13.250    4.72 | 19.33    1.06
                  1.167    0.76 | 7.250    1.37 |13.333    3.99 | 19.42    1.06
                  1.250    0.76 | 7.333    1.41 |13.417    3.99 | 19.50    1.06
                  1.333    0.78 | 7.417    1.41 |13.500    3.99 | 19.58    1.01
                  1.417    0.78 | 7.500    1.41 |13.583    3.52 | 19.67    1.01
                  1.500    0.78 | 7.583    1.44 |13.667    3.52 | 19.75    1.01
                  1.583    0.79 | 7.667    1.44 |13.750    3.52 | 19.83    0.97
                  1.667    0.79 | 7.750    1.44 |13.833    3.09 | 19.92    0.97
                  1.750    0.79 | 7.833    1.48 |13.917    3.09 | 20.00    0.97
                  1.833    0.81 | 7.917    1.48 |14.000    3.09 | 20.08    0.93
                  1.917    0.81 | 8.000    1.48 |14.083    2.76 | 20.17    0.93
                  2.000    0.81 | 8.083    1.51 |14.167    2.76 | 20.25    0.93
```

2.083	0.83	8.167	1.51	14.250	2.76	20.33	0.90
2.167	0.83	8.250	1.51	14.333	2.51	20.42	0.90
2.250	0.83	8.333	1.62	14.417	2.51	20.50	0.90
2.333	0.84	8.417	1.62	14.500	2.51	20.58	0.89
2.417	0.84	8.500	1.62	14.583	2.40	20.67	0.89
2.500	0.84	8.583	1.79	14.667	2.40	20.75	0.89
2.583	0.86	8.667	1.79	14.750	2.40	20.83	0.88
2.667	0.86	8.750	1.79	14.833	2.27	20.92	0.88
2.750	0.86	8.833	1.97	14.917	2.27	21.00	0.88
2.833	0.88	8.917	1.97	15.000	2.27	21.08	0.87
2.917	0.88	9.000	1.97	15.083	2.15	21.17	0.87
3.000	0.88	9.083	2.14	15.167	2.15	21.25	0.87
3.083	0.90	9.167	2.14	15.250	2.15	21.33	0.87
3.167	0.90	9.250	2.14	15.333	2.03	21.42	0.87
3.250	0.90	9.333	2.23	15.417	2.03	21.50	0.87
3.333	0.91	9.417	2.23	15.500	2.03	21.58	0.86
3.417	0.91	9.500	2.23	15.583	1.91	21.67	0.86
3.500	0.91	9.583	2.23	15.667	1.91	21.75	0.86
3.583	0.93	9.667	2.23	15.750	1.91	21.83	0.85
3.667	0.93	9.750	2.23	15.833	1.78	21.92	0.85
3.750	0.93	9.833	2.37	15.917	1.78	22.00	0.85
3.833	0.95	9.917	2.37	16.000	1.78	22.08	0.84
3.917	0.95	10.000	2.37	16.083	1.66	22.17	0.84
4.000	0.95	10.083	2.64	16.167	1.66	22.25	0.84
4.083	0.96	10.167	2.64	16.250	1.66	22.33	0.83
4.167	0.96	10.250	2.64	16.333	1.58	22.42	0.83
4.250	0.96	10.333	3.00	16.417	1.58	22.50	0.83
4.333	0.99	10.417	3.00	16.500	1.58	22.58	0.82
4.417	0.99	10.500	3.00	16.583	1.54	22.67	0.82
4.500	0.99	10.583	3.40	16.667	1.54	22.75	0.82
4.583	1.03	10.667	3.40	16.750	1.54	22.83	0.81
4.667	1.03	10.750	3.40	16.833	1.49	22.92	0.81
4.750	1.03	10.833	3.98	16.917	1.49	23.00	0.81
4.833	1.06	10.917	3.98	17.000	1.49	23.08	0.80
4.917	1.06	11.000	3.98	17.083	1.45	23.17	0.80
5.000	1.06	11.083	4.65	17.167	1.45	23.25	0.80
5.083	1.10	11.167	4.65	17.250	1.45	23.33	0.80
5.167	1.10	11.250	4.65	17.333	1.40	23.42	0.80
5.250	1.10	11.333	5.88	17.417	1.40	23.50	0.80
5.333	1.13	11.417	5.88	17.500	1.40	23.58	0.79
5.417	1.13	11.500	5.88	17.583	1.36	23.67	0.79
5.500	1.13	11.583	7.48	17.667	1.36	23.75	0.79
5.583	1.17	11.667	7.48	17.750	1.36	23.83	0.78
5.667	1.17	11.750	7.48	17.833	1.32	23.92	0.78
5.750	1.17	11.833	30.50	17.917	1.32	24.00	0.78
5.833	1.20	11.917	30.51	18.000	1.32	24.08	0.77
5.917	1.20	12.000	30.51	18.083	1.28	24.17	0.77
6.000	1.20	12.083	75.28	18.167	1.28	24.25	0.77
6.083	1.23	12.167	75.29	18.250	1.28		

Max.Eff.Inten.(mm/hr)=	64.09	34.25
over (min)	20.00	35.00

Storage Coeff. (min)=	17.77 (ii)	31.10 (ii)	
Unit Hyd. Tpeak (min)=	20.00	35.00	
Unit Hyd. peak (cms)=	0.06	0.03	
			TOTALS
PEAK FLOW (cms)=	0.23	0.10	0.296 (iii)
TIME TO PEAK (hrs)=	12.42	12.67	12.42
RUNOFF VOLUME (mm)=	68.60	21.45	37.95
TOTAL RAINFALL (mm)=	69.60	69.60	69.60
RUNOFF COEFFICIENT =	0.99	0.31	0.55

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB |
| STANDHYD (0040)| Area (ha)= 3.43
|ID= 1 DT= 5.0 min | Total Imp(%)= 50.00 Dir. Conn.(%)= 35.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.71	1.71
Dep. Storage (mm)=	1.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	151.22	40.00
Mannings n =	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.23	12.250	75.29	18.33	1.23
0.167	0.00	6.250	1.23	12.333	11.93	18.42	1.23
0.250	0.00	6.333	1.27	12.417	11.93	18.50	1.23
0.333	0.71	6.417	1.27	12.500	11.93	18.58	1.19
0.417	0.71	6.500	1.27	12.583	8.12	18.67	1.19
0.500	0.71	6.583	1.30	12.667	8.12	18.75	1.19
0.583	0.72	6.667	1.30	12.750	8.12	18.83	1.14
0.667	0.72	6.750	1.30	12.833	5.59	18.92	1.14
0.750	0.72	6.833	1.34	12.917	5.58	19.00	1.14
0.833	0.74	6.917	1.34	13.000	5.58	19.08	1.10
0.917	0.74	7.000	1.34	13.083	4.72	19.17	1.10
1.000	0.74	7.083	1.37	13.167	4.72	19.25	1.10
1.083	0.76	7.167	1.37	13.250	4.72	19.33	1.06
1.167	0.76	7.250	1.37	13.333	3.99	19.42	1.06
1.250	0.76	7.333	1.41	13.417	3.99	19.50	1.06
1.333	0.78	7.417	1.41	13.500	3.99	19.58	1.01

```
 1.417    0.78 | 7.500    1.41 |13.583    3.52 | 19.67    1.01
 1.500    0.78 | 7.583    1.44 |13.667    3.52 | 19.75    1.01
 1.583    0.79 | 7.667    1.44 |13.750    3.52 | 19.83    0.97
 1.667    0.79 | 7.750    1.44 |13.833    3.09 | 19.92    0.97
 1.750    0.79 | 7.833    1.48 |13.917    3.09 | 20.00    0.97
 1.833    0.81 | 7.917    1.48 |14.000    3.09 | 20.08    0.93
 1.917    0.81 | 8.000    1.48 |14.083    2.76 | 20.17    0.93
 2.000    0.81 | 8.083    1.51 |14.167    2.76 | 20.25    0.93
 2.083    0.83 | 8.167    1.51 |14.250    2.76 | 20.33    0.90
 2.167    0.83 | 8.250    1.51 |14.333    2.51 | 20.42    0.90
 2.250    0.83 | 8.333    1.62 |14.417    2.51 | 20.50    0.90
 2.333    0.84 | 8.417    1.62 |14.500    2.51 | 20.58    0.89
 2.417    0.84 | 8.500    1.62 |14.583    2.40 | 20.67    0.89
 2.500    0.84 | 8.583    1.79 |14.667    2.40 | 20.75    0.89
 2.583    0.86 | 8.667    1.79 |14.750    2.40 | 20.83    0.88
 2.667    0.86 | 8.750    1.79 |14.833    2.27 | 20.92    0.88
 2.750    0.86 | 8.833    1.97 |14.917    2.27 | 21.00    0.88
 2.833    0.88 | 8.917    1.97 |15.000    2.27 | 21.08    0.87
 2.917    0.88 | 9.000    1.97 |15.083    2.15 | 21.17    0.87
 3.000    0.88 | 9.083    2.14 |15.167    2.15 | 21.25    0.87
 3.083    0.90 | 9.167    2.14 |15.250    2.15 | 21.33    0.87
 3.167    0.90 | 9.250    2.14 |15.333    2.03 | 21.42    0.87
 3.250    0.90 | 9.333    2.23 |15.417    2.03 | 21.50    0.87
 3.333    0.91 | 9.417    2.23 |15.500    2.03 | 21.58    0.86
 3.417    0.91 | 9.500    2.23 |15.583    1.91 | 21.67    0.86
 3.500    0.91 | 9.583    2.23 |15.667    1.91 | 21.75    0.86
 3.583    0.93 | 9.667    2.23 |15.750    1.91 | 21.83    0.85
 3.667    0.93 | 9.750    2.23 |15.833    1.78 | 21.92    0.85
 3.750    0.93 | 9.833    2.37 |15.917    1.78 | 22.00    0.85
 3.833    0.95 | 9.917    2.37 |16.000    1.78 | 22.08    0.84
 3.917    0.95 |10.000    2.37 |16.083    1.66 | 22.17    0.84
 4.000    0.95 |10.083    2.64 |16.167    1.66 | 22.25    0.84
 4.083    0.96 |10.167    2.64 |16.250    1.66 | 22.33    0.83
 4.167    0.96 |10.250    2.64 |16.333    1.58 | 22.42    0.83
 4.250    0.96 |10.333    3.00 |16.417    1.58 | 22.50    0.83
 4.333    0.99 |10.417    3.00 |16.500    1.58 | 22.58    0.82
 4.417    0.99 |10.500    3.00 |16.583    1.54 | 22.67    0.82
 4.500    0.99 |10.583    3.40 |16.667    1.54 | 22.75    0.82
 4.583    1.03 |10.667    3.40 |16.750    1.54 | 22.83    0.81
 4.667    1.03 |10.750    3.40 |16.833    1.49 | 22.92    0.81
 4.750    1.03 |10.833    3.98 |16.917    1.49 | 23.00    0.81
 4.833    1.06 |10.917    3.98 |17.000    1.49 | 23.08    0.80
 4.917    1.06 |11.000    3.98 |17.083    1.45 | 23.17    0.80
 5.000    1.06 |11.083    4.65 |17.167    1.45 | 23.25    0.80
 5.083    1.10 |11.167    4.65 |17.250    1.45 | 23.33    0.80
 5.167    1.10 |11.250    4.65 |17.333    1.40 | 23.42    0.80
 5.250    1.10 |11.333    5.88 |17.417    1.40 | 23.50    0.80
 5.333    1.13 |11.417    5.88 |17.500    1.40 | 23.58    0.79
 5.417    1.13 |11.500    5.88 |17.583    1.36 | 23.67    0.79
 5.500    1.13 |11.583    7.48 |17.667    1.36 | 23.75    0.79
 5.583    1.17 |11.667    7.48 |17.750    1.36 | 23.83    0.78
 5.667    1.17 |11.750    7.48 |17.833    1.32 | 23.92    0.78
```

```
            5.750    1.17 |11.833   30.50 |17.917    1.32 | 24.00    0.78
            5.833    1.20 |11.917   30.51 |18.000    1.32 | 24.08    0.77
            5.917    1.20 |12.000   30.51 |18.083    1.28 | 24.17    0.77
            6.000    1.20 |12.083   75.28 |18.167    1.28 | 24.25    0.77
            6.083    1.23 |12.167   75.29 |18.250    1.28 |

     Max.Eff.Inten.(mm/hr)=      75.29        34.25
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.67 (ii)   14.50 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.25         0.08
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.10          0.336 (iii)
     TIME TO PEAK    (hrs)=      12.25        12.33          12.25
     RUNOFF VOLUME    (mm)=      68.60        21.45          37.95
     TOTAL RAINFALL   (mm)=      69.60        69.60          69.60
     RUNOFF COEFFICIENT   =       0.99         0.31           0.55

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0033):     0.41   0.025    12.33    24.57
      + ID2= 2 (  0036):     5.32   0.296    12.42    37.95
        ================================================
        ID = 3 (  0041):     5.73   0.318    12.42    36.99

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

--------------------
| ADD HYD  (  0041)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0041):     5.73   0.318    12.42    36.99
      + ID2= 2 (  0037):     2.05   0.109    12.33    23.10
        ================================================
        ID = 1 (  0041):     7.78   0.420    12.42    33.33

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

```
--------------------
| ADD HYD  (  0041)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0041):     7.78   0.420    12.42    33.33
      + ID2= 2 (  0040):     3.43   0.336    12.25    37.95
        ==================================================
        ID = 3 (  0041):    11.21   0.680    12.25    34.75

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0039)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 6.167    1.23 |12.250   75.29 | 18.33    1.23
                0.167    0.00 | 6.250    1.23 |12.333   11.93 | 18.42    1.23
                0.250    0.00 | 6.333    1.27 |12.417   11.93 | 18.50    1.23
                0.333    0.71 | 6.417    1.27 |12.500   11.93 | 18.58    1.19
                0.417    0.71 | 6.500    1.27 |12.583    8.12 | 18.67    1.19
                0.500    0.71 | 6.583    1.30 |12.667    8.12 | 18.75    1.19
                0.583    0.72 | 6.667    1.30 |12.750    8.12 | 18.83    1.14
                0.667    0.72 | 6.750    1.30 |12.833    5.59 | 18.92    1.14
                0.750    0.72 | 6.833    1.34 |12.917    5.58 | 19.00    1.14
                0.833    0.74 | 6.917    1.34 |13.000    5.58 | 19.08    1.10
                0.917    0.74 | 7.000    1.34 |13.083    4.72 | 19.17    1.10
                1.000    0.74 | 7.083    1.37 |13.167    4.72 | 19.25    1.10
                1.083    0.76 | 7.167    1.37 |13.250    4.72 | 19.33    1.06
                1.167    0.76 | 7.250    1.37 |13.333    3.99 | 19.42    1.06
                1.250    0.76 | 7.333    1.41 |13.417    3.99 | 19.50    1.06
                1.333    0.78 | 7.417    1.41 |13.500    3.99 | 19.58    1.01
                1.417    0.78 | 7.500    1.41 |13.583    3.52 | 19.67    1.01
                1.500    0.78 | 7.583    1.44 |13.667    3.52 | 19.75    1.01
                1.583    0.79 | 7.667    1.44 |13.750    3.52 | 19.83    0.97
                1.667    0.79 | 7.750    1.44 |13.833    3.09 | 19.92    0.97
                1.750    0.79 | 7.833    1.48 |13.917    3.09 | 20.00    0.97
                1.833    0.81 | 7.917    1.48 |14.000    3.09 | 20.08    0.93
                1.917    0.81 | 8.000    1.48 |14.083    2.76 | 20.17    0.93
                2.000    0.81 | 8.083    1.51 |14.167    2.76 | 20.25    0.93
                2.083    0.83 | 8.167    1.51 |14.250    2.76 | 20.33    0.90
                2.167    0.83 | 8.250    1.51 |14.333    2.51 | 20.42    0.90
                2.250    0.83 | 8.333    1.62 |14.417    2.51 | 20.50    0.90
                2.333    0.84 | 8.417    1.62 |14.500    2.51 | 20.58    0.89
                2.417    0.84 | 8.500    1.62 |14.583    2.40 | 20.67    0.89
                2.500    0.84 | 8.583    1.79 |14.667    2.40 | 20.75    0.89
                2.583    0.86 | 8.667    1.79 |14.750    2.40 | 20.83    0.88
                2.667    0.86 | 8.750    1.79 |14.833    2.27 | 20.92    0.88
                2.750    0.86 | 8.833    1.97 |14.917    2.27 | 21.00    0.88
                2.833    0.88 | 8.917    1.97 |15.000    2.27 | 21.08    0.87
                2.917    0.88 | 9.000    1.97 |15.083    2.15 | 21.17    0.87
                3.000    0.88 | 9.083    2.14 |15.167    2.15 | 21.25    0.87
                3.083    0.90 | 9.167    2.14 |15.250    2.15 | 21.33    0.87
                3.167    0.90 | 9.250    2.14 |15.333    2.03 | 21.42    0.87
                3.250    0.90 | 9.333    2.23 |15.417    2.03 | 21.50    0.87
                3.333    0.91 | 9.417    2.23 |15.500    2.03 | 21.58    0.86
                3.417    0.91 | 9.500    2.23 |15.583    1.91 | 21.67    0.86
                3.500    0.91 | 9.583    2.23 |15.667    1.91 | 21.75    0.86
                3.583    0.93 | 9.667    2.23 |15.750    1.91 | 21.83    0.85
                3.667    0.93 | 9.750    2.23 |15.833    1.78 | 21.92    0.85
                3.750    0.93 | 9.833    2.37 |15.917    1.78 | 22.00    0.85
                3.833    0.95 | 9.917    2.37 |16.000    1.78 | 22.08    0.84
                3.917    0.95 |10.000    2.37 |16.083    1.66 | 22.17    0.84
                4.000    0.95 |10.083    2.64 |16.167    1.66 | 22.25    0.84
                4.083    0.96 |10.167    2.64 |16.250    1.66 | 22.33    0.83
                4.167    0.96 |10.250    2.64 |16.333    1.58 | 22.42    0.83
                4.250    0.96 |10.333    3.00 |16.417    1.58 | 22.50    0.83
                4.333    0.99 |10.417    3.00 |16.500    1.58 | 22.58    0.82
                4.417    0.99 |10.500    3.00 |16.583    1.54 | 22.67    0.82
                4.500    0.99 |10.583    3.40 |16.667    1.54 | 22.75    0.82
                4.583    1.03 |10.667    3.40 |16.750    1.54 | 22.83    0.81
                4.667    1.03 |10.750    3.40 |16.833    1.49 | 22.92    0.81
                4.750    1.03 |10.833    3.98 |16.917    1.49 | 23.00    0.81
                4.833    1.06 |10.917    3.98 |17.000    1.49 | 23.08    0.80
                4.917    1.06 |11.000    3.98 |17.083    1.45 | 23.17    0.80
                5.000    1.06 |11.083    4.65 |17.167    1.45 | 23.25    0.80
                5.083    1.10 |11.167    4.65 |17.250    1.45 | 23.33    0.80
                5.167    1.10 |11.250    4.65 |17.333    1.40 | 23.42    0.80
                5.250    1.10 |11.333    5.88 |17.417    1.40 | 23.50    0.80
                5.333    1.13 |11.417    5.88 |17.500    1.40 | 23.58    0.79
                5.417    1.13 |11.500    5.88 |17.583    1.36 | 23.67    0.79
                5.500    1.13 |11.583    7.48 |17.667    1.36 | 23.75    0.79
                5.583    1.17 |11.667    7.48 |17.750    1.36 | 23.83    0.78
                5.667    1.17 |11.750    7.48 |17.833    1.32 | 23.92    0.78
                5.750    1.17 |11.833   30.50 |17.917    1.32 | 24.00    0.78
                5.833    1.20 |11.917   30.51 |18.000    1.32 | 24.08    0.77
                5.917    1.20 |12.000   30.51 |18.083    1.28 | 24.17    0.77
                6.000    1.20 |12.083   75.28 |18.167    1.28 | 24.25    0.77
                6.083    1.23 |12.167   75.29 |18.250    1.28 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.051 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  24.565
     TOTAL RAINFALL   (mm)=  69.600
     RUNOFF COEFFICIENT   =   0.353
```

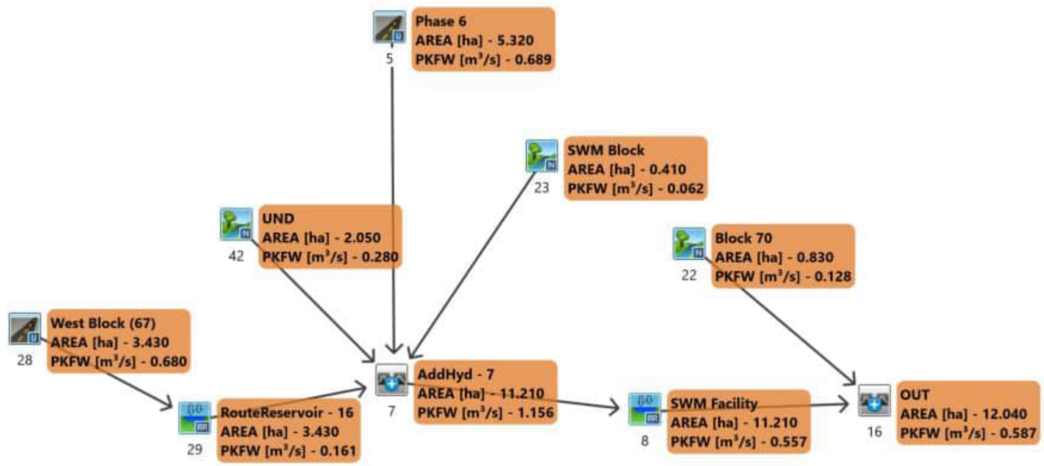
```
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

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

 --------------------
 | ADD HYD  (  0032)|
 |   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0039):     0.83   0.051    12.33    24.56
       + ID2= 2 (  0041):    11.21   0.680    12.25    34.75
         ====================================================
         ID = 3 (  0032):    12.04   0.729    12.25    34.05

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

VO Model Post-Development Results - Controlled



```
 *****************************************
 ** SIMULATION:1-002yr 4hr 10min Chicago **
 *****************************************
 --------------------
 | CALIB              |
 | NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
 |ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
 --------------------   U.H. Tp(hrs)=   0.19

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


                             ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.007 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   4.266
     TOTAL RAINFALL   (mm)=  31.287
     RUNOFF COEFFICIENT   =   0.136

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

 ------------------------------------------------------------------------------
 --------------------
 | CALIB              |
 | NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
 |ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
 --------------------   U.H. Tp(hrs)=   0.20

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


                             ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
                 1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.004 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   4.268
     TOTAL RAINFALL   (mm)=  31.287
     RUNOFF COEFFICIENT   =   0.136

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

 ------------------------------------------------------------------------------
 --------------------
 | CALIB              |
 | STANDHYD (  0005)|   Area    (ha)=   5.32
 |ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
 --------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      2.66         2.66
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         1.00
     Length            (m)=    188.33        40.00
     Mannings n          =     0.130        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    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
                 0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
                 0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
                 0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
                 0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
                 0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
                 0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
                 0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
                 0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
                 0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
                 0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
```

```
          1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Max.Eff.Inten.(mm/hr)=      44.33         5.85
               over (min)       20.00        50.00
     Storage Coeff.  (min)=      20.59 (ii)   47.63 (ii)
     Unit Hyd. Tpeak (min)=      20.00        50.00
     Unit Hyd. peak  (cms)=       0.06         0.02
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.15         0.02         0.153 (iii)
     TIME TO PEAK    (hrs)=       1.58         2.25          1.58
     RUNOFF VOLUME    (mm)=      30.29         4.61         13.59
     TOTAL RAINFALL   (mm)=      31.29        31.29         31.29
     RUNOFF COEFFICIENT   =       0.97         0.15          0.43


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                         IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

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


                        ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
          0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
          0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
          0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
          0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
          0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
          0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
          0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
          0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
          0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
          0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
          1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16
```

```
     Max.Eff.Inten.(mm/hr)=      71.35         6.44
               over (min)        5.00        25.00
     Storage Coeff.  (min)=       3.75 (ii)   24.89 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=       0.25         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.02         0.228 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.67          1.33
     RUNOFF VOLUME    (mm)=      30.29         4.61         13.60
     TOTAL RAINFALL   (mm)=      31.29        31.29         31.29
     RUNOFF COEFFICIENT   =       0.97         0.15          0.43

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200     0.1300
                          0.1100     0.0700   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430     0.228      1.33      13.60
   OUTFLOW: ID= 1 (  0029)      3.430     0.035      2.00      13.55

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 15.40
                  TIME SHIFT OF PEAK FLOW        (min)= 40.00
                  MAXIMUM  STORAGE   USED      (ha.m.)=  0.0224

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                        ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

```
          0.083    2.45 | 1.083   13.68 | 2.083    5.08 |  3.08    2.85
          0.167    2.45 | 1.167   13.68 | 2.167    5.08 |  3.17    2.85
          0.250    2.76 | 1.250   71.35 | 2.250    4.44 |  3.25    2.67
          0.333    2.76 | 1.333   71.35 | 2.333    4.44 |  3.33    2.67
          0.417    3.17 | 1.417   17.30 | 2.417    3.96 |  3.42    2.52
          0.500    3.17 | 1.500   17.30 | 2.500    3.96 |  3.50    2.52
          0.583    3.78 | 1.583   10.08 | 2.583    3.59 |  3.58    2.39
          0.667    3.78 | 1.667   10.08 | 2.667    3.59 |  3.67    2.39
          0.750    4.76 | 1.750    7.43 | 2.750    3.30 |  3.75    2.27
          0.833    4.76 | 1.833    7.43 | 2.833    3.30 |  3.83    2.27
          0.917    6.70 | 1.917    5.99 | 2.917    3.05 |  3.92    2.16
          1.000    6.70 | 2.000    5.99 | 3.000    3.05 |  4.00    2.16

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.015 (i)
     TIME TO PEAK    (hrs)=   1.667
     RUNOFF VOLUME    (mm)=   3.927
     TOTAL RAINFALL   (mm)=  31.287
     RUNOFF COEFFICIENT   =   0.126

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.004     1.58     4.27
      + ID2= 2 (  0029):     3.43   0.035     2.00    13.55
        ====================================================
        ID = 3 (  0007):     3.84   0.038     1.83    12.56

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.038     1.83    12.56
      + ID2= 2 (  0042):     2.05   0.015     1.67     3.93
        ====================================================
        ID = 1 (  0007):     5.89   0.052     1.67     9.55

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.052     1.67     9.55
      + ID2= 2 (  0005):     5.32   0.153     1.58    13.59
        ====================================================
        ID = 3 (  0007):    11.21   0.204     1.58    11.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390      0.1535
                          0.0410     0.0120   |   0.3840      0.1758
                          0.0580     0.0253   |   0.5390      0.1989
                          0.0710     0.0399   |   0.6480      0.2228
                          0.0830     0.0559   |   0.7320      0.2476
                          0.0920     0.0732   |   0.8050      0.2733
                          0.1010     0.0918   |   0.8710      0.2998
                          0.2130     0.1116   |   0.9320      0.3263
                          0.2860     0.1321   |   0.9880      0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.204      1.58      11.47
   OUTFLOW: ID= 1 (  0008)     11.210      0.075      3.00      11.47

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 36.49
                   TIME SHIFT OF PEAK FLOW        (min)= 85.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0446

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.007     1.58     4.27
      + ID2= 2 (  0008):    11.21   0.075     3.00    11.47
        ====================================================
        ID = 3 (  0016):    12.04   0.077     2.83    10.97

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
******************************************
** SIMULATION:1-005yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
```

```
--------------------   U.H. Tp(hrs)=   0.19

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

    Unit Hyd Qpeak  (cms)=   0.167

    PEAK FLOW       (cms)=   0.017 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=   8.466
    TOTAL RAINFALL   (mm)=  41.381
    RUNOFF COEFFICIENT   =   0.205

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

    Unit Hyd Qpeak  (cms)=   0.078

    PEAK FLOW       (cms)=   0.008 (i)
    TIME TO PEAK    (hrs)=   1.500
    RUNOFF VOLUME    (mm)=   8.469
    TOTAL RAINFALL   (mm)=  41.381
    RUNOFF COEFFICIENT   =   0.205

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66         2.66
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         1.00
    Length            (m)=     188.33        40.00
    Mannings n          =      0.130        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    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

    Max.Eff.Inten.(mm/hr)=      58.77        13.48
               over (min)      20.00        40.00
    Storage Coeff.  (min)=      18.39 (ii)   37.76 (ii)
    Unit Hyd. Tpeak (min)=      20.00        40.00
    Unit Hyd. peak  (cms)=       0.06         0.03
```

```
                                                  *TOTALS*
    PEAK FLOW       (cms)=       0.21         0.04          0.223 (iii)
    TIME TO PEAK    (hrs)=       1.58         2.00           1.58
    RUNOFF VOLUME    (mm)=      40.38         8.13          19.41
    TOTAL RAINFALL   (mm)=      41.38        41.38          41.38
    RUNOFF COEFFICIENT   =       0.98         0.20           0.47

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
                0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
                0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
                0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
                0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
                1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

    Max.Eff.Inten.(mm/hr)=      94.66        15.30
               over (min)        5.00        20.00
    Storage Coeff.  (min)=       3.35 (ii)   18.30 (ii)
    Unit Hyd. Tpeak (min)=       5.00        20.00
    Unit Hyd. peak  (cms)=       0.26         0.06
                                                  *TOTALS*
    PEAK FLOW       (cms)=       0.30         0.04          0.315 (iii)
    TIME TO PEAK    (hrs)=       1.33         1.58           1.33
    RUNOFF VOLUME    (mm)=      40.38         8.13          19.41
    TOTAL RAINFALL   (mm)=      41.38        41.38          41.38
    RUNOFF COEFFICIENT   =       0.98         0.20           0.47

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

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200     0.1300
                          0.1100     0.0700   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430     0.315      1.33      19.41
   OUTFLOW: ID= 1 (  0029)      3.430     0.051      2.00      19.37

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.14
                  TIME SHIFT OF PEAK FLOW        (min)= 40.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0324

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    3.23 | 1.083   18.09 | 2.083    6.70 |  3.08    3.75
                0.167    3.23 | 1.167   18.09 | 2.167    6.70 |  3.17    3.75
                0.250    3.63 | 1.250   94.66 | 2.250    5.86 |  3.25    3.52
                0.333    3.63 | 1.333   94.66 | 2.333    5.86 |  3.33    3.52
                0.417    4.18 | 1.417   22.88 | 2.417    5.23 |  3.42    3.32
                0.500    4.18 | 1.500   22.88 | 2.500    5.23 |  3.50    3.32
                0.583    4.98 | 1.583   13.31 | 2.583    4.74 |  3.58    3.14
```

```
          0.667    4.98 | 1.667   13.31 | 2.667    4.74 |  3.67    3.14
          0.750    6.28 | 1.750    9.80 | 2.750    4.35 |  3.75    2.99
          0.833    6.28 | 1.833    9.80 | 2.833    4.35 |  3.83    2.99
          0.917    8.85 | 1.917    7.91 | 2.917    4.02 |  3.92    2.85
          1.000    8.85 | 2.000    7.91 | 3.000    4.02 |  4.00    2.85

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.036 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=   7.847
     TOTAL RAINFALL   (mm)=  41.381
     RUNOFF COEFFICIENT   =   0.190

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.008     1.50     8.47
      + ID2= 2 (  0029):     3.43   0.051     2.00    19.37
        ====================================================
        ID = 3 (  0007):     3.84   0.056     1.83    18.20

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.056     1.83    18.20
      + ID2= 2 (  0042):     2.05   0.036     1.58     7.85
        ====================================================
        ID = 1 (  0007):     5.89   0.090     1.58    14.60

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.090     1.58    14.60
      + ID2= 2 (  0005):     5.32   0.223     1.58    19.41
        ====================================================
        ID = 3 (  0007):    11.21   0.313     1.58    16.88

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

```
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390     0.1535
                          0.0410     0.0120   |   0.3840     0.1758
                          0.0580     0.0253   |   0.5390     0.1989
                          0.0710     0.0399   |   0.6480     0.2228
                          0.0830     0.0559   |   0.7320     0.2476
                          0.0920     0.0732   |   0.8050     0.2733
                          0.1010     0.0918   |   0.8710     0.2998
                          0.2130     0.1116   |   0.9320     0.3263
                          0.2860     0.1321   |   0.9880     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.313      1.58      16.88
   OUTFLOW: ID= 1 (  0008)     11.210      0.094      3.33      16.88

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 30.05
                   TIME SHIFT OF PEAK FLOW         (min)=105.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0774

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.017     1.50     8.47
      + ID2= 2 (  0008):    11.21   0.094     3.33    16.88
        ====================================================
        ID = 3 (  0016):    12.04   0.098     3.08    16.30

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
******************************************
** SIMULATION:1-010yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                             ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

```
      hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs    mm/hr
    0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
    0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
    0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
    0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
    0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
    0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
    0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
    0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
    0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
    0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
    0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
    1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

Unit Hyd Qpeak  (cms)=   0.167

PEAK FLOW       (cms)=   0.026 (i)
TIME TO PEAK    (hrs)=   1.500
RUNOFF VOLUME    (mm)=  11.924
TOTAL RAINFALL   (mm)=  48.343
RUNOFF COEFFICIENT   =   0.247

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                        ---- TRANSFORMED HYETOGRAPH ----
     TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
      hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs    mm/hr
    0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
    0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
    0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
    0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
    0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
    0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
    0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
    0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
    0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
    0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
    0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
    1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

Unit Hyd Qpeak  (cms)=   0.078
```

```
PEAK FLOW       (cms)=   0.012 (i)
TIME TO PEAK    (hrs)=   1.500
RUNOFF VOLUME    (mm)=  11.928
TOTAL RAINFALL   (mm)=  48.343
RUNOFF COEFFICIENT   =   0.247

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

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
Surface Area     (ha)=       2.66         2.66
Dep. Storage     (mm)=       1.00         5.00
Average Slope     (%)=       1.00         1.00
Length            (m)=     188.33        40.00
Mannings n          =      0.130        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    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
    0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
    0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
    0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
    0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
    0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
    0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
    0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
    0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
    0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
    0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
    1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

Max.Eff.Inten.(mm/hr)=      82.41        18.48
           over (min)       15.00        35.00
Storage Coeff.  (min)=      16.07 (ii)   33.14 (ii)
Unit Hyd. Tpeak (min)=      15.00        35.00
Unit Hyd. peak  (cms)=       0.07         0.03
                                                    *TOTALS*
PEAK FLOW       (cms)=       0.27         0.06        0.292 (iii)
TIME TO PEAK    (hrs)=       1.50         1.83         1.50
RUNOFF VOLUME    (mm)=      47.34        10.98        23.71
TOTAL RAINFALL   (mm)=      48.34        48.34        48.34
RUNOFF COEFFICIENT   =       0.98         0.23         0.49
```

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
               0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
               0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
               0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
               0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
               0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
               0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
               0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
               0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
               0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
               0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
               1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

     Max.Eff.Inten.(mm/hr)=     110.25        21.07
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       3.15 (ii)   16.31 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.27         0.06
                                                          *TOTALS*
     PEAK FLOW      (cms)=       0.36         0.06          0.374 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.58           1.33
     RUNOFF VOLUME    (mm)=      47.34        10.98          23.71
     TOTAL RAINFALL   (mm)=      48.34        48.34          48.34
     RUNOFF COEFFICIENT   =       0.98         0.23           0.49

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

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200      0.1300
                          0.1100     0.0700   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.374      1.33      23.71
   OUTFLOW: ID= 1 (  0029)      3.430      0.062      2.08      23.66

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.61
                   TIME SHIFT OF PEAK FLOW        (min)= 45.00
                   MAXIMUM  STORAGE   USED      (ha.m.)=  0.0396

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                              ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    3.78 | 1.083   21.14 | 2.083    7.85 |  3.08    4.40
               0.167    3.78 | 1.167   21.14 | 2.167    7.85 |  3.17    4.40
               0.250    4.26 | 1.250  110.25 | 2.250    6.86 |  3.25    4.13
               0.333    4.26 | 1.333  110.25 | 2.333    6.86 |  3.33    4.13
               0.417    4.90 | 1.417   26.74 | 2.417    6.13 |  3.42    3.89
               0.500    4.90 | 1.500   26.74 | 2.500    6.13 |  3.50    3.89
               0.583    5.83 | 1.583   15.57 | 2.583    5.55 |  3.58    3.69
               0.667    5.83 | 1.667   15.57 | 2.667    5.55 |  3.67    3.69
               0.750    7.35 | 1.750   11.47 | 2.750    5.09 |  3.75    3.50
               0.833    7.35 | 1.833   11.47 | 2.833    5.09 |  3.83    3.50
               0.917   10.36 | 1.917    9.26 | 2.917    4.72 |  3.92    3.34
               1.000   10.36 | 2.000    9.26 | 3.000    4.72 |  4.00    3.34

    Unit Hyd Qpeak  (cms)=   0.356
```

```
     PEAK FLOW       (cms)=   0.053 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  11.099
     TOTAL RAINFALL   (mm)=  48.343
     RUNOFF COEFFICIENT   =   0.230

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.012     1.50    11.93
      + ID2= 2 (  0029):     3.43   0.062     2.08    23.66
        ===================================================
        ID = 3 (  0007):     3.84   0.069     1.75    22.41

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.069     1.75    22.41
      + ID2= 2 (  0042):     2.05   0.053     1.58    11.10
        ===================================================
        ID = 1 (  0007):     5.89   0.121     1.58    18.47

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.121     1.58    18.47
      + ID2= 2 (  0005):     5.32   0.292     1.50    23.71
        ===================================================
        ID = 3 (  0007):    11.21   0.408     1.50    20.96

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390      0.1535
                          0.0410     0.0120   |   0.3840      0.1758
                          0.0580     0.0253   |   0.5390      0.1989
                          0.0710     0.0399   |   0.6480      0.2228
                          0.0830     0.0559   |   0.7320      0.2476
                          0.0920     0.0732   |   0.8050      0.2733
                          0.1010     0.0918   |   0.8710      0.2998
                          0.2130     0.1116   |   0.9320      0.3263
                          0.2860     0.1321   |   0.9880      0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.408      1.50      20.96
   OUTFLOW: ID= 1 (  0008)     11.210      0.133      2.92      20.95

                 PEAK   FLOW   REDUCTION [Qout/Qin](%)= 32.64
                 TIME SHIFT OF PEAK FLOW         (min)= 85.00
                 MAXIMUM  STORAGE   USED       (ha.m.)=  0.0975

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.026     1.50    11.92
      + ID2= 2 (  0008):    11.21   0.133     2.92    20.95
        ===================================================
        ID = 3 (  0016):    12.04   0.139     2.92    20.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*******************************************
** SIMULATION:1-025yr 4hr 10min Chicago **
*******************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                            ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
                0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
                0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
                0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
                0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
                0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
```

```
          0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
          0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
          0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
          0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
          0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
          1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.038 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  16.562
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.292

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                           ---- TRANSFORMED HYETOGRAPH ----
           TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
            hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
          0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
          0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
          0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
          0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
          0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
          0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
          0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
          0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
          0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
          0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
          0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
          1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.018 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  16.569
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.292

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        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    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
          0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
          0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
          0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
          0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
          0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
          0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
          0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
          0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
          0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
          0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
          1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Max.Eff.Inten.(mm/hr)=      96.65        28.99
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.07 (ii)   29.33 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.32         0.09         0.368 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.75          1.50
     RUNOFF VOLUME    (mm)=      55.70        14.81         29.12
     TOTAL RAINFALL   (mm)=      56.70        56.70         56.70
     RUNOFF COEFFICIENT   =       0.98         0.26          0.51


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
                0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
                0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
                0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
                0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
                0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
                0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
                0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
                0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
                0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
                0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
                1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Max.Eff.Inten.(mm/hr)=     129.30        28.99
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.95 (ii)   14.54 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.08
                                                          *TOTALS*
     PEAK FLOW      (cms)=       0.42         0.09          0.461 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      55.70        14.81          29.12
     TOTAL RAINFALL   (mm)=      56.70        56.70          56.70
     RUNOFF COEFFICIENT   =       0.98         0.26           0.51

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200     0.1300
                          0.1100     0.0700   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.461      1.33      29.12
   OUTFLOW: ID= 1 (  0029)      3.430      0.077      2.00      29.07

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.79
                  TIME SHIFT OF PEAK FLOW        (min)= 40.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0492

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    4.44 | 1.083   24.80 | 2.083    9.21 |  3.08    5.16
                0.167    4.44 | 1.167   24.80 | 2.167    9.21 |  3.17    5.16
                0.250    4.99 | 1.250  129.30 | 2.250    8.05 |  3.25    4.84
                0.333    4.99 | 1.333  129.30 | 2.333    8.05 |  3.33    4.84
                0.417    5.75 | 1.417   31.36 | 2.417    7.18 |  3.42    4.56
                0.500    5.75 | 1.500   31.36 | 2.500    7.19 |  3.50    4.56
                0.583    6.84 | 1.583   18.26 | 2.583    6.51 |  3.58    4.32
                0.667    6.84 | 1.667   18.26 | 2.667    6.51 |  3.67    4.32
                0.750    8.62 | 1.750   13.46 | 2.750    5.97 |  3.75    4.11
                0.833    8.62 | 1.833   13.46 | 2.833    5.97 |  3.83    4.11
                0.917   12.15 | 1.917   10.86 | 2.917    5.53 |  3.92    3.92
                1.000   12.15 | 2.000   10.86 | 3.000    5.53 |  4.00    3.92

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW      (cms)=   0.078 (i)
     TIME TO PEAK    (hrs)=   1.583
     RUNOFF VOLUME    (mm)=  15.486
     TOTAL RAINFALL   (mm)=  56.700
     RUNOFF COEFFICIENT   =   0.273
```

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

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

 --------------------
 | ADD HYD  (  0007)|
 |   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0023):     0.41   0.018     1.50    16.57
       + ID2= 2 (  0029):     3.43   0.077     2.00    29.07
         ===================================================
         ID = 3 (  0007):     3.84   0.088     1.75    27.74

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

 --------------------
 | ADD HYD  (  0007)|
 |   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 3 (  0007):     3.84   0.088     1.75    27.74
       + ID2= 2 (  0042):     2.05   0.078     1.58    15.49
         ===================================================
         ID = 1 (  0007):     5.89   0.164     1.58    23.47

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

 --------------------
 | ADD HYD  (  0007)|
 |   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0007):     5.89   0.164     1.58    23.47
       + ID2= 2 (  0005):     5.32   0.368     1.50    29.12
         ===================================================
         ID = 3 (  0007):    11.21   0.528     1.50    26.15

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 --------------------------------------------------------------------------------
 --------------------
 | RESERVOIR(  0008)|     OVERFLOW IS OFF
 | IN= 2---> OUT= 1 |
 | DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
 --------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                           0.0000     0.0000   |   0.3390     0.1535
                           0.0410     0.0120   |   0.3840     0.1758
                           0.0580     0.0253   |   0.5390     0.1989
                           0.0710     0.0399   |   0.6480     0.2228
                           0.0830     0.0559   |   0.7320     0.2476
                           0.0920     0.0732   |   0.8050     0.2733
                           0.1010     0.0918   |   0.8710     0.2998
                           0.2130     0.1116   |   0.9320     0.3263
                           0.2860     0.1321   |   0.9880     0.3528

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
    INFLOW : ID= 2 (  0007)     11.210     0.528      1.50      26.15
    OUTFLOW: ID= 1 (  0008)     11.210     0.208      2.50      26.15

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 39.30
                   TIME SHIFT OF PEAK FLOW         (min)= 60.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1107

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

 --------------------
 | ADD HYD  (  0016)|
 |   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
 --------------------         (ha)    (cms)    (hrs)     (mm)
         ID1= 1 (  0022):     0.83   0.038     1.50    16.56
       + ID2= 2 (  0008):    11.21   0.208     2.50    26.15
         ===================================================
         ID = 3 (  0016):    12.04   0.217     2.50    25.49

      NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
 --------------------------------------------------------------------------------
 ******************************************
 ** SIMULATION:1-050yr 4hr 10min Chicago **
 ******************************************
 --------------------
 | CALIB            |
 | NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
 |ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
 --------------------   U.H. Tp(hrs)=   0.19

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


                             ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                 0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                 0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                 0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                 0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                 0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                 0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                 0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                 0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                 0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                 0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                 1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38
```

```
     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.048 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  20.429
     TOTAL RAINFALL   (mm)=  63.117
     RUNOFF COEFFICIENT   =   0.324

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
               0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
               0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
               0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
               0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
               0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
               0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
               0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
               0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
               0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
               0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
               1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.023 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  20.437
     TOTAL RAINFALL   (mm)=  63.117
     RUNOFF COEFFICIENT   =   0.324

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
```

```
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        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    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
               0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
               0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
               0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
               0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
               0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
               0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
               0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
               0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
               0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
               0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
               1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Max.Eff.Inten.(mm/hr)=     107.30        35.61
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      14.46 (ii)   27.59 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                         *TOTALS*
     PEAK FLOW      (cms)=       0.37         0.11          0.423 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.75           1.50
     RUNOFF VOLUME    (mm)=      62.12        18.01          33.44
     TOTAL RAINFALL   (mm)=      63.12        63.12          63.12
     RUNOFF COEFFICIENT   =       0.98         0.29           0.53


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                           ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                 0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                 0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                 0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                 0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                 0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                 0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                 0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                 0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                 0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                 0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                 1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Max.Eff.Inten.(mm/hr)=     143.50        45.22
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.83 (ii)   12.53 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.47         0.12          0.523 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      62.12        18.01          33.45
     TOTAL RAINFALL   (mm)=      63.12        63.12          63.12
     RUNOFF COEFFICIENT   =       0.98         0.29           0.53

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200      0.1300
                          0.1100     0.0700   |   0.0000      0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.523      1.33      33.45
   OUTFLOW: ID= 1 (  0029)      3.430      0.089      2.00      33.40

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.07
                   TIME SHIFT OF PEAK FLOW         (min)= 40.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0569

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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


                           ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    4.96 | 1.083   27.61 | 2.083   10.27 |  3.08    5.76
                 0.167    4.96 | 1.167   27.61 | 2.167   10.27 |  3.17    5.76
                 0.250    5.58 | 1.250  143.50 | 2.250    8.98 |  3.25    5.40
                 0.333    5.58 | 1.333  143.50 | 2.333    8.98 |  3.33    5.40
                 0.417    6.42 | 1.417   34.91 | 2.417    8.02 |  3.42    5.10
                 0.500    6.42 | 1.500   34.91 | 2.500    8.02 |  3.50    5.10
                 0.583    7.64 | 1.583   20.35 | 2.583    7.27 |  3.58    4.83
                 0.667    7.64 | 1.667   20.35 | 2.667    7.27 |  3.67    4.83
                 0.750    9.62 | 1.750   15.00 | 2.750    6.67 |  3.75    4.59
                 0.833    9.62 | 1.833   15.00 | 2.833    6.67 |  3.83    4.59
                 0.917   13.55 | 1.917   12.12 | 2.917    6.17 |  3.92    4.38
                 1.000   13.55 | 2.000   12.12 | 3.000    6.17 |  4.00    4.38

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.100 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  19.159
     TOTAL RAINFALL   (mm)=  63.117
     RUNOFF COEFFICIENT   =   0.304

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.023     1.50    20.44
      + ID2= 2 (  0029):     3.43   0.089     2.00    33.40
        ==================================================
        ID = 3 (  0007):     3.84   0.103     1.67    32.02

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.103     1.67    32.02
      + ID2= 2 (  0042):     2.05   0.100     1.50    19.16
        ==================================================
        ID = 1 (  0007):     5.89   0.200     1.58    27.54

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.200     1.58    27.54
      + ID2= 2 (  0005):     5.32   0.423     1.50    33.44
        ==================================================
        ID = 3 (  0007):    11.21   0.619     1.50    30.34

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390      0.1535
                          0.0410     0.0120   |   0.3840      0.1758
                          0.0580     0.0253   |   0.5390      0.1989
                          0.0710     0.0399   |   0.6480      0.2228
                          0.0830     0.0559   |   0.7320      0.2476
                          0.0920     0.0732   |   0.8050      0.2733
                          0.1010     0.0918   |   0.8710      0.2998
                          0.2130     0.1116   |   0.9320      0.3263
                          0.2860     0.1321   |   0.9880      0.3528

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.619      1.50      30.34
   OUTFLOW: ID= 1 (  0008)     11.210      0.252      2.42      30.34
```

```
                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.68
                   TIME SHIFT OF PEAK FLOW         (min)= 55.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1226

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.048     1.50    20.43
      + ID2= 2 (  0008):    11.21   0.252     2.42    30.34
        ==================================================
        ID = 3 (  0016):    12.04   0.264     2.42    29.65

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
******************************************
** SIMULATION:1-100yr 4hr 10min Chicago **
******************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.059 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  24.473
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.352
```

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                        ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                  0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                  0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                  0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                  0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                  0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                  0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                  0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                  0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                  0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                  0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                  1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.028 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  24.483
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.352

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n           =      0.130        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    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
                  0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
                  0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
                  0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
                  0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
                  0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
                  0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
                  0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
                  0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
                  0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
                  0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
                  1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Max.Eff.Inten.(mm/hr)=     118.09        42.74
                over (min)      15.00        30.00
     Storage Coeff.  (min)=      13.91 (ii)   26.12 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.08         0.04
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.41         0.13          0.481 (iii)
     TIME TO PEAK    (hrs)=       1.50         1.75           1.50
     RUNOFF VOLUME    (mm)=      68.46        21.38          37.85
     TOTAL RAINFALL   (mm)=      69.46        69.46          69.46
     RUNOFF COEFFICIENT   =       0.99         0.31           0.54


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

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

```
                    ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
         0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
         0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
         0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
         0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
         0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
         0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
         0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
         0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
         0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
         0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
         1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Max.Eff.Inten.(mm/hr)=     157.92        54.39
               over (min)        5.00         15.00
     Storage Coeff.  (min)=       2.73 (ii)   11.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.29         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.52         0.14         0.587 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50          1.33
     RUNOFF VOLUME    (mm)=      68.46        21.38         37.85
     TOTAL RAINFALL   (mm)=      69.46        69.46         69.46
     RUNOFF COEFFICIENT   =       0.99         0.31          0.54

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200     0.1300
                          0.1100     0.0700   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.587      1.33      37.85
   OUTFLOW: ID= 1 (  0029)      3.430      0.101      2.00      37.81
```

```
                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 17.28
                   TIME SHIFT OF PEAK FLOW         (min)= 40.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0645

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

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

                    ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    5.46 | 1.083   30.39 | 2.083   11.31 |  3.08    6.34
         0.167    5.46 | 1.167   30.39 | 2.167   11.31 |  3.17    6.34
         0.250    6.14 | 1.250  157.92 | 2.250    9.88 |  3.25    5.95
         0.333    6.14 | 1.333  157.92 | 2.333    9.88 |  3.33    5.95
         0.417    7.06 | 1.417   38.42 | 2.417    8.83 |  3.42    5.61
         0.500    7.06 | 1.500   38.42 | 2.500    8.83 |  3.50    5.61
         0.583    8.40 | 1.583   22.40 | 2.583    8.00 |  3.58    5.31
         0.667    8.40 | 1.667   22.40 | 2.667    8.00 |  3.67    5.31
         0.750   10.58 | 1.750   16.51 | 2.750    7.34 |  3.75    5.05
         0.833   10.58 | 1.833   16.51 | 2.833    7.34 |  3.83    5.05
         0.917   14.91 | 1.917   13.33 | 2.917    6.80 |  3.92    4.82
         1.000   14.91 | 2.000   13.33 | 3.000    6.80 |  4.00    4.82

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.123 (i)
     TIME TO PEAK    (hrs)=   1.500
     RUNOFF VOLUME    (mm)=  23.016
     TOTAL RAINFALL   (mm)=  69.460
     RUNOFF COEFFICIENT   =   0.331

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.028     1.50    24.48
      + ID2= 2 (  0029):     3.43   0.101     2.00    37.81
        ====================================================
        ID = 3 (  0007):     3.84   0.118     1.67    36.39

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

```
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.118     1.67    36.39
      + ID2= 2 (  0042):     2.05   0.123     1.50    23.02
        ====================================================
        ID = 1 (  0007):     5.89   0.238     1.58    31.73

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.238     1.58    31.73
      + ID2= 2 (  0005):     5.32   0.481     1.50    37.85
        ====================================================
        ID = 3 (  0007):    11.21   0.715     1.50    34.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390      0.1535
                          0.0410     0.0120   |   0.3840      0.1758
                          0.0580     0.0253   |   0.5390      0.1989
                          0.0710     0.0399   |   0.6480      0.2228
                          0.0830     0.0559   |   0.7320      0.2476
                          0.0920     0.0732   |   0.8050      0.2733
                          0.1010     0.0918   |   0.8710      0.2998
                          0.2130     0.1116   |   0.9320      0.3263
                          0.2860     0.1321   |   0.9880      0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.715      1.50      34.64
   OUTFLOW: ID= 1 (  0008)     11.210      0.295      2.42      34.63

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 41.30
                   TIME SHIFT OF PEAK FLOW         (min)= 55.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1360

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

--------------------
```

```
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.059     1.50    24.47
      + ID2= 2 (  0008):    11.21   0.295     2.42    34.63
        ====================================================
        ID = 3 (  0016):    12.04   0.311     2.33    33.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
***************************************
** SIMULATION:2-025yr 12hr 15min SCS **
***************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                       ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083   0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
                0.167   0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
                0.250   0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
                0.333   1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
                0.417   1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
                0.500   1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
                0.583   1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
                0.667   1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
                0.750   1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
                0.833   1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
                0.917   1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
                1.000   1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
                1.083   1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
                1.167   1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
                1.250   1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
                1.333   1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
                1.417   1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
                1.500   1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
                1.583   1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
                1.667   1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
                1.750   1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
                1.833   1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
                1.917   1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
                2.000   1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
                2.083   1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
                2.167   1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
                2.250   1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
```

```
                2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
                2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
                2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
                2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
                2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
                2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
                2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
                2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
                3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
                3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.077 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  30.217
     TOTAL RAINFALL   (mm)=  78.000
     RUNOFF COEFFICIENT   =   0.387

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
                0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
                0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
                0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
                0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
                0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
                0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
                0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
                0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
                0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
                0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
                1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
                1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
                1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
                1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
                1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
                1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
                1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
```

```
                1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
                1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
                1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
                1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
                1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
                2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
                2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
                2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
                2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
                2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
                2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
                2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
                2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
                2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
                2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
                2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
                2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
                3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
                3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.037 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  30.229
     TOTAL RAINFALL   (mm)=  78.000
     RUNOFF COEFFICIENT   =   0.388

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

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


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
                0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
                0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
```

```
          0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
          0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
          0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
          0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
          0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
          0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
          0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
          0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
          1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
          1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
          1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
          1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
          1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
          1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
          1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
          1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
          1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
          1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
          1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
          1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
          2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
          2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
          2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
          2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
          2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
          2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
          2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
          2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
          2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
          2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
          2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
          2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
          3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
          3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

Max.Eff.Inten.(mm/hr)=     102.96        51.58
          over (min)        15.00        30.00
Storage Coeff.  (min)=      14.70 (ii)   26.02 (ii)
Unit Hyd. Tpeak (min)=      15.00        30.00
Unit Hyd. peak  (cms)=       0.08         0.04
                                                    *TOTALS*
PEAK FLOW       (cms)=       0.34         0.16        0.447 (iii)
TIME TO PEAK    (hrs)=       6.33         6.58         6.33
RUNOFF VOLUME    (mm)=      77.00        26.19        43.97
TOTAL RAINFALL   (mm)=      78.00        78.00        78.00
RUNOFF COEFFICIENT   =       0.99         0.34         0.56


  (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
       CN*  =  59.0    Ia = Dep. Storage  (Above)
 (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
      THAN THE STORAGE COEFFICIENT.
```

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
                 0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
                 0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
                 0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
                 0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
                 0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
                 0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
                 0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
                 0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
                 0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
                 0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
                 1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
                 1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
                 1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
                 1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
                 1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
                 1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
                 1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
                 1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
                 1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
                 1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
                 1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
                 1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
                 2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
                 2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
                 2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
                 2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
                 2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
                 2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
                 2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
                 2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
```

```
          2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
          2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
          2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
          2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
          3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
          3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

     Max.Eff.Inten.(mm/hr)=     102.96       55.74
                over (min)        5.00       15.00
     Storage Coeff.  (min)=       3.24 (ii)  12.15 (ii)
     Unit Hyd. Tpeak (min)=       5.00       15.00
     Unit Hyd. peak  (cms)=       0.27        0.09
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.34        0.16          0.481 (iii)
     TIME TO PEAK    (hrs)=       6.25        6.33          6.25
     RUNOFF VOLUME    (mm)=      77.00       26.19         43.97
     TOTAL RAINFALL   (mm)=      78.00       78.00         78.00
     RUNOFF COEFFICIENT   =       0.99        0.34          0.56

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

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200      0.1300
                          0.1100     0.0700   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430     0.481      6.25      43.97
   OUTFLOW: ID= 1 (  0029)      3.430     0.106      6.75      43.93

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.05
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0675

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22
```

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

                         ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    0.00 | 3.167    2.34 | 6.250  102.96 |  9.33    2.73
            0.167    0.00 | 3.250    2.34 | 6.333   14.04 |  9.42    2.73
            0.250    0.00 | 3.333    3.12 | 6.417   14.04 |  9.50    2.73
            0.333    1.95 | 3.417    3.12 | 6.500   14.04 |  9.58    2.73
            0.417    1.95 | 3.500    3.12 | 6.583   14.04 |  9.67    2.73
            0.500    1.95 | 3.583    3.12 | 6.667   14.04 |  9.75    2.73
            0.583    1.95 | 3.667    3.12 | 6.750   14.04 |  9.83    2.73
            0.667    1.95 | 3.750    3.12 | 6.833    6.24 |  9.92    2.73
            0.750    1.95 | 3.833    3.12 | 6.917    6.24 | 10.00    2.73
            0.833    1.95 | 3.917    3.12 | 7.000    6.24 | 10.08    2.73
            0.917    1.95 | 4.000    3.12 | 7.083    6.24 | 10.17    2.73
            1.000    1.95 | 4.083    3.12 | 7.167    6.24 | 10.25    2.73
            1.083    1.95 | 4.167    3.12 | 7.250    6.24 | 10.33    1.56
            1.167    1.95 | 4.250    3.12 | 7.333    4.68 | 10.42    1.56
            1.250    1.95 | 4.333    4.68 | 7.417    4.68 | 10.50    1.56
            1.333    1.95 | 4.417    4.68 | 7.500    4.68 | 10.58    1.56
            1.417    1.95 | 4.500    4.68 | 7.583    4.68 | 10.67    1.56
            1.500    1.95 | 4.583    4.68 | 7.667    4.68 | 10.75    1.56
            1.583    1.95 | 4.667    4.68 | 7.750    4.68 | 10.83    1.56
            1.667    1.95 | 4.750    4.68 | 7.833    4.68 | 10.92    1.56
            1.750    1.95 | 4.833    6.24 | 7.917    4.68 | 11.00    1.56
            1.833    1.95 | 4.917    6.24 | 8.000    4.68 | 11.08    1.56
            1.917    1.95 | 5.000    6.24 | 8.083    4.68 | 11.17    1.56
            2.000    1.95 | 5.083    6.24 | 8.167    4.68 | 11.25    1.56
            2.083    1.95 | 5.167    6.24 | 8.250    4.68 | 11.33    1.56
            2.167    1.95 | 5.250    6.24 | 8.333    2.73 | 11.42    1.56
            2.250    1.95 | 5.333    9.36 | 8.417    2.73 | 11.50    1.56
            2.333    2.34 | 5.417    9.36 | 8.500    2.73 | 11.58    1.56
            2.417    2.34 | 5.500    9.36 | 8.583    2.73 | 11.67    1.56
            2.500    2.34 | 5.583    9.36 | 8.667    2.73 | 11.75    1.56
            2.583    2.34 | 5.667    9.36 | 8.750    2.73 | 11.83    1.56
            2.667    2.34 | 5.750    9.36 | 8.833    2.73 | 11.92    1.56
            2.750    2.34 | 5.833   37.44 | 8.917    2.73 | 12.00    1.56
            2.833    2.34 | 5.917   37.44 | 9.000    2.73 | 12.08    1.56
            2.917    2.34 | 6.000   37.44 | 9.083    2.73 | 12.17    1.56
            3.000    2.34 | 6.083  102.96 | 9.167    2.73 | 12.25    1.56
            3.083    2.34 | 6.167  102.96 | 9.250    2.73 |

Unit Hyd Qpeak  (cms)=   0.356

PEAK FLOW       (cms)=   0.163 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  28.515
TOTAL RAINFALL   (mm)=  78.000
RUNOFF COEFFICIENT   =   0.366
```

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

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.037     6.33    30.23
      + ID2= 2 (  0029):     3.43   0.106     6.75    43.93
        ====================================================
        ID = 3 (  0007):     3.84   0.130     6.42    42.47

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

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.130     6.42    42.47
      + ID2= 2 (  0042):     2.05   0.163     6.33    28.52
        ====================================================
        ID = 1 (  0007):     5.89   0.291     6.33    37.61

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

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.291     6.33    37.61
      + ID2= 2 (  0005):     5.32   0.447     6.33    43.97
        ====================================================
        ID = 3 (  0007):    11.21   0.738     6.33    40.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390      0.1535
                          0.0410     0.0120   |   0.3840      0.1758
                          0.0580     0.0253   |   0.5390      0.1989
                          0.0710     0.0399   |   0.6480      0.2228
                          0.0830     0.0559   |   0.7320      0.2476
                          0.0920     0.0732   |   0.8050      0.2733
                          0.1010     0.0918   |   0.8710      0.2998
                          0.2130     0.1116   |   0.9320      0.3263
```

```
                          0.2860     0.1321   |   0.9880      0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.738      6.33      40.63
   OUTFLOW: ID= 1 (  0008)     11.210      0.310      7.08      40.62

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 42.01
                   TIME SHIFT OF PEAK FLOW         (min)= 45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1419

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

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.077     6.33    30.22
      + ID2= 2 (  0008):    11.21   0.310     7.08    40.62
        ====================================================
        ID = 3 (  0016):    12.04   0.324     6.92    39.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
**************************************
** SIMULATION:2-02yr 12hr 15min SCS **
**************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

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


                                 ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                 0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                 0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                 0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                 0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                 0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
                 0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
                 0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
                 0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
                 0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
                 0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
                 1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
                 1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
```

```
            1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
            1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
            1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
            1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
            1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
            1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
            1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
            1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
            1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
            1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
            2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
            2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
            2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
            2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
            2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
            2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
            2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
            2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
            2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
            2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
            2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
            2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
            3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
            3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.022 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=   9.330
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.216

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

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


                                ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
            0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
            0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
            0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
```

```
            0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
            0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
            0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
            0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
            0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
            0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
            0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
            1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
            1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
            1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
            1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
            1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
            1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
            1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
            1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
            1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
            1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
            1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
            1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
            2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
            2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
            2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
            2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
            2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
            2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
            2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
            2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
            2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
            2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
            2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
            2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
            3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
            3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.011 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=   9.333
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.216

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
```

```
Dep. Storage     (mm)=       1.00         5.00
Average Slope     (%)=       1.00         1.00
Length            (m)=     188.33        40.00
Mannings n          =      0.130        0.250

    NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
           0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
           0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
           0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
           0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
           0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
           0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
           0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
           0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
           0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
           0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
           1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
           1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
           1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
           1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
           1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
           1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
           1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
           1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
           1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
           1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
           1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
           1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
           2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
           2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
           2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
           2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
           2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
           2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
           2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
           2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
           2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
           2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
           2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
           2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
           3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
           3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

Max.Eff.Inten.(mm/hr)=      47.95        13.86
           over (min)       20.00        40.00
Storage Coeff.  (min)=      19.95 (ii)   39.10 (ii)
```

```
     Unit Hyd. Tpeak (min)=      20.00        40.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.16         0.04         0.184 (iii)
     TIME TO PEAK    (hrs)=       6.42         6.83          6.42
     RUNOFF VOLUME    (mm)=      42.20         8.84         20.51
     TOTAL RAINFALL   (mm)=      43.20        43.20         43.20
     RUNOFF COEFFICIENT   =       0.98         0.20          0.47


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
                0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
                0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
                0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
                0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
                0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
                1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
                1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
                1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
                1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
                1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
                1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
```

```
               1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
               1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
               1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
               1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
               1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
               1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
               2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
               2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
               2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
               2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
               2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
               2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
               2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
               2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
               2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
               2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
               2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
               2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
               3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
               3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Max.Eff.Inten.(mm/hr)=      57.02        17.16
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.10 (ii)   18.38 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=       0.24         0.06
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.19         0.04          0.215 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.42           6.25
     RUNOFF VOLUME    (mm)=      42.20         8.84          20.52
     TOTAL RAINFALL   (mm)=      43.20        43.20          43.20
     RUNOFF COEFFICIENT   =       0.98         0.20           0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200      0.1300
                          0.1100     0.0700   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.215      6.25      20.52
   OUTFLOW: ID= 1 (  0029)      3.430      0.048      6.75      20.47

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.32
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0306

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                            ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    1.30 | 6.250   57.02 |  9.33    1.51
                 0.167    0.00 | 3.250    1.30 | 6.333    7.78 |  9.42    1.51
                 0.250    0.00 | 3.333    1.73 | 6.417    7.78 |  9.50    1.51
                 0.333    1.08 | 3.417    1.73 | 6.500    7.78 |  9.58    1.51
                 0.417    1.08 | 3.500    1.73 | 6.583    7.78 |  9.67    1.51
                 0.500    1.08 | 3.583    1.73 | 6.667    7.78 |  9.75    1.51
                 0.583    1.08 | 3.667    1.73 | 6.750    7.78 |  9.83    1.51
                 0.667    1.08 | 3.750    1.73 | 6.833    3.46 |  9.92    1.51
                 0.750    1.08 | 3.833    1.73 | 6.917    3.46 | 10.00    1.51
                 0.833    1.08 | 3.917    1.73 | 7.000    3.46 | 10.08    1.51
                 0.917    1.08 | 4.000    1.73 | 7.083    3.46 | 10.17    1.51
                 1.000    1.08 | 4.083    1.73 | 7.167    3.46 | 10.25    1.51
                 1.083    1.08 | 4.167    1.73 | 7.250    3.46 | 10.33    0.86
                 1.167    1.08 | 4.250    1.73 | 7.333    2.59 | 10.42    0.86
                 1.250    1.08 | 4.333    2.59 | 7.417    2.59 | 10.50    0.86
                 1.333    1.08 | 4.417    2.59 | 7.500    2.59 | 10.58    0.86
                 1.417    1.08 | 4.500    2.59 | 7.583    2.59 | 10.67    0.86
                 1.500    1.08 | 4.583    2.59 | 7.667    2.59 | 10.75    0.86
                 1.583    1.08 | 4.667    2.59 | 7.750    2.59 | 10.83    0.86
                 1.667    1.08 | 4.750    2.59 | 7.833    2.59 | 10.92    0.86
                 1.750    1.08 | 4.833    3.46 | 7.917    2.59 | 11.00    0.86
                 1.833    1.08 | 4.917    3.46 | 8.000    2.59 | 11.08    0.86
                 1.917    1.08 | 5.000    3.46 | 8.083    2.59 | 11.17    0.86
                 2.000    1.08 | 5.083    3.46 | 8.167    2.59 | 11.25    0.86
                 2.083    1.08 | 5.167    3.46 | 8.250    2.59 | 11.33    0.86
                 2.167    1.08 | 5.250    3.46 | 8.333    1.51 | 11.42    0.86
                 2.250    1.08 | 5.333    5.18 | 8.417    1.51 | 11.50    0.86
                 2.333    1.30 | 5.417    5.18 | 8.500    1.51 | 11.58    0.86
                 2.417    1.30 | 5.500    5.18 | 8.583    1.51 | 11.67    0.86
                 2.500    1.30 | 5.583    5.18 | 8.667    1.51 | 11.75    0.86
                 2.583    1.30 | 5.667    5.18 | 8.750    1.51 | 11.83    0.86
                 2.667    1.30 | 5.750    5.18 | 8.833    1.51 | 11.92    0.86
```

```
            2.750    1.30 | 5.833   20.74 | 8.917    1.51 | 12.00    0.86
            2.833    1.30 | 5.917   20.74 | 9.000    1.51 | 12.08    0.86
            2.917    1.30 | 6.000   20.74 | 9.083    1.51 | 12.17    0.86
            3.000    1.30 | 6.083   57.02 | 9.167    1.51 | 12.25    0.86
            3.083    1.30 | 6.167   57.02 | 9.250    1.51 |

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.046 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=   8.657
     TOTAL RAINFALL   (mm)=  43.200
     RUNOFF COEFFICIENT   =   0.200

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.011     6.33     9.33
      + ID2= 2 (  0029):     3.43   0.048     6.75    20.47
        ====================================================
        ID = 3 (  0007):     3.84   0.054     6.42    19.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.054     6.42    19.28
      + ID2= 2 (  0042):     2.05   0.046     6.33     8.66
        ====================================================
        ID = 1 (  0007):     5.89   0.098     6.33    15.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.098     6.33    15.58
      + ID2= 2 (  0005):     5.32   0.184     6.42    20.51
        ====================================================
        ID = 3 (  0007):    11.21   0.282     6.42    17.92

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390     0.1535
                          0.0410     0.0120   |   0.3840     0.1758
                          0.0580     0.0253   |   0.5390     0.1989
                          0.0710     0.0399   |   0.6480     0.2228
                          0.0830     0.0559   |   0.7320     0.2476
                          0.0920     0.0732   |   0.8050     0.2733
                          0.1010     0.0918   |   0.8710     0.2998
                          0.2130     0.1116   |   0.9320     0.3263
                          0.2860     0.1321   |   0.9880     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.282      6.42      17.92
   OUTFLOW: ID= 1 (  0008)     11.210      0.088      7.67      17.92

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.42
                   TIME SHIFT OF PEAK FLOW        (min)= 75.00
                   MAXIMUM  STORAGE   USED      (ha.m.)=  0.0664

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.022     6.33     9.33
      + ID2= 2 (  0008):    11.21   0.088     7.67    17.92
        ====================================================
        ID = 3 (  0016):    12.04   0.091     7.50    17.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
***************************************
** SIMULATION:2-050yr 12hr 15min SCS **
***************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

hrs	mm/hr	hrs	mm/hr	' hrs	mm/hr	hrs	mm/hr
0.083	0.00	3.167	2.59	6.250	114.05	9.33	3.02
0.167	0.00	3.250	2.59	6.333	15.55	9.42	3.02
0.250	0.00	3.333	3.46	6.417	15.55	9.50	3.02
0.333	2.16	3.417	3.46	6.500	15.55	9.58	3.02
0.417	2.16	3.500	3.46	6.583	15.55	9.67	3.02
0.500	2.16	3.583	3.46	6.667	15.55	9.75	3.02
0.583	2.16	3.667	3.46	6.750	15.55	9.83	3.02
0.667	2.16	3.750	3.46	6.833	6.91	9.92	3.02
0.750	2.16	3.833	3.46	6.917	6.91	10.00	3.02
0.833	2.16	3.917	3.46	7.000	6.91	10.08	3.02
0.917	2.16	4.000	3.46	7.083	6.91	10.17	3.02
1.000	2.16	4.083	3.46	7.167	6.91	10.25	3.02
1.083	2.16	4.167	3.46	7.250	6.91	10.33	1.73
1.167	2.16	4.250	3.46	7.333	5.18	10.42	1.73
1.250	2.16	4.333	5.18	7.417	5.18	10.50	1.73
1.333	2.16	4.417	5.18	7.500	5.18	10.58	1.73
1.417	2.16	4.500	5.18	7.583	5.18	10.67	1.73
1.500	2.16	4.583	5.18	7.667	5.18	10.75	1.73
1.583	2.16	4.667	5.18	7.750	5.18	10.83	1.73
1.667	2.16	4.750	5.18	7.833	5.18	10.92	1.73
1.750	2.16	4.833	6.91	7.917	5.18	11.00	1.73
1.833	2.16	4.917	6.91	8.000	5.18	11.08	1.73
1.917	2.16	5.000	6.91	8.083	5.18	11.17	1.73
2.000	2.16	5.083	6.91	8.167	5.18	11.25	1.73
2.083	2.16	5.167	6.91	8.250	5.18	11.33	1.73
2.167	2.16	5.250	6.91	8.333	3.02	11.42	1.73
2.250	2.16	5.333	10.37	8.417	3.02	11.50	1.73
2.333	2.59	5.417	10.37	8.500	3.02	11.58	1.73
2.417	2.59	5.500	10.37	8.583	3.02	11.67	1.73
2.500	2.59	5.583	10.37	8.667	3.02	11.75	1.73
2.583	2.59	5.667	10.37	8.750	3.02	11.83	1.73
2.667	2.59	5.750	10.37	8.833	3.02	11.92	1.73
2.750	2.59	5.833	41.47	8.917	3.02	12.00	1.73
2.833	2.59	5.917	41.47	9.000	3.02	12.08	1.73
2.917	2.59	6.000	41.47	9.083	3.02	12.17	1.73
3.000	2.59	6.083	114.05	9.167	3.02	12.25	1.73
3.083	2.59	6.167	114.05	9.250	3.02		

```
Unit Hyd Qpeak  (cms)=   0.167

PEAK FLOW       (cms)=   0.092 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  36.155
TOTAL RAINFALL   (mm)=  86.400
RUNOFF COEFFICIENT   =   0.418

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.59	6.250	114.05	9.33	3.02
0.167	0.00	3.250	2.59	6.333	15.55	9.42	3.02
0.250	0.00	3.333	3.46	6.417	15.55	9.50	3.02
0.333	2.16	3.417	3.46	6.500	15.55	9.58	3.02
0.417	2.16	3.500	3.46	6.583	15.55	9.67	3.02
0.500	2.16	3.583	3.46	6.667	15.55	9.75	3.02
0.583	2.16	3.667	3.46	6.750	15.55	9.83	3.02
0.667	2.16	3.750	3.46	6.833	6.91	9.92	3.02
0.750	2.16	3.833	3.46	6.917	6.91	10.00	3.02
0.833	2.16	3.917	3.46	7.000	6.91	10.08	3.02
0.917	2.16	4.000	3.46	7.083	6.91	10.17	3.02
1.000	2.16	4.083	3.46	7.167	6.91	10.25	3.02
1.083	2.16	4.167	3.46	7.250	6.91	10.33	1.73
1.167	2.16	4.250	3.46	7.333	5.18	10.42	1.73
1.250	2.16	4.333	5.18	7.417	5.18	10.50	1.73
1.333	2.16	4.417	5.18	7.500	5.18	10.58	1.73
1.417	2.16	4.500	5.18	7.583	5.18	10.67	1.73
1.500	2.16	4.583	5.18	7.667	5.18	10.75	1.73
1.583	2.16	4.667	5.18	7.750	5.18	10.83	1.73
1.667	2.16	4.750	5.18	7.833	5.18	10.92	1.73
1.750	2.16	4.833	6.91	7.917	5.18	11.00	1.73
1.833	2.16	4.917	6.91	8.000	5.18	11.08	1.73
1.917	2.16	5.000	6.91	8.083	5.18	11.17	1.73
2.000	2.16	5.083	6.91	8.167	5.18	11.25	1.73
2.083	2.16	5.167	6.91	8.250	5.18	11.33	1.73
2.167	2.16	5.250	6.91	8.333	3.02	11.42	1.73
2.250	2.16	5.333	10.37	8.417	3.02	11.50	1.73
2.333	2.59	5.417	10.37	8.500	3.02	11.58	1.73
2.417	2.59	5.500	10.37	8.583	3.02	11.67	1.73
2.500	2.59	5.583	10.37	8.667	3.02	11.75	1.73
2.583	2.59	5.667	10.37	8.750	3.02	11.83	1.73
2.667	2.59	5.750	10.37	8.833	3.02	11.92	1.73
2.750	2.59	5.833	41.47	8.917	3.02	12.00	1.73
2.833	2.59	5.917	41.47	9.000	3.02	12.08	1.73
2.917	2.59	6.000	41.47	9.083	3.02	12.17	1.73
3.000	2.59	6.083	114.05	9.167	3.02	12.25	1.73
3.083	2.59	6.167	114.05	9.250	3.02		

```
Unit Hyd Qpeak  (cms)=   0.078

PEAK FLOW       (cms)=   0.044 (i)
TIME TO PEAK    (hrs)=   6.333
```

```
     RUNOFF VOLUME    (mm)=  36.170
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.419

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
                0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
                0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
                0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
                0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
                0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
                0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
                0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
                0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
                0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
                0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
                1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
                1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
                1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
                1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
                1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
                1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
                1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
                1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
                1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
                1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
                1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
                1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
                2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
                2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
                2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
                2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
```

```
                2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
                2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
                2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
                2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
                2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
                2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
                2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
                2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
                3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
                3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Max.Eff.Inten.(mm/hr)=     114.05        61.59
               over (min)      15.00        25.00
     Storage Coeff.  (min)=      14.11 (ii)   24.66 (ii)
     Unit Hyd. Tpeak (min)=      15.00        25.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                           *TOTALS*
     PEAK FLOW      (cms)=       0.39         0.20          0.542 (iii)
     TIME TO PEAK    (hrs)=       6.33         6.50           6.42
     RUNOFF VOLUME    (mm)=      85.40        31.21          50.18
     TOTAL RAINFALL   (mm)=      86.40        86.40          86.40
     RUNOFF COEFFICIENT   =       0.99         0.36           0.58


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
                0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
                0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
```

```
            0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
            0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
            0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
            0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
            0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
            0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
            0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
            0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
            1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
            1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
            1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
            1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
            1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
            1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
            1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
            1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
            1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
            1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
            1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
            1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
            2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
            2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
            2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
            2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
            2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
            2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
            2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
            2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
            2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
            2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
            2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
            2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
            3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
            3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Max.Eff.Inten.(mm/hr)=     114.05        66.34
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.11 (ii)   11.42 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.38         0.20          0.551 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33           6.25
     RUNOFF VOLUME    (mm)=      85.40        31.21          50.18
     TOTAL RAINFALL   (mm)=      86.40        86.40          86.40
     RUNOFF COEFFICIENT   =       0.99         0.36           0.58

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200     0.1300
                          0.1100     0.0700   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430     0.551      6.25      50.18
   OUTFLOW: ID= 1 (  0029)      3.430     0.123      6.75      50.13

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.35
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0772

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |   TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |    hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    2.59 | 6.250  114.05 |  9.33    3.02
                 0.167    0.00 | 3.250    2.59 | 6.333   15.55 |  9.42    3.02
                 0.250    0.00 | 3.333    3.46 | 6.417   15.55 |  9.50    3.02
                 0.333    2.16 | 3.417    3.46 | 6.500   15.55 |  9.58    3.02
                 0.417    2.16 | 3.500    3.46 | 6.583   15.55 |  9.67    3.02
                 0.500    2.16 | 3.583    3.46 | 6.667   15.55 |  9.75    3.02
                 0.583    2.16 | 3.667    3.46 | 6.750   15.55 |  9.83    3.02
                 0.667    2.16 | 3.750    3.46 | 6.833    6.91 |  9.92    3.02
                 0.750    2.16 | 3.833    3.46 | 6.917    6.91 | 10.00    3.02
                 0.833    2.16 | 3.917    3.46 | 7.000    6.91 | 10.08    3.02
                 0.917    2.16 | 4.000    3.46 | 7.083    6.91 | 10.17    3.02
                 1.000    2.16 | 4.083    3.46 | 7.167    6.91 | 10.25    3.02
                 1.083    2.16 | 4.167    3.46 | 7.250    6.91 | 10.33    1.73
                 1.167    2.16 | 4.250    3.46 | 7.333    5.18 | 10.42    1.73
                 1.250    2.16 | 4.333    5.18 | 7.417    5.18 | 10.50    1.73
                 1.333    2.16 | 4.417    5.18 | 7.500    5.18 | 10.58    1.73
                 1.417    2.16 | 4.500    5.18 | 7.583    5.18 | 10.67    1.73
                 1.500    2.16 | 4.583    5.18 | 7.667    5.18 | 10.75    1.73
```

```
            1.583    2.16 | 4.667    5.18 | 7.750    5.18 | 10.83    1.73
            1.667    2.16 | 4.750    5.18 | 7.833    5.18 | 10.92    1.73
            1.750    2.16 | 4.833    6.91 | 7.917    5.18 | 11.00    1.73
            1.833    2.16 | 4.917    6.91 | 8.000    5.18 | 11.08    1.73
            1.917    2.16 | 5.000    6.91 | 8.083    5.18 | 11.17    1.73
            2.000    2.16 | 5.083    6.91 | 8.167    5.18 | 11.25    1.73
            2.083    2.16 | 5.167    6.91 | 8.250    5.18 | 11.33    1.73
            2.167    2.16 | 5.250    6.91 | 8.333    3.02 | 11.42    1.73
            2.250    2.16 | 5.333   10.37 | 8.417    3.02 | 11.50    1.73
            2.333    2.59 | 5.417   10.37 | 8.500    3.02 | 11.58    1.73
            2.417    2.59 | 5.500   10.37 | 8.583    3.02 | 11.67    1.73
            2.500    2.59 | 5.583   10.37 | 8.667    3.02 | 11.75    1.73
            2.583    2.59 | 5.667   10.37 | 8.750    3.02 | 11.83    1.73
            2.667    2.59 | 5.750   10.37 | 8.833    3.02 | 11.92    1.73
            2.750    2.59 | 5.833   41.47 | 8.917    3.02 | 12.00    1.73
            2.833    2.59 | 5.917   41.47 | 9.000    3.02 | 12.08    1.73
            2.917    2.59 | 6.000   41.47 | 9.083    3.02 | 12.17    1.73
            3.000    2.59 | 6.083  114.05 | 9.167    3.02 | 12.25    1.73
            3.083    2.59 | 6.167  114.05 | 9.250    3.02 |

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.197 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  34.220
     TOTAL RAINFALL   (mm)=  86.400
     RUNOFF COEFFICIENT   =   0.396

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.044     6.33    36.17
      + ID2= 2 (  0029):     3.43   0.123     6.75    50.13
        ====================================================
        ID = 3 (  0007):     3.84   0.151     6.42    48.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.151     6.42    48.64
      + ID2= 2 (  0042):     2.05   0.197     6.33    34.22
        ====================================================
        ID = 1 (  0007):     5.89   0.345     6.33    43.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.345     6.33    43.62
      + ID2= 2 (  0005):     5.32   0.542     6.42    50.18
        ====================================================
        ID = 3 (  0007):    11.21   0.883     6.33    46.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390      0.1535
                          0.0410     0.0120   |   0.3840      0.1758
                          0.0580     0.0253   |   0.5390      0.1989
                          0.0710     0.0399   |   0.6480      0.2228
                          0.0830     0.0559   |   0.7320      0.2476
                          0.0920     0.0732   |   0.8050      0.2733
                          0.1010     0.0918   |   0.8710      0.2998
                          0.2130     0.1116   |   0.9320      0.3263
                          0.2860     0.1321   |   0.9880      0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.883      6.33      46.73
   OUTFLOW: ID= 1 (  0008)     11.210      0.359      7.00      46.73

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.62
                   TIME SHIFT OF PEAK FLOW        (min)= 40.00
                   MAXIMUM  STORAGE   USED      (ha.m.)=  0.1634

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.092     6.33    36.15
      + ID2= 2 (  0008):    11.21   0.359     7.00    46.73
        ====================================================
        ID = 3 (  0016):    12.04   0.377     6.92    46.00

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
```

```
**************************************
** SIMULATION:2-05yr 12hr 15min SCS **
**************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19
```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.73	6.250	76.03	9.33	2.02
0.167	0.00	3.250	1.73	6.333	10.37	9.42	2.02
0.250	0.00	3.333	2.30	6.417	10.37	9.50	2.02
0.333	1.44	3.417	2.30	6.500	10.37	9.58	2.02
0.417	1.44	3.500	2.30	6.583	10.37	9.67	2.02
0.500	1.44	3.583	2.30	6.667	10.37	9.75	2.02
0.583	1.44	3.667	2.30	6.750	10.37	9.83	2.02
0.667	1.44	3.750	2.30	6.833	4.61	9.92	2.02
0.750	1.44	3.833	2.30	6.917	4.61	10.00	2.02
0.833	1.44	3.917	2.30	7.000	4.61	10.08	2.02
0.917	1.44	4.000	2.30	7.083	4.61	10.17	2.02
1.000	1.44	4.083	2.30	7.167	4.61	10.25	2.02
1.083	1.44	4.167	2.30	7.250	4.61	10.33	1.15
1.167	1.44	4.250	2.30	7.333	3.46	10.42	1.15
1.250	1.44	4.333	3.46	7.417	3.46	10.50	1.15
1.333	1.44	4.417	3.46	7.500	3.46	10.58	1.15
1.417	1.44	4.500	3.46	7.583	3.46	10.67	1.15
1.500	1.44	4.583	3.46	7.667	3.46	10.75	1.15
1.583	1.44	4.667	3.46	7.750	3.46	10.83	1.15
1.667	1.44	4.750	3.46	7.833	3.46	10.92	1.15
1.750	1.44	4.833	4.61	7.917	3.46	11.00	1.15
1.833	1.44	4.917	4.61	8.000	3.46	11.08	1.15
1.917	1.44	5.000	4.61	8.083	3.46	11.17	1.15
2.000	1.44	5.083	4.61	8.167	3.46	11.25	1.15
2.083	1.44	5.167	4.61	8.250	3.46	11.33	1.15
2.167	1.44	5.250	4.61	8.333	2.02	11.42	1.15
2.250	1.44	5.333	6.91	8.417	2.02	11.50	1.15
2.333	1.73	5.417	6.91	8.500	2.02	11.58	1.15
2.417	1.73	5.500	6.91	8.583	2.02	11.67	1.15
2.500	1.73	5.583	6.91	8.667	2.02	11.75	1.15
2.583	1.73	5.667	6.91	8.750	2.02	11.83	1.15
2.667	1.73	5.750	6.91	8.833	2.02	11.92	1.15
2.750	1.73	5.833	27.65	8.917	2.02	12.00	1.15
2.833	1.73	5.917	27.65	9.000	2.02	12.08	1.15
2.917	1.73	6.000	27.65	9.083	2.02	12.17	1.15
3.000	1.73	6.083	76.03	9.167	2.02	12.25	1.15
3.083	1.73	6.167	76.03	9.250	2.02		

```
Unit Hyd Qpeak  (cms)=   0.167

PEAK FLOW       (cms)=   0.043 (i)
TIME TO PEAK    (hrs)=   6.333
RUNOFF VOLUME    (mm)=  17.090
TOTAL RAINFALL   (mm)=  57.600
RUNOFF COEFFICIENT   =   0.297

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20
```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.73	6.250	76.03	9.33	2.02
0.167	0.00	3.250	1.73	6.333	10.37	9.42	2.02
0.250	0.00	3.333	2.30	6.417	10.37	9.50	2.02
0.333	1.44	3.417	2.30	6.500	10.37	9.58	2.02
0.417	1.44	3.500	2.30	6.583	10.37	9.67	2.02
0.500	1.44	3.583	2.30	6.667	10.37	9.75	2.02
0.583	1.44	3.667	2.30	6.750	10.37	9.83	2.02
0.667	1.44	3.750	2.30	6.833	4.61	9.92	2.02
0.750	1.44	3.833	2.30	6.917	4.61	10.00	2.02
0.833	1.44	3.917	2.30	7.000	4.61	10.08	2.02
0.917	1.44	4.000	2.30	7.083	4.61	10.17	2.02
1.000	1.44	4.083	2.30	7.167	4.61	10.25	2.02
1.083	1.44	4.167	2.30	7.250	4.61	10.33	1.15
1.167	1.44	4.250	2.30	7.333	3.46	10.42	1.15
1.250	1.44	4.333	3.46	7.417	3.46	10.50	1.15
1.333	1.44	4.417	3.46	7.500	3.46	10.58	1.15
1.417	1.44	4.500	3.46	7.583	3.46	10.67	1.15
1.500	1.44	4.583	3.46	7.667	3.46	10.75	1.15
1.583	1.44	4.667	3.46	7.750	3.46	10.83	1.15
1.667	1.44	4.750	3.46	7.833	3.46	10.92	1.15
1.750	1.44	4.833	4.61	7.917	3.46	11.00	1.15
1.833	1.44	4.917	4.61	8.000	3.46	11.08	1.15
1.917	1.44	5.000	4.61	8.083	3.46	11.17	1.15
2.000	1.44	5.083	4.61	8.167	3.46	11.25	1.15
2.083	1.44	5.167	4.61	8.250	3.46	11.33	1.15
2.167	1.44	5.250	4.61	8.333	2.02	11.42	1.15
2.250	1.44	5.333	6.91	8.417	2.02	11.50	1.15
2.333	1.73	5.417	6.91	8.500	2.02	11.58	1.15

```
            2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
            2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
            2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
            2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
            2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
            2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
            2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
            3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
            3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.020 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  17.097
     TOTAL RAINFALL   (mm)=  57.600
     RUNOFF COEFFICIENT   =   0.297

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
             TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
              hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
            0.083    0.00 | 3.167    1.73 | 6.250   76.03 |  9.33    2.02
            0.167    0.00 | 3.250    1.73 | 6.333   10.37 |  9.42    2.02
            0.250    0.00 | 3.333    2.30 | 6.417   10.37 |  9.50    2.02
            0.333    1.44 | 3.417    2.30 | 6.500   10.37 |  9.58    2.02
            0.417    1.44 | 3.500    2.30 | 6.583   10.37 |  9.67    2.02
            0.500    1.44 | 3.583    2.30 | 6.667   10.37 |  9.75    2.02
            0.583    1.44 | 3.667    2.30 | 6.750   10.37 |  9.83    2.02
            0.667    1.44 | 3.750    2.30 | 6.833    4.61 |  9.92    2.02
            0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
            0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
            0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
            1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
            1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
            1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
            1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
            1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
            1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
            1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
            1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
            1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
            1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
            1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
            1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
            2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
            2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
            2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
            2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
            2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
            2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
            2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
            2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
            2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
            2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
            2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
            2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
            3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
            3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Max.Eff.Inten.(mm/hr)=      63.94        29.81
                over (min)      20.00        35.00
     Storage Coeff.  (min)=      17.78 (ii)   31.88 (ii)
     Unit Hyd. Tpeak (min)=      20.00        35.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.22         0.08         0.278 (iii)
     TIME TO PEAK    (hrs)=       6.42         6.75          6.42
     RUNOFF VOLUME    (mm)=      56.60        15.25         29.72
     TOTAL RAINFALL   (mm)=      57.60        57.60         57.60
     RUNOFF COEFFICIENT   =       0.98         0.26          0.52


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
```

```
Dep. Storage     (mm)=       1.00         5.00
Average Slope     (%)=       1.00         2.00
Length            (m)=     151.22        40.00
Mannings n          =      0.013        0.250

    NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                      ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    0.00 | 3.167    1.73 | 6.250   76.03 |  9.33    2.02
           0.167    0.00 | 3.250    1.73 | 6.333   10.37 |  9.42    2.02
           0.250    0.00 | 3.333    2.30 | 6.417   10.37 |  9.50    2.02
           0.333    1.44 | 3.417    2.30 | 6.500   10.37 |  9.58    2.02
           0.417    1.44 | 3.500    2.30 | 6.583   10.37 |  9.67    2.02
           0.500    1.44 | 3.583    2.30 | 6.667   10.37 |  9.75    2.02
           0.583    1.44 | 3.667    2.30 | 6.750   10.37 |  9.83    2.02
           0.667    1.44 | 3.750    2.30 | 6.833    4.61 |  9.92    2.02
           0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
           0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
           0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
           1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
           1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
           1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
           1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
           1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
           1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
           1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
           1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
           1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
           1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
           1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
           1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
           2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
           2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
           2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
           2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
           2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
           2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
           2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
           2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
           2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
           2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
           2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
           2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
           3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
           3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

Max.Eff.Inten.(mm/hr)=      76.03        29.81
           over (min)        5.00        20.00
Storage Coeff.  (min)=       3.65 (ii)   15.11 (ii)
```

```
    Unit Hyd. Tpeak (min)=       5.00        20.00
    Unit Hyd. peak  (cms)=       0.25         0.07
                                                          *TOTALS*
    PEAK FLOW       (cms)=       0.25         0.08          0.306 (iii)
    TIME TO PEAK    (hrs)=       6.25         6.42           6.25
    RUNOFF VOLUME    (mm)=      56.60        15.25          29.72
    TOTAL RAINFALL   (mm)=      57.60        57.60          57.60
    RUNOFF COEFFICIENT   =       0.98         0.26           0.52

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200      0.1300
                          0.1100     0.0700   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.306      6.25      29.72
   OUTFLOW: ID= 1 (  0029)      3.430      0.070      6.75      29.67

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.87
                   TIME SHIFT OF PEAK FLOW        (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0446

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                      ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    0.00 | 3.167    1.73 | 6.250   76.03 |  9.33    2.02
           0.167    0.00 | 3.250    1.73 | 6.333   10.37 |  9.42    2.02
           0.250    0.00 | 3.333    2.30 | 6.417   10.37 |  9.50    2.02
           0.333    1.44 | 3.417    2.30 | 6.500   10.37 |  9.58    2.02
```

```
                0.417    1.44 | 3.500    2.30 | 6.583   10.37 |  9.67    2.02
                0.500    1.44 | 3.583    2.30 | 6.667   10.37 |  9.75    2.02
                0.583    1.44 | 3.667    2.30 | 6.750   10.37 |  9.83    2.02
                0.667    1.44 | 3.750    2.30 | 6.833    4.61 |  9.92    2.02
                0.750    1.44 | 3.833    2.30 | 6.917    4.61 | 10.00    2.02
                0.833    1.44 | 3.917    2.30 | 7.000    4.61 | 10.08    2.02
                0.917    1.44 | 4.000    2.30 | 7.083    4.61 | 10.17    2.02
                1.000    1.44 | 4.083    2.30 | 7.167    4.61 | 10.25    2.02
                1.083    1.44 | 4.167    2.30 | 7.250    4.61 | 10.33    1.15
                1.167    1.44 | 4.250    2.30 | 7.333    3.46 | 10.42    1.15
                1.250    1.44 | 4.333    3.46 | 7.417    3.46 | 10.50    1.15
                1.333    1.44 | 4.417    3.46 | 7.500    3.46 | 10.58    1.15
                1.417    1.44 | 4.500    3.46 | 7.583    3.46 | 10.67    1.15
                1.500    1.44 | 4.583    3.46 | 7.667    3.46 | 10.75    1.15
                1.583    1.44 | 4.667    3.46 | 7.750    3.46 | 10.83    1.15
                1.667    1.44 | 4.750    3.46 | 7.833    3.46 | 10.92    1.15
                1.750    1.44 | 4.833    4.61 | 7.917    3.46 | 11.00    1.15
                1.833    1.44 | 4.917    4.61 | 8.000    3.46 | 11.08    1.15
                1.917    1.44 | 5.000    4.61 | 8.083    3.46 | 11.17    1.15
                2.000    1.44 | 5.083    4.61 | 8.167    3.46 | 11.25    1.15
                2.083    1.44 | 5.167    4.61 | 8.250    3.46 | 11.33    1.15
                2.167    1.44 | 5.250    4.61 | 8.333    2.02 | 11.42    1.15
                2.250    1.44 | 5.333    6.91 | 8.417    2.02 | 11.50    1.15
                2.333    1.73 | 5.417    6.91 | 8.500    2.02 | 11.58    1.15
                2.417    1.73 | 5.500    6.91 | 8.583    2.02 | 11.67    1.15
                2.500    1.73 | 5.583    6.91 | 8.667    2.02 | 11.75    1.15
                2.583    1.73 | 5.667    6.91 | 8.750    2.02 | 11.83    1.15
                2.667    1.73 | 5.750    6.91 | 8.833    2.02 | 11.92    1.15
                2.750    1.73 | 5.833   27.65 | 8.917    2.02 | 12.00    1.15
                2.833    1.73 | 5.917   27.65 | 9.000    2.02 | 12.08    1.15
                2.917    1.73 | 6.000   27.65 | 9.083    2.02 | 12.17    1.15
                3.000    1.73 | 6.083   76.03 | 9.167    2.02 | 12.25    1.15
                3.083    1.73 | 6.167   76.03 | 9.250    2.02 |

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.089 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  15.986
     TOTAL RAINFALL   (mm)=  57.600
     RUNOFF COEFFICIENT   =   0.278

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):      0.41   0.020     6.33    17.10
      + ID2= 2 (  0029):      3.43   0.070     6.75    29.67
```

```
        ==================================================
        ID = 3 (  0007):      3.84   0.082     6.42    28.33

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):      3.84   0.082     6.42    28.33
      + ID2= 2 (  0042):      2.05   0.089     6.33    15.99
        ==================================================
        ID = 1 (  0007):      5.89   0.169     6.33    24.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):      5.89   0.169     6.33    24.03
      + ID2= 2 (  0005):      5.32   0.278     6.42    29.72
        ==================================================
        ID = 3 (  0007):     11.21   0.444     6.42    26.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390     0.1535
                          0.0410     0.0120   |   0.3840     0.1758
                          0.0580     0.0253   |   0.5390     0.1989
                          0.0710     0.0399   |   0.6480     0.2228
                          0.0830     0.0559   |   0.7320     0.2476
                          0.0920     0.0732   |   0.8050     0.2733
                          0.1010     0.0918   |   0.8710     0.2998
                          0.2130     0.1116   |   0.9320     0.3263
                          0.2860     0.1321   |   0.9880     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.444      6.42      26.73
   OUTFLOW: ID= 1 (  0008)     11.210      0.164      7.33      26.72

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 36.93
                  TIME SHIFT OF PEAK FLOW         (min)= 55.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1029
```

```
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.043     6.33    17.09
      + ID2= 2 (  0008):    11.21   0.164     7.33    26.72
        ===================================================
        ID = 3 (  0016):    12.04   0.169     7.33    26.06

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
***************************************
** SIMULATION:2-100yr 12hr 15min SCS **
***************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.88	6.250	126.72	9.33	3.36
0.167	0.00	3.250	2.88	6.333	17.28	9.42	3.36
0.250	0.00	3.333	3.84	6.417	17.28	9.50	3.36
0.333	2.40	3.417	3.84	6.500	17.28	9.58	3.36
0.417	2.40	3.500	3.84	6.583	17.28	9.67	3.36
0.500	2.40	3.583	3.84	6.667	17.28	9.75	3.36
0.583	2.40	3.667	3.84	6.750	17.28	9.83	3.36
0.667	2.40	3.750	3.84	6.833	7.68	9.92	3.36
0.750	2.40	3.833	3.84	6.917	7.68	10.00	3.36
0.833	2.40	3.917	3.84	7.000	7.68	10.08	3.36
0.917	2.40	4.000	3.84	7.083	7.68	10.17	3.36
1.000	2.40	4.083	3.84	7.167	7.68	10.25	3.36
1.083	2.40	4.167	3.84	7.250	7.68	10.33	1.92
1.167	2.40	4.250	3.84	7.333	5.76	10.42	1.92
1.250	2.40	4.333	5.76	7.417	5.76	10.50	1.92
1.333	2.40	4.417	5.76	7.500	5.76	10.58	1.92
1.417	2.40	4.500	5.76	7.583	5.76	10.67	1.92
1.500	2.40	4.583	5.76	7.667	5.76	10.75	1.92
1.583	2.40	4.667	5.76	7.750	5.76	10.83	1.92
1.667	2.40	4.750	5.76	7.833	5.76	10.92	1.92
1.750	2.40	4.833	7.68	7.917	5.76	11.00	1.92
1.833	2.40	4.917	7.68	8.000	5.76	11.08	1.92
1.917	2.40	5.000	7.68	8.083	5.76	11.17	1.92
2.000	2.40	5.083	7.68	8.167	5.76	11.25	1.92
2.083	2.40	5.167	7.68	8.250	5.76	11.33	1.92
2.167	2.40	5.250	7.68	8.333	3.36	11.42	1.92
2.250	2.40	5.333	11.52	8.417	3.36	11.50	1.92
2.333	2.88	5.417	11.52	8.500	3.36	11.58	1.92
2.417	2.88	5.500	11.52	8.583	3.36	11.67	1.92
2.500	2.88	5.583	11.52	8.667	3.36	11.75	1.92
2.583	2.88	5.667	11.52	8.750	3.36	11.83	1.92
2.667	2.88	5.750	11.52	8.833	3.36	11.92	1.92
2.750	2.88	5.833	46.08	8.917	3.36	12.00	1.92
2.833	2.88	5.917	46.08	9.000	3.36	12.08	1.92
2.917	2.88	6.000	46.08	9.083	3.36	12.17	1.92
3.000	2.88	6.083	126.72	9.167	3.36	12.25	1.92
3.083	2.88	6.167	126.72	9.250	3.36		

```
     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.110 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  43.235
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.450

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	2.88	6.250	126.72	9.33	3.36
0.167	0.00	3.250	2.88	6.333	17.28	9.42	3.36
0.250	0.00	3.333	3.84	6.417	17.28	9.50	3.36
0.333	2.40	3.417	3.84	6.500	17.28	9.58	3.36
0.417	2.40	3.500	3.84	6.583	17.28	9.67	3.36
0.500	2.40	3.583	3.84	6.667	17.28	9.75	3.36
0.583	2.40	3.667	3.84	6.750	17.28	9.83	3.36
0.667	2.40	3.750	3.84	6.833	7.68	9.92	3.36
0.750	2.40	3.833	3.84	6.917	7.68	10.00	3.36
0.833	2.40	3.917	3.84	7.000	7.68	10.08	3.36
0.917	2.40	4.000	3.84	7.083	7.68	10.17	3.36
1.000	2.40	4.083	3.84	7.167	7.68	10.25	3.36
1.083	2.40	4.167	3.84	7.250	7.68	10.33	1.92
1.167	2.40	4.250	3.84	7.333	5.76	10.42	1.92

```
              1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
              1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
              1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
              1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
              1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
              1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
              1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
              1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
              1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
              2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
              2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
              2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
              2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
              2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
              2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
              2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
              2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
              2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
              2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
              2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
              2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
              3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
              3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.053 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  43.252
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.451

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

```
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs    mm/hr
             0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
             0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
             0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
             0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
             0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
             0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
             0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
             0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
             0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
             0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
             0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
             1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
             1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
             1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
             1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
             1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
             1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
             1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
             1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
             1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
             1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
             1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
             1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
             2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
             2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
             2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
             2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
             2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
             2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
             2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
             2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
             2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
             2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
             2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
             2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
             3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
             3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

  Max.Eff.Inten.(mm/hr)=     126.72        79.06
            over (min)       15.00        25.00
  Storage Coeff.  (min)=      13.53 (ii)   23.07 (ii)
  Unit Hyd. Tpeak (min)=      15.00        25.00
  Unit Hyd. peak  (cms)=       0.08         0.05
                                                         *TOTALS*
  PEAK FLOW       (cms)=       0.44         0.25          0.631 (iii)
  TIME TO PEAK    (hrs)=       6.33         6.50           6.42
  RUNOFF VOLUME    (mm)=      95.00        37.26          57.47
  TOTAL RAINFALL   (mm)=      96.00        96.00          96.00
  RUNOFF COEFFICIENT   =       0.99         0.39           0.60
```

```
      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
                 0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
                 0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
                 0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
                 0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
                 0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
                 0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
                 0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
                 0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
                 0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
                 0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
                 1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
                 1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
                 1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
                 1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
                 1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
                 1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
                 1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
                 1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
                 1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
                 1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
                 1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
                 1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
                 2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
                 2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
                 2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
                 2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
                 2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
                 2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
                 2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
                 2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
                 2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
                 2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
                 2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
                 2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
                 3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
                 3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Max.Eff.Inten.(mm/hr)=     126.72        79.06
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.98 (ii)   10.73 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.42         0.24         0.634 (iii)
     TIME TO PEAK    (hrs)=       6.25         6.33          6.25
     RUNOFF VOLUME    (mm)=      95.00        37.26         57.47
     TOTAL RAINFALL   (mm)=      96.00        96.00         96.00
     RUNOFF COEFFICIENT   =       0.99         0.39          0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200     0.1300
                          0.1100     0.0700   |   0.0000     0.0000

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.634      6.25      57.47
   OUTFLOW: ID= 1 (  0029)      3.430      0.144      6.75      57.42

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.67
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0884

------------------------------------------------------------------------------
--------------------
| CALIB             |
```

```
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    2.88 | 6.250  126.72 |  9.33    3.36
               0.167    0.00 | 3.250    2.88 | 6.333   17.28 |  9.42    3.36
               0.250    0.00 | 3.333    3.84 | 6.417   17.28 |  9.50    3.36
               0.333    2.40 | 3.417    3.84 | 6.500   17.28 |  9.58    3.36
               0.417    2.40 | 3.500    3.84 | 6.583   17.28 |  9.67    3.36
               0.500    2.40 | 3.583    3.84 | 6.667   17.28 |  9.75    3.36
               0.583    2.40 | 3.667    3.84 | 6.750   17.28 |  9.83    3.36
               0.667    2.40 | 3.750    3.84 | 6.833    7.68 |  9.92    3.36
               0.750    2.40 | 3.833    3.84 | 6.917    7.68 | 10.00    3.36
               0.833    2.40 | 3.917    3.84 | 7.000    7.68 | 10.08    3.36
               0.917    2.40 | 4.000    3.84 | 7.083    7.68 | 10.17    3.36
               1.000    2.40 | 4.083    3.84 | 7.167    7.68 | 10.25    3.36
               1.083    2.40 | 4.167    3.84 | 7.250    7.68 | 10.33    1.92
               1.167    2.40 | 4.250    3.84 | 7.333    5.76 | 10.42    1.92
               1.250    2.40 | 4.333    5.76 | 7.417    5.76 | 10.50    1.92
               1.333    2.40 | 4.417    5.76 | 7.500    5.76 | 10.58    1.92
               1.417    2.40 | 4.500    5.76 | 7.583    5.76 | 10.67    1.92
               1.500    2.40 | 4.583    5.76 | 7.667    5.76 | 10.75    1.92
               1.583    2.40 | 4.667    5.76 | 7.750    5.76 | 10.83    1.92
               1.667    2.40 | 4.750    5.76 | 7.833    5.76 | 10.92    1.92
               1.750    2.40 | 4.833    7.68 | 7.917    5.76 | 11.00    1.92
               1.833    2.40 | 4.917    7.68 | 8.000    5.76 | 11.08    1.92
               1.917    2.40 | 5.000    7.68 | 8.083    5.76 | 11.17    1.92
               2.000    2.40 | 5.083    7.68 | 8.167    5.76 | 11.25    1.92
               2.083    2.40 | 5.167    7.68 | 8.250    5.76 | 11.33    1.92
               2.167    2.40 | 5.250    7.68 | 8.333    3.36 | 11.42    1.92
               2.250    2.40 | 5.333   11.52 | 8.417    3.36 | 11.50    1.92
               2.333    2.88 | 5.417   11.52 | 8.500    3.36 | 11.58    1.92
               2.417    2.88 | 5.500   11.52 | 8.583    3.36 | 11.67    1.92
               2.500    2.88 | 5.583   11.52 | 8.667    3.36 | 11.75    1.92
               2.583    2.88 | 5.667   11.52 | 8.750    3.36 | 11.83    1.92
               2.667    2.88 | 5.750   11.52 | 8.833    3.36 | 11.92    1.92
               2.750    2.88 | 5.833   46.08 | 8.917    3.36 | 12.00    1.92
               2.833    2.88 | 5.917   46.08 | 9.000    3.36 | 12.08    1.92
               2.917    2.88 | 6.000   46.08 | 9.083    3.36 | 12.17    1.92
               3.000    2.88 | 6.083  126.72 | 9.167    3.36 | 12.25    1.92
               3.083    2.88 | 6.167  126.72 | 9.250    3.36 |

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.238 (i)
     TIME TO PEAK    (hrs)=   6.333
```

```
     RUNOFF VOLUME    (mm)=  41.047
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.428

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.053     6.33    43.25
      + ID2= 2 (  0029):     3.43   0.144     6.75    57.42
        ====================================================
        ID = 3 (  0007):     3.84   0.178     6.42    55.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|  3 +  2 =  1     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.178     6.42    55.91
      + ID2= 2 (  0042):     2.05   0.238     6.33    41.05
        ====================================================
        ID = 1 (  0007):     5.89   0.411     6.33    50.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|  1 +  2 =  3     |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.411     6.33    50.74
      + ID2= 2 (  0005):     5.32   0.631     6.42    57.47
        ====================================================
        ID = 3 (  0007):    11.21   1.036     6.33    53.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390     0.1535
                          0.0410     0.0120   |   0.3840     0.1758
                          0.0580     0.0253   |   0.5390     0.1989
                          0.0710     0.0399   |   0.6480     0.2228
```

```
                    0.0830     0.0559   |   0.7320      0.2476
                    0.0920     0.0732   |   0.8050      0.2733
                    0.1010     0.0918   |   0.8710      0.2998
                    0.2130     0.1116   |   0.9320      0.3263
                    0.2860     0.1321   |   0.9880      0.3528

                          AREA     QPEAK     TPEAK       R.V.
                          (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      1.036      6.33      53.93
   OUTFLOW: ID= 1 (  0008)     11.210      0.456      6.92      53.92

              PEAK   FLOW   REDUCTION [Qout/Qin](%)= 44.03
              TIME SHIFT OF PEAK FLOW         (min)= 35.00
              MAXIMUM  STORAGE   USED       (ha.m.)=  0.1870

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.110     6.33    43.23
      + ID2= 2 (  0008):    11.21   0.456     6.92    53.92
        ==================================================
        ID = 3 (  0016):    12.04   0.480     6.92    53.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
**************************************
** SIMULATION:2-10yr 12hr 15min SCS **
**************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
                0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
                0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
                0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
                0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
                0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
                0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
                0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
                0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
                0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
                0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
                1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
                1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
                1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
                1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
                1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
                1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
                1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
                1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
                1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
                1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
                1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
                1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
                2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
                2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
                2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
                2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
                2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
                2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
                2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
                2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
                2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
                2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
                2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
                2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
                3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
                3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW      (cms)=   0.056 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  22.242
     TOTAL RAINFALL   (mm)=  66.000
     RUNOFF COEFFICIENT   =   0.337

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

0.083	0.00	3.167	1.98	6.250	87.12	9.33	2.31
0.167	0.00	3.250	1.98	6.333	11.88	9.42	2.31
0.250	0.00	3.333	2.64	6.417	11.88	9.50	2.31
0.333	1.65	3.417	2.64	6.500	11.88	9.58	2.31
0.417	1.65	3.500	2.64	6.583	11.88	9.67	2.31
0.500	1.65	3.583	2.64	6.667	11.88	9.75	2.31
0.583	1.65	3.667	2.64	6.750	11.88	9.83	2.31
0.667	1.65	3.750	2.64	6.833	5.28	9.92	2.31
0.750	1.65	3.833	2.64	6.917	5.28	10.00	2.31
0.833	1.65	3.917	2.64	7.000	5.28	10.08	2.31
0.917	1.65	4.000	2.64	7.083	5.28	10.17	2.31
1.000	1.65	4.083	2.64	7.167	5.28	10.25	2.31
1.083	1.65	4.167	2.64	7.250	5.28	10.33	1.32
1.167	1.65	4.250	2.64	7.333	3.96	10.42	1.32
1.250	1.65	4.333	3.96	7.417	3.96	10.50	1.32
1.333	1.65	4.417	3.96	7.500	3.96	10.58	1.32
1.417	1.65	4.500	3.96	7.583	3.96	10.67	1.32
1.500	1.65	4.583	3.96	7.667	3.96	10.75	1.32
1.583	1.65	4.667	3.96	7.750	3.96	10.83	1.32
1.667	1.65	4.750	3.96	7.833	3.96	10.92	1.32
1.750	1.65	4.833	5.28	7.917	3.96	11.00	1.32
1.833	1.65	4.917	5.28	8.000	3.96	11.08	1.32
1.917	1.65	5.000	5.28	8.083	3.96	11.17	1.32
2.000	1.65	5.083	5.28	8.167	3.96	11.25	1.32
2.083	1.65	5.167	5.28	8.250	3.96	11.33	1.32
2.167	1.65	5.250	5.28	8.333	2.31	11.42	1.32
2.250	1.65	5.333	7.92	8.417	2.31	11.50	1.32
2.333	1.98	5.417	7.92	8.500	2.31	11.58	1.32
2.417	1.98	5.500	7.92	8.583	2.31	11.67	1.32
2.500	1.98	5.583	7.92	8.667	2.31	11.75	1.32
2.583	1.98	5.667	7.92	8.750	2.31	11.83	1.32
2.667	1.98	5.750	7.92	8.833	2.31	11.92	1.32
2.750	1.98	5.833	31.68	8.917	2.31	12.00	1.32
2.833	1.98	5.917	31.68	9.000	2.31	12.08	1.32
2.917	1.98	6.000	31.68	9.083	2.31	12.17	1.32
3.000	1.98	6.083	87.12	9.167	2.31	12.25	1.32
3.083	1.98	6.167	87.12	9.250	2.31		

Unit Hyd Qpeak (cms)= 0.078

PEAK FLOW (cms)= 0.027 (i)
TIME TO PEAK (hrs)= 6.333
RUNOFF VOLUME (mm)= 22.250
TOTAL RAINFALL (mm)= 66.000
RUNOFF COEFFICIENT = 0.337

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.66	2.66
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	1.00
Length	(m)=	188.33	40.00
Mannings n	=	0.130	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	3.167	1.98	6.250	87.12	9.33	2.31
0.167	0.00	3.250	1.98	6.333	11.88	9.42	2.31
0.250	0.00	3.333	2.64	6.417	11.88	9.50	2.31
0.333	1.65	3.417	2.64	6.500	11.88	9.58	2.31
0.417	1.65	3.500	2.64	6.583	11.88	9.67	2.31
0.500	1.65	3.583	2.64	6.667	11.88	9.75	2.31
0.583	1.65	3.667	2.64	6.750	11.88	9.83	2.31
0.667	1.65	3.750	2.64	6.833	5.28	9.92	2.31
0.750	1.65	3.833	2.64	6.917	5.28	10.00	2.31
0.833	1.65	3.917	2.64	7.000	5.28	10.08	2.31
0.917	1.65	4.000	2.64	7.083	5.28	10.17	2.31
1.000	1.65	4.083	2.64	7.167	5.28	10.25	2.31
1.083	1.65	4.167	2.64	7.250	5.28	10.33	1.32
1.167	1.65	4.250	2.64	7.333	3.96	10.42	1.32
1.250	1.65	4.333	3.96	7.417	3.96	10.50	1.32
1.333	1.65	4.417	3.96	7.500	3.96	10.58	1.32
1.417	1.65	4.500	3.96	7.583	3.96	10.67	1.32
1.500	1.65	4.583	3.96	7.667	3.96	10.75	1.32
1.583	1.65	4.667	3.96	7.750	3.96	10.83	1.32
1.667	1.65	4.750	3.96	7.833	3.96	10.92	1.32
1.750	1.65	4.833	5.28	7.917	3.96	11.00	1.32
1.833	1.65	4.917	5.28	8.000	3.96	11.08	1.32
1.917	1.65	5.000	5.28	8.083	3.96	11.17	1.32
2.000	1.65	5.083	5.28	8.167	3.96	11.25	1.32
2.083	1.65	5.167	5.28	8.250	3.96	11.33	1.32
2.167	1.65	5.250	5.28	8.333	2.31	11.42	1.32
2.250	1.65	5.333	7.92	8.417	2.31	11.50	1.32
2.333	1.98	5.417	7.92	8.500	2.31	11.58	1.32
2.417	1.98	5.500	7.92	8.583	2.31	11.67	1.32
2.500	1.98	5.583	7.92	8.667	2.31	11.75	1.32
2.583	1.98	5.667	7.92	8.750	2.31	11.83	1.32
2.667	1.98	5.750	7.92	8.833	2.31	11.92	1.32
2.750	1.98	5.833	31.68	8.917	2.31	12.00	1.32
2.833	1.98	5.917	31.68	9.000	2.31	12.08	1.32
2.917	1.98	6.000	31.68	9.083	2.31	12.17	1.32
3.000	1.98	6.083	87.12	9.167	2.31	12.25	1.32
3.083	1.98	6.167	87.12	9.250	2.31		

```
    Max.Eff.Inten.(mm/hr)=      87.12        38.29
               over (min)       15.00        30.00
    Storage Coeff.  (min)=      15.71 (ii)   28.47 (ii)
    Unit Hyd. Tpeak (min)=      15.00        30.00
    Unit Hyd. peak  (cms)=       0.07         0.04
                                                           *TOTALS*
    PEAK FLOW       (cms)=       0.28         0.11          0.355 (iii)
    TIME TO PEAK    (hrs)=       6.33         6.58           6.33
    RUNOFF VOLUME    (mm)=      65.00        19.52          35.43
    TOTAL RAINFALL   (mm)=      66.00        66.00          66.00
    RUNOFF COEFFICIENT   =       0.98         0.30           0.54


      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. Storage  (Above)
     (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
          THAN THE STORAGE COEFFICIENT.
    (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       1.71         1.71
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         2.00
    Length            (m)=     151.22        40.00
    Mannings n          =      0.013        0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
              0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
              0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
              0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
              0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
              0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
              0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
              0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
              0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
              0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
              0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
              1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
              1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
              1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
              1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
              1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
              1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
              1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
              1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
              1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
              1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
              1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
              1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
              2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
              2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
              2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
              2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
              2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
              2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
              2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
              2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
              2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
              2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
              2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
              2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
              3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
              3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

    Max.Eff.Inten.(mm/hr)=      87.12        38.29
               over (min)        5.00        15.00
    Storage Coeff.  (min)=       3.46 (ii)   13.82 (ii)
    Unit Hyd. Tpeak (min)=       5.00        15.00
    Unit Hyd. peak  (cms)=       0.26         0.08
                                                           *TOTALS*
    PEAK FLOW       (cms)=       0.29         0.11          0.384 (iii)
    TIME TO PEAK    (hrs)=       6.25         6.33           6.25
    RUNOFF VOLUME    (mm)=      65.00        19.52          35.43
    TOTAL RAINFALL   (mm)=      66.00        66.00          66.00
    RUNOFF COEFFICIENT   =       0.98         0.30           0.54

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

      (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200     0.1300
```

```
                    0.1100     0.0700   |   0.0000      0.0000

                          AREA     QPEAK     TPEAK       R.V.
                          (ha)     (cms)     (hrs)       (mm)
 INFLOW : ID= 2 (  0028)      3.430      0.384      6.25      35.43
 OUTFLOW: ID= 1 (  0029)      3.430      0.085      6.75      35.39

             PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.03
             TIME SHIFT OF PEAK FLOW         (min)= 30.00
             MAXIMUM  STORAGE   USED       (ha.m.)=  0.0540

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                             ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 3.167    1.98 | 6.250   87.12 |  9.33    2.31
               0.167    0.00 | 3.250    1.98 | 6.333   11.88 |  9.42    2.31
               0.250    0.00 | 3.333    2.64 | 6.417   11.88 |  9.50    2.31
               0.333    1.65 | 3.417    2.64 | 6.500   11.88 |  9.58    2.31
               0.417    1.65 | 3.500    2.64 | 6.583   11.88 |  9.67    2.31
               0.500    1.65 | 3.583    2.64 | 6.667   11.88 |  9.75    2.31
               0.583    1.65 | 3.667    2.64 | 6.750   11.88 |  9.83    2.31
               0.667    1.65 | 3.750    2.64 | 6.833    5.28 |  9.92    2.31
               0.750    1.65 | 3.833    2.64 | 6.917    5.28 | 10.00    2.31
               0.833    1.65 | 3.917    2.64 | 7.000    5.28 | 10.08    2.31
               0.917    1.65 | 4.000    2.64 | 7.083    5.28 | 10.17    2.31
               1.000    1.65 | 4.083    2.64 | 7.167    5.28 | 10.25    2.31
               1.083    1.65 | 4.167    2.64 | 7.250    5.28 | 10.33    1.32
               1.167    1.65 | 4.250    2.64 | 7.333    3.96 | 10.42    1.32
               1.250    1.65 | 4.333    3.96 | 7.417    3.96 | 10.50    1.32
               1.333    1.65 | 4.417    3.96 | 7.500    3.96 | 10.58    1.32
               1.417    1.65 | 4.500    3.96 | 7.583    3.96 | 10.67    1.32
               1.500    1.65 | 4.583    3.96 | 7.667    3.96 | 10.75    1.32
               1.583    1.65 | 4.667    3.96 | 7.750    3.96 | 10.83    1.32
               1.667    1.65 | 4.750    3.96 | 7.833    3.96 | 10.92    1.32
               1.750    1.65 | 4.833    5.28 | 7.917    3.96 | 11.00    1.32
               1.833    1.65 | 4.917    5.28 | 8.000    3.96 | 11.08    1.32
               1.917    1.65 | 5.000    5.28 | 8.083    3.96 | 11.17    1.32
               2.000    1.65 | 5.083    5.28 | 8.167    3.96 | 11.25    1.32
               2.083    1.65 | 5.167    5.28 | 8.250    3.96 | 11.33    1.32
               2.167    1.65 | 5.250    5.28 | 8.333    2.31 | 11.42    1.32
               2.250    1.65 | 5.333    7.92 | 8.417    2.31 | 11.50    1.32
               2.333    1.98 | 5.417    7.92 | 8.500    2.31 | 11.58    1.32
               2.417    1.98 | 5.500    7.92 | 8.583    2.31 | 11.67    1.32
               2.500    1.98 | 5.583    7.92 | 8.667    2.31 | 11.75    1.32
               2.583    1.98 | 5.667    7.92 | 8.750    2.31 | 11.83    1.32
               2.667    1.98 | 5.750    7.92 | 8.833    2.31 | 11.92    1.32
               2.750    1.98 | 5.833   31.68 | 8.917    2.31 | 12.00    1.32
               2.833    1.98 | 5.917   31.68 | 9.000    2.31 | 12.08    1.32
               2.917    1.98 | 6.000   31.68 | 9.083    2.31 | 12.17    1.32
               3.000    1.98 | 6.083   87.12 | 9.167    2.31 | 12.25    1.32
               3.083    1.98 | 6.167   87.12 | 9.250    2.31 |

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.118 (i)
     TIME TO PEAK    (hrs)=   6.333
     RUNOFF VOLUME    (mm)=  20.887
     TOTAL RAINFALL   (mm)=  66.000
     RUNOFF COEFFICIENT   =   0.316

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.027     6.33    22.25
      + ID2= 2 (  0029):     3.43   0.085     6.75    35.39
        ====================================================
        ID = 3 (  0007):     3.84   0.102     6.42    33.99

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.102     6.42    33.99
      + ID2= 2 (  0042):     2.05   0.118     6.33    20.89
        ====================================================
        ID = 1 (  0007):     5.89   0.218     6.33    29.43

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.218     6.33    29.43
      + ID2= 2 (  0005):     5.32   0.355     6.33    35.43
```

```
        ====================================================
        ID = 3 (  0007):    11.21   0.573     6.33    32.28

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390     0.1535
                          0.0410     0.0120   |   0.3840     0.1758
                          0.0580     0.0253   |   0.5390     0.1989
                          0.0710     0.0399   |   0.6480     0.2228
                          0.0830     0.0559   |   0.7320     0.2476
                          0.0920     0.0732   |   0.8050     0.2733
                          0.1010     0.0918   |   0.8710     0.2998
                          0.2130     0.1116   |   0.9320     0.3263
                          0.2860     0.1321   |   0.9880     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.573      6.33      32.28
   OUTFLOW: ID= 1 (  0008)     11.210      0.232      7.08      32.27

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.50
                   TIME SHIFT OF PEAK FLOW         (min)= 45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1170

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------        (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.056     6.33    22.24
      + ID2= 2 (  0008):    11.21   0.232     7.08    32.27
        ====================================================
        ID = 3 (  0016):    12.04   0.241     7.08    31.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
***********************************************
** SIMULATION:3-100yr 24hr 15min SCS Type II **
***********************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

```
                            ---- TRANSFORMED HYETOGRAPH ----
       TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
        hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
      0.083    0.00 | 6.167    2.09 |12.250  127.21 | 18.33    2.08
      0.167    0.00 | 6.250    2.09 |12.333   20.17 | 18.42    2.08
      0.250    0.00 | 6.333    2.15 |12.417   20.15 | 18.50    2.08
      0.333    1.19 | 6.417    2.15 |12.500   20.15 | 18.58    2.01
      0.417    1.19 | 6.500    2.15 |12.583   13.72 | 18.67    2.01
      0.500    1.19 | 6.583    2.20 |12.667   13.72 | 18.75    2.01
      0.583    1.22 | 6.667    2.20 |12.750   13.72 | 18.83    1.93
      0.667    1.22 | 6.750    2.20 |12.833    9.44 | 18.92    1.93
      0.750    1.22 | 6.833    2.26 |12.917    9.44 | 19.00    1.93
      0.833    1.25 | 6.917    2.26 |13.000    9.44 | 19.08    1.86
      0.917    1.25 | 7.000    2.26 |13.083    7.97 | 19.17    1.86
      1.000    1.25 | 7.083    2.32 |13.167    7.97 | 19.25    1.86
      1.083    1.28 | 7.167    2.32 |13.250    7.97 | 19.33    1.79
      1.167    1.28 | 7.250    2.32 |13.333    6.75 | 19.42    1.79
      1.250    1.28 | 7.333    2.38 |13.417    6.75 | 19.50    1.79
      1.333    1.31 | 7.417    2.38 |13.500    6.75 | 19.58    1.71
      1.417    1.31 | 7.500    2.38 |13.583    5.96 | 19.67    1.71
      1.500    1.31 | 7.583    2.44 |13.667    5.96 | 19.75    1.71
      1.583    1.34 | 7.667    2.44 |13.750    5.96 | 19.83    1.64
      1.667    1.34 | 7.750    2.44 |13.833    5.22 | 19.92    1.64
      1.750    1.34 | 7.833    2.50 |13.917    5.22 | 20.00    1.64
      1.833    1.37 | 7.917    2.50 |14.000    5.22 | 20.08    1.57
      1.917    1.37 | 8.000    2.50 |14.083    4.66 | 20.17    1.57
      2.000    1.37 | 8.083    2.56 |14.167    4.66 | 20.25    1.57
      2.083    1.39 | 8.167    2.56 |14.250    4.66 | 20.33    1.52
      2.167    1.39 | 8.250    2.56 |14.333    4.25 | 20.42    1.52
      2.250    1.39 | 8.333    2.74 |14.417    4.25 | 20.50    1.52
      2.333    1.43 | 8.417    2.74 |14.500    4.25 | 20.58    1.51
      2.417    1.43 | 8.500    2.74 |14.583    4.05 | 20.67    1.51
      2.500    1.43 | 8.583    3.02 |14.667    4.05 | 20.75    1.51
      2.583    1.46 | 8.667    3.02 |14.750    4.05 | 20.83    1.49
      2.667    1.46 | 8.750    3.02 |14.833    3.83 | 20.92    1.49
      2.750    1.46 | 8.833    3.33 |14.917    3.83 | 21.00    1.49
      2.833    1.48 | 8.917    3.33 |15.000    3.83 | 21.08    1.48
      2.917    1.48 | 9.000    3.33 |15.083    3.63 | 21.17    1.48
      3.000    1.48 | 9.083    3.61 |15.167    3.63 | 21.25    1.48
      3.083    1.51 | 9.167    3.61 |15.250    3.63 | 21.33    1.46
      3.167    1.51 | 9.250    3.61 |15.333    3.42 | 21.42    1.46
      3.250    1.51 | 9.333    3.76 |15.417    3.42 | 21.50    1.46
      3.333    1.55 | 9.417    3.76 |15.500    3.42 | 21.58    1.45
      3.417    1.55 | 9.500    3.76 |15.583    3.22 | 21.67    1.45
      3.500    1.55 | 9.583    3.76 |15.667    3.22 | 21.75    1.45
      3.583    1.57 | 9.667    3.76 |15.750    3.22 | 21.83    1.43
      3.667    1.57 | 9.750    3.76 |15.833    3.01 | 21.92    1.43
      3.750    1.57 | 9.833    4.01 |15.917    3.01 | 22.00    1.43
      3.833    1.60 | 9.917    4.01 |16.000    3.01 | 22.08    1.42
      3.917    1.60 |10.000    4.01 |16.083    2.81 | 22.17    1.42
```

```
         4.000    1.60 |10.083    4.46 |16.167    2.81 | 22.25    1.42
         4.083    1.63 |10.167    4.46 |16.250    2.81 | 22.33    1.40
         4.167    1.63 |10.250    4.46 |16.333    2.67 | 22.42    1.40
         4.250    1.63 |10.333    5.07 |16.417    2.67 | 22.50    1.40
         4.333    1.68 |10.417    5.07 |16.500    2.67 | 22.58    1.39
         4.417    1.68 |10.500    5.07 |16.583    2.60 | 22.67    1.39
         4.500    1.68 |10.583    5.75 |16.667    2.60 | 22.75    1.39
         4.583    1.73 |10.667    5.75 |16.750    2.60 | 22.83    1.37
         4.667    1.73 |10.750    5.75 |16.833    2.52 | 22.92    1.37
         4.750    1.73 |10.833    6.73 |16.917    2.52 | 23.00    1.37
         4.833    1.79 |10.917    6.73 |17.000    2.52 | 23.08    1.36
         4.917    1.79 |11.000    6.73 |17.083    2.45 | 23.17    1.36
         5.000    1.79 |11.083    7.86 |17.167    2.45 | 23.25    1.36
         5.083    1.85 |11.167    7.86 |17.250    2.45 | 23.33    1.35
         5.167    1.85 |11.250    7.86 |17.333    2.37 | 23.42    1.35
         5.250    1.85 |11.333    9.93 |17.417    2.37 | 23.50    1.35
         5.333    1.91 |11.417    9.93 |17.500    2.37 | 23.58    1.33
         5.417    1.91 |11.500    9.93 |17.583    2.30 | 23.67    1.33
         5.500    1.91 |11.583   12.64 |17.667    2.30 | 23.75    1.33
         5.583    1.97 |11.667   12.64 |17.750    2.30 | 23.83    1.31
         5.667    1.97 |11.750   12.64 |17.833    2.23 | 23.92    1.31
         5.750    1.97 |11.833   51.54 |17.917    2.22 | 24.00    1.31
         5.833    2.03 |11.917   51.54 |18.000    2.22 | 24.08    1.30
         5.917    2.03 |12.000   51.54 |18.083    2.15 | 24.17    1.30
         6.000    2.03 |12.083  127.20 |18.167    2.15 | 24.25    1.30
         6.083    2.09 |12.167  127.21 |18.250    2.15 |

    Unit Hyd Qpeak  (cms)=   0.167

    PEAK FLOW       (cms)=   0.128 (i)
    TIME TO PEAK    (hrs)=  12.333
    RUNOFF VOLUME    (mm)=  60.077
    TOTAL RAINFALL   (mm)= 117.600
    RUNOFF COEFFICIENT   =   0.511

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
          TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
           hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
         0.083    0.00 | 6.167    2.09 |12.250  127.21 | 18.33    2.08
         0.167    0.00 | 6.250    2.09 |12.333   20.17 | 18.42    2.08
         0.250    0.00 | 6.333    2.15 |12.417   20.15 | 18.50    2.08
         0.333    1.19 | 6.417    2.15 |12.500   20.15 | 18.58    2.01
         0.417    1.19 | 6.500    2.15 |12.583   13.72 | 18.67    2.01
         0.500    1.19 | 6.583    2.20 |12.667   13.72 | 18.75    2.01
         0.583    1.22 | 6.667    2.20 |12.750   13.72 | 18.83    1.93
         0.667    1.22 | 6.750    2.20 |12.833    9.44 | 18.92    1.93
         0.750    1.22 | 6.833    2.26 |12.917    9.44 | 19.00    1.93
         0.833    1.25 | 6.917    2.26 |13.000    9.44 | 19.08    1.86
         0.917    1.25 | 7.000    2.26 |13.083    7.97 | 19.17    1.86
         1.000    1.25 | 7.083    2.32 |13.167    7.97 | 19.25    1.86
         1.083    1.28 | 7.167    2.32 |13.250    7.97 | 19.33    1.79
         1.167    1.28 | 7.250    2.32 |13.333    6.75 | 19.42    1.79
         1.250    1.28 | 7.333    2.38 |13.417    6.75 | 19.50    1.79
         1.333    1.31 | 7.417    2.38 |13.500    6.75 | 19.58    1.71
         1.417    1.31 | 7.500    2.38 |13.583    5.96 | 19.67    1.71
         1.500    1.31 | 7.583    2.44 |13.667    5.96 | 19.75    1.71
         1.583    1.34 | 7.667    2.44 |13.750    5.96 | 19.83    1.64
         1.667    1.34 | 7.750    2.44 |13.833    5.22 | 19.92    1.64
         1.750    1.34 | 7.833    2.50 |13.917    5.22 | 20.00    1.64
         1.833    1.37 | 7.917    2.50 |14.000    5.22 | 20.08    1.57
         1.917    1.37 | 8.000    2.50 |14.083    4.66 | 20.17    1.57
         2.000    1.37 | 8.083    2.56 |14.167    4.66 | 20.25    1.57
         2.083    1.39 | 8.167    2.56 |14.250    4.66 | 20.33    1.52
         2.167    1.39 | 8.250    2.56 |14.333    4.25 | 20.42    1.52
         2.250    1.39 | 8.333    2.74 |14.417    4.25 | 20.50    1.52
         2.333    1.43 | 8.417    2.74 |14.500    4.25 | 20.58    1.51
         2.417    1.43 | 8.500    2.74 |14.583    4.05 | 20.67    1.51
         2.500    1.43 | 8.583    3.02 |14.667    4.05 | 20.75    1.51
         2.583    1.46 | 8.667    3.02 |14.750    4.05 | 20.83    1.49
         2.667    1.46 | 8.750    3.02 |14.833    3.83 | 20.92    1.49
         2.750    1.46 | 8.833    3.33 |14.917    3.83 | 21.00    1.49
         2.833    1.48 | 8.917    3.33 |15.000    3.83 | 21.08    1.48
         2.917    1.48 | 9.000    3.33 |15.083    3.63 | 21.17    1.48
         3.000    1.48 | 9.083    3.61 |15.167    3.63 | 21.25    1.48
         3.083    1.51 | 9.167    3.61 |15.250    3.63 | 21.33    1.46
         3.167    1.51 | 9.250    3.61 |15.333    3.42 | 21.42    1.46
         3.250    1.51 | 9.333    3.76 |15.417    3.42 | 21.50    1.46
         3.333    1.55 | 9.417    3.76 |15.500    3.42 | 21.58    1.45
         3.417    1.55 | 9.500    3.76 |15.583    3.22 | 21.67    1.45
         3.500    1.55 | 9.583    3.76 |15.667    3.22 | 21.75    1.45
         3.583    1.57 | 9.667    3.76 |15.750    3.22 | 21.83    1.43
         3.667    1.57 | 9.750    3.76 |15.833    3.01 | 21.92    1.43
         3.750    1.57 | 9.833    4.01 |15.917    3.01 | 22.00    1.43
         3.833    1.60 | 9.917    4.01 |16.000    3.01 | 22.08    1.42
         3.917    1.60 |10.000    4.01 |16.083    2.81 | 22.17    1.42
         4.000    1.60 |10.083    4.46 |16.167    2.81 | 22.25    1.42
         4.083    1.63 |10.167    4.46 |16.250    2.81 | 22.33    1.40
         4.167    1.63 |10.250    4.46 |16.333    2.67 | 22.42    1.40
         4.250    1.63 |10.333    5.07 |16.417    2.67 | 22.50    1.40
         4.333    1.68 |10.417    5.07 |16.500    2.67 | 22.58    1.39
         4.417    1.68 |10.500    5.07 |16.583    2.60 | 22.67    1.39
         4.500    1.68 |10.583    5.75 |16.667    2.60 | 22.75    1.39
```

```
4.583    1.73 |10.667    5.75 |16.750    2.60 | 22.83    1.37
4.667    1.73 |10.750    5.75 |16.833    2.52 | 22.92    1.37
4.750    1.73 |10.833    6.73 |16.917    2.52 | 23.00    1.37
4.833    1.79 |10.917    6.73 |17.000    2.52 | 23.08    1.36
4.917    1.79 |11.000    6.73 |17.083    2.45 | 23.17    1.36
5.000    1.79 |11.083    7.86 |17.167    2.45 | 23.25    1.36
5.083    1.85 |11.167    7.86 |17.250    2.45 | 23.33    1.35
5.167    1.85 |11.250    7.86 |17.333    2.37 | 23.42    1.35
5.250    1.85 |11.333    9.93 |17.417    2.37 | 23.50    1.35
5.333    1.91 |11.417    9.93 |17.500    2.37 | 23.58    1.33
5.417    1.91 |11.500    9.93 |17.583    2.30 | 23.67    1.33
5.500    1.91 |11.583   12.64 |17.667    2.30 | 23.75    1.33
5.583    1.97 |11.667   12.64 |17.750    2.30 | 23.83    1.31
5.667    1.97 |11.750   12.64 |17.833    2.23 | 23.92    1.31
5.750    1.97 |11.833   51.54 |17.917    2.22 | 24.00    1.31
5.833    2.03 |11.917   51.54 |18.000    2.22 | 24.08    1.30
5.917    2.03 |12.000   51.54 |18.083    2.15 | 24.17    1.30
6.000    2.03 |12.083  127.20 |18.167    2.15 | 24.25    1.30
6.083    2.09 |12.167  127.21 |18.250    2.15 |

Unit Hyd Qpeak  (cms)=   0.078

PEAK FLOW       (cms)=   0.062 (i)
TIME TO PEAK    (hrs)=  12.333
RUNOFF VOLUME    (mm)=  60.101
TOTAL RAINFALL   (mm)= 117.600
RUNOFF COEFFICIENT   =   0.511

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66        2.66
    Dep. Storage     (mm)=       1.00        5.00
    Average Slope     (%)=       1.00        1.00
    Length            (m)=     188.33       40.00
    Mannings n          =      0.130       0.250

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                           ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 6.167    2.09 |12.250  127.21 | 18.33    2.08
                0.167    0.00 | 6.250    2.09 |12.333   20.17 | 18.42    2.08
                0.250    0.00 | 6.333    2.15 |12.417   20.15 | 18.50    2.08
```

```
0.333    1.19 | 6.417    2.15 |12.500   20.15 | 18.58    2.01
0.417    1.19 | 6.500    2.15 |12.583   13.72 | 18.67    2.01
0.500    1.19 | 6.583    2.20 |12.667   13.72 | 18.75    2.01
0.583    1.22 | 6.667    2.20 |12.750   13.72 | 18.83    1.93
0.667    1.22 | 6.750    2.20 |12.833    9.44 | 18.92    1.93
0.750    1.22 | 6.833    2.26 |12.917    9.44 | 19.00    1.93
0.833    1.25 | 6.917    2.26 |13.000    9.44 | 19.08    1.86
0.917    1.25 | 7.000    2.26 |13.083    7.97 | 19.17    1.86
1.000    1.25 | 7.083    2.32 |13.167    7.97 | 19.25    1.86
1.083    1.28 | 7.167    2.32 |13.250    7.97 | 19.33    1.79
1.167    1.28 | 7.250    2.32 |13.333    6.75 | 19.42    1.79
1.250    1.28 | 7.333    2.38 |13.417    6.75 | 19.50    1.79
1.333    1.31 | 7.417    2.38 |13.500    6.75 | 19.58    1.71
1.417    1.31 | 7.500    2.38 |13.583    5.96 | 19.67    1.71
1.500    1.31 | 7.583    2.44 |13.667    5.96 | 19.75    1.71
1.583    1.34 | 7.667    2.44 |13.750    5.96 | 19.83    1.64
1.667    1.34 | 7.750    2.44 |13.833    5.22 | 19.92    1.64
1.750    1.34 | 7.833    2.50 |13.917    5.22 | 20.00    1.64
1.833    1.37 | 7.917    2.50 |14.000    5.22 | 20.08    1.57
1.917    1.37 | 8.000    2.50 |14.083    4.66 | 20.17    1.57
2.000    1.37 | 8.083    2.56 |14.167    4.66 | 20.25    1.57
2.083    1.39 | 8.167    2.56 |14.250    4.66 | 20.33    1.52
2.167    1.39 | 8.250    2.56 |14.333    4.25 | 20.42    1.52
2.250    1.39 | 8.333    2.74 |14.417    4.25 | 20.50    1.52
2.333    1.43 | 8.417    2.74 |14.500    4.25 | 20.58    1.51
2.417    1.43 | 8.500    2.74 |14.583    4.05 | 20.67    1.51
2.500    1.43 | 8.583    3.02 |14.667    4.05 | 20.75    1.51
2.583    1.46 | 8.667    3.02 |14.750    4.05 | 20.83    1.49
2.667    1.46 | 8.750    3.02 |14.833    3.83 | 20.92    1.49
2.750    1.46 | 8.833    3.33 |14.917    3.83 | 21.00    1.49
2.833    1.48 | 8.917    3.33 |15.000    3.83 | 21.08    1.48
2.917    1.48 | 9.000    3.33 |15.083    3.63 | 21.17    1.48
3.000    1.48 | 9.083    3.61 |15.167    3.63 | 21.25    1.48
3.083    1.51 | 9.167    3.61 |15.250    3.63 | 21.33    1.46
3.167    1.51 | 9.250    3.61 |15.333    3.42 | 21.42    1.46
3.250    1.51 | 9.333    3.76 |15.417    3.42 | 21.50    1.46
3.333    1.55 | 9.417    3.76 |15.500    3.42 | 21.58    1.45
3.417    1.55 | 9.500    3.76 |15.583    3.22 | 21.67    1.45
3.500    1.55 | 9.583    3.76 |15.667    3.22 | 21.75    1.45
3.583    1.57 | 9.667    3.76 |15.750    3.22 | 21.83    1.43
3.667    1.57 | 9.750    3.76 |15.833    3.01 | 21.92    1.43
3.750    1.57 | 9.833    4.01 |15.917    3.01 | 22.00    1.43
3.833    1.60 | 9.917    4.01 |16.000    3.01 | 22.08    1.42
3.917    1.60 |10.000    4.01 |16.083    2.81 | 22.17    1.42
4.000    1.60 |10.083    4.46 |16.167    2.81 | 22.25    1.42
4.083    1.63 |10.167    4.46 |16.250    2.81 | 22.33    1.40
4.167    1.63 |10.250    4.46 |16.333    2.67 | 22.42    1.40
4.250    1.63 |10.333    5.07 |16.417    2.67 | 22.50    1.40
4.333    1.68 |10.417    5.07 |16.500    2.67 | 22.58    1.39
4.417    1.68 |10.500    5.07 |16.583    2.60 | 22.67    1.39
4.500    1.68 |10.583    5.75 |16.667    2.60 | 22.75    1.39
4.583    1.73 |10.667    5.75 |16.750    2.60 | 22.83    1.37
```

```
         4.667    1.73 |10.750    5.75 |16.833    2.52 | 22.92    1.37
         4.750    1.73 |10.833    6.73 |16.917    2.52 | 23.00    1.37
         4.833    1.79 |10.917    6.73 |17.000    2.52 | 23.08    1.36
         4.917    1.79 |11.000    6.73 |17.083    2.45 | 23.17    1.36
         5.000    1.79 |11.083    7.86 |17.167    2.45 | 23.25    1.36
         5.083    1.85 |11.167    7.86 |17.250    2.45 | 23.33    1.35
         5.167    1.85 |11.250    7.86 |17.333    2.37 | 23.42    1.35
         5.250    1.85 |11.333    9.93 |17.417    2.37 | 23.50    1.35
         5.333    1.91 |11.417    9.93 |17.500    2.37 | 23.58    1.33
         5.417    1.91 |11.500    9.93 |17.583    2.30 | 23.67    1.33
         5.500    1.91 |11.583   12.64 |17.667    2.30 | 23.75    1.33
         5.583    1.97 |11.667   12.64 |17.750    2.30 | 23.83    1.31
         5.667    1.97 |11.750   12.64 |17.833    2.23 | 23.92    1.31
         5.750    1.97 |11.833   51.54 |17.917    2.22 | 24.00    1.31
         5.833    2.03 |11.917   51.54 |18.000    2.22 | 24.08    1.30
         5.917    2.03 |12.000   51.54 |18.083    2.15 | 24.17    1.30
         6.000    2.03 |12.083  127.20 |18.167    2.15 | 24.25    1.30
         6.083    2.09 |12.167  127.21 |18.250    2.15 |

     Max.Eff.Inten.(mm/hr)=     127.20        88.40
               over (min)       15.00        25.00
     Storage Coeff.  (min)=      13.50 (ii)   22.63 (ii)
     Unit Hyd. Tpeak (min)=      15.00        25.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                         *TOTALS*
     PEAK FLOW       (cms)=       0.45         0.30          0.689 (iii)
     TIME TO PEAK    (hrs)=      12.33        12.50          12.42
     RUNOFF VOLUME    (mm)=     116.60        51.86          74.51
     TOTAL RAINFALL   (mm)=     117.60       117.60         117.60
     RUNOFF COEFFICIENT   =       0.99         0.44           0.63


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

```
                    ---- TRANSFORMED HYETOGRAPH ----
       TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
        hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
      0.083    0.00 | 6.167    2.09 |12.250  127.21 | 18.33    2.08
      0.167    0.00 | 6.250    2.09 |12.333   20.17 | 18.42    2.08
      0.250    0.00 | 6.333    2.15 |12.417   20.15 | 18.50    2.08
      0.333    1.19 | 6.417    2.15 |12.500   20.15 | 18.58    2.01
      0.417    1.19 | 6.500    2.15 |12.583   13.72 | 18.67    2.01
      0.500    1.19 | 6.583    2.20 |12.667   13.72 | 18.75    2.01
      0.583    1.22 | 6.667    2.20 |12.750   13.72 | 18.83    1.93
      0.667    1.22 | 6.750    2.20 |12.833    9.44 | 18.92    1.93
      0.750    1.22 | 6.833    2.26 |12.917    9.44 | 19.00    1.93
      0.833    1.25 | 6.917    2.26 |13.000    9.44 | 19.08    1.86
      0.917    1.25 | 7.000    2.26 |13.083    7.97 | 19.17    1.86
      1.000    1.25 | 7.083    2.32 |13.167    7.97 | 19.25    1.86
      1.083    1.28 | 7.167    2.32 |13.250    7.97 | 19.33    1.79
      1.167    1.28 | 7.250    2.32 |13.333    6.75 | 19.42    1.79
      1.250    1.28 | 7.333    2.38 |13.417    6.75 | 19.50    1.79
      1.333    1.31 | 7.417    2.38 |13.500    6.75 | 19.58    1.71
      1.417    1.31 | 7.500    2.38 |13.583    5.96 | 19.67    1.71
      1.500    1.31 | 7.583    2.44 |13.667    5.96 | 19.75    1.71
      1.583    1.34 | 7.667    2.44 |13.750    5.96 | 19.83    1.64
      1.667    1.34 | 7.750    2.44 |13.833    5.22 | 19.92    1.64
      1.750    1.34 | 7.833    2.50 |13.917    5.22 | 20.00    1.64
      1.833    1.37 | 7.917    2.50 |14.000    5.22 | 20.08    1.57
      1.917    1.37 | 8.000    2.50 |14.083    4.66 | 20.17    1.57
      2.000    1.37 | 8.083    2.56 |14.167    4.66 | 20.25    1.57
      2.083    1.39 | 8.167    2.56 |14.250    4.66 | 20.33    1.52
      2.167    1.39 | 8.250    2.56 |14.333    4.25 | 20.42    1.52
      2.250    1.39 | 8.333    2.74 |14.417    4.25 | 20.50    1.52
      2.333    1.43 | 8.417    2.74 |14.500    4.25 | 20.58    1.51
      2.417    1.43 | 8.500    2.74 |14.583    4.05 | 20.67    1.51
      2.500    1.43 | 8.583    3.02 |14.667    4.05 | 20.75    1.51
      2.583    1.46 | 8.667    3.02 |14.750    4.05 | 20.83    1.49
      2.667    1.46 | 8.750    3.02 |14.833    3.83 | 20.92    1.49
      2.750    1.46 | 8.833    3.33 |14.917    3.83 | 21.00    1.49
      2.833    1.48 | 8.917    3.33 |15.000    3.83 | 21.08    1.48
      2.917    1.48 | 9.000    3.33 |15.083    3.63 | 21.17    1.48
      3.000    1.48 | 9.083    3.61 |15.167    3.63 | 21.25    1.48
      3.083    1.51 | 9.167    3.61 |15.250    3.63 | 21.33    1.46
      3.167    1.51 | 9.250    3.61 |15.333    3.42 | 21.42    1.46
      3.250    1.51 | 9.333    3.76 |15.417    3.42 | 21.50    1.46
      3.333    1.55 | 9.417    3.76 |15.500    3.42 | 21.58    1.45
      3.417    1.55 | 9.500    3.76 |15.583    3.22 | 21.67    1.45
      3.500    1.55 | 9.583    3.76 |15.667    3.22 | 21.75    1.45
      3.583    1.57 | 9.667    3.76 |15.750    3.22 | 21.83    1.43
      3.667    1.57 | 9.750    3.76 |15.833    3.01 | 21.92    1.43
      3.750    1.57 | 9.833    4.01 |15.917    3.01 | 22.00    1.43
      3.833    1.60 | 9.917    4.01 |16.000    3.01 | 22.08    1.42
      3.917    1.60 |10.000    4.01 |16.083    2.81 | 22.17    1.42
```

```
                4.000    1.60 |10.083    4.46 |16.167    2.81 | 22.25    1.42
                4.083    1.63 |10.167    4.46 |16.250    2.81 | 22.33    1.40
                4.167    1.63 |10.250    4.46 |16.333    2.67 | 22.42    1.40
                4.250    1.63 |10.333    5.07 |16.417    2.67 | 22.50    1.40
                4.333    1.68 |10.417    5.07 |16.500    2.67 | 22.58    1.39
                4.417    1.68 |10.500    5.07 |16.583    2.60 | 22.67    1.39
                4.500    1.68 |10.583    5.75 |16.667    2.60 | 22.75    1.39
                4.583    1.73 |10.667    5.75 |16.750    2.60 | 22.83    1.37
                4.667    1.73 |10.750    5.75 |16.833    2.52 | 22.92    1.37
                4.750    1.73 |10.833    6.73 |16.917    2.52 | 23.00    1.37
                4.833    1.79 |10.917    6.73 |17.000    2.52 | 23.08    1.36
                4.917    1.79 |11.000    6.73 |17.083    2.45 | 23.17    1.36
                5.000    1.79 |11.083    7.86 |17.167    2.45 | 23.25    1.36
                5.083    1.85 |11.167    7.86 |17.250    2.45 | 23.33    1.35
                5.167    1.85 |11.250    7.86 |17.333    2.37 | 23.42    1.35
                5.250    1.85 |11.333    9.93 |17.417    2.37 | 23.50    1.35
                5.333    1.91 |11.417    9.93 |17.500    2.37 | 23.58    1.33
                5.417    1.91 |11.500    9.93 |17.583    2.30 | 23.67    1.33
                5.500    1.91 |11.583   12.64 |17.667    2.30 | 23.75    1.33
                5.583    1.97 |11.667   12.64 |17.750    2.30 | 23.83    1.31
                5.667    1.97 |11.750   12.64 |17.833    2.23 | 23.92    1.31
                5.750    1.97 |11.833   51.54 |17.917    2.22 | 24.00    1.31
                5.833    2.03 |11.917   51.54 |18.000    2.22 | 24.08    1.30
                5.917    2.03 |12.000   51.54 |18.083    2.15 | 24.17    1.30
                6.000    2.03 |12.083  127.20 |18.167    2.15 | 24.25    1.30
                6.083    2.09 |12.167  127.21 |18.250    2.15 |

     Max.Eff.Inten.(mm/hr)=     127.21        88.40
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       2.97 (ii)   10.39 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.28         0.09
                                                           *TOTALS*
     PEAK FLOW      (cms)=       0.42         0.29          0.680 (iii)
     TIME TO PEAK   (hrs)=      12.25        12.33          12.25
     RUNOFF VOLUME   (mm)=     116.60        51.86          74.52
     TOTAL RAINFALL  (mm)=     117.60       117.60         117.60
     RUNOFF COEFFICIENT  =       0.99         0.44           0.63

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
```

```
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200     0.1300
                          0.1100     0.0700   |   0.0000     0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.680     12.25      74.52
   OUTFLOW: ID= 1 (  0029)      3.430      0.161     12.67      74.47

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.64
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0977

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                  hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.083    0.00 | 6.167    2.09 |12.250  127.21 | 18.33    2.08
                0.167    0.00 | 6.250    2.09 |12.333   20.17 | 18.42    2.08
                0.250    0.00 | 6.333    2.15 |12.417   20.15 | 18.50    2.08
                0.333    1.19 | 6.417    2.15 |12.500   20.15 | 18.58    2.01
                0.417    1.19 | 6.500    2.15 |12.583   13.72 | 18.67    2.01
                0.500    1.19 | 6.583    2.20 |12.667   13.72 | 18.75    2.01
                0.583    1.22 | 6.667    2.20 |12.750   13.72 | 18.83    1.93
                0.667    1.22 | 6.750    2.20 |12.833    9.44 | 18.92    1.93
                0.750    1.22 | 6.833    2.26 |12.917    9.44 | 19.00    1.93
                0.833    1.25 | 6.917    2.26 |13.000    9.44 | 19.08    1.86
                0.917    1.25 | 7.000    2.26 |13.083    7.97 | 19.17    1.86
                1.000    1.25 | 7.083    2.32 |13.167    7.97 | 19.25    1.86
                1.083    1.28 | 7.167    2.32 |13.250    7.97 | 19.33    1.79
                1.167    1.28 | 7.250    2.32 |13.333    6.75 | 19.42    1.79
                1.250    1.28 | 7.333    2.38 |13.417    6.75 | 19.50    1.79
                1.333    1.31 | 7.417    2.38 |13.500    6.75 | 19.58    1.71
                1.417    1.31 | 7.500    2.38 |13.583    5.96 | 19.67    1.71
                1.500    1.31 | 7.583    2.44 |13.667    5.96 | 19.75    1.71
                1.583    1.34 | 7.667    2.44 |13.750    5.96 | 19.83    1.64
                1.667    1.34 | 7.750    2.44 |13.833    5.22 | 19.92    1.64
                1.750    1.34 | 7.833    2.50 |13.917    5.22 | 20.00    1.64
                1.833    1.37 | 7.917    2.50 |14.000    5.22 | 20.08    1.57
                1.917    1.37 | 8.000    2.50 |14.083    4.66 | 20.17    1.57
                2.000    1.37 | 8.083    2.56 |14.167    4.66 | 20.25    1.57
                2.083    1.39 | 8.167    2.56 |14.250    4.66 | 20.33    1.52
                2.167    1.39 | 8.250    2.56 |14.333    4.25 | 20.42    1.52
```

```
          2.250    1.39 | 8.333    2.74 |14.417    4.25 | 20.50    1.52
          2.333    1.43 | 8.417    2.74 |14.500    4.25 | 20.58    1.51
          2.417    1.43 | 8.500    2.74 |14.583    4.05 | 20.67    1.51
          2.500    1.43 | 8.583    3.02 |14.667    4.05 | 20.75    1.51
          2.583    1.46 | 8.667    3.02 |14.750    4.05 | 20.83    1.49
          2.667    1.46 | 8.750    3.02 |14.833    3.83 | 20.92    1.49
          2.750    1.46 | 8.833    3.33 |14.917    3.83 | 21.00    1.49
          2.833    1.48 | 8.917    3.33 |15.000    3.83 | 21.08    1.48
          2.917    1.48 | 9.000    3.33 |15.083    3.63 | 21.17    1.48
          3.000    1.48 | 9.083    3.61 |15.167    3.63 | 21.25    1.48
          3.083    1.51 | 9.167    3.61 |15.250    3.63 | 21.33    1.46
          3.167    1.51 | 9.250    3.61 |15.333    3.42 | 21.42    1.46
          3.250    1.51 | 9.333    3.76 |15.417    3.42 | 21.50    1.46
          3.333    1.55 | 9.417    3.76 |15.500    3.42 | 21.58    1.45
          3.417    1.55 | 9.500    3.76 |15.583    3.22 | 21.67    1.45
          3.500    1.55 | 9.583    3.76 |15.667    3.22 | 21.75    1.45
          3.583    1.57 | 9.667    3.76 |15.750    3.22 | 21.83    1.43
          3.667    1.57 | 9.750    3.76 |15.833    3.01 | 21.92    1.43
          3.750    1.57 | 9.833    4.01 |15.917    3.01 | 22.00    1.43
          3.833    1.60 | 9.917    4.01 |16.000    3.01 | 22.08    1.42
          3.917    1.60 |10.000    4.01 |16.083    2.81 | 22.17    1.42
          4.000    1.60 |10.083    4.46 |16.167    2.81 | 22.25    1.42
          4.083    1.63 |10.167    4.46 |16.250    2.81 | 22.33    1.40
          4.167    1.63 |10.250    4.46 |16.333    2.67 | 22.42    1.40
          4.250    1.63 |10.333    5.07 |16.417    2.67 | 22.50    1.40
          4.333    1.68 |10.417    5.07 |16.500    2.67 | 22.58    1.39
          4.417    1.68 |10.500    5.07 |16.583    2.60 | 22.67    1.39
          4.500    1.68 |10.583    5.75 |16.667    2.60 | 22.75    1.39
          4.583    1.73 |10.667    5.75 |16.750    2.60 | 22.83    1.37
          4.667    1.73 |10.750    5.75 |16.833    2.52 | 22.92    1.37
          4.750    1.73 |10.833    6.73 |16.917    2.52 | 23.00    1.37
          4.833    1.79 |10.917    6.73 |17.000    2.52 | 23.08    1.36
          4.917    1.79 |11.000    6.73 |17.083    2.45 | 23.17    1.36
          5.000    1.79 |11.083    7.86 |17.167    2.45 | 23.25    1.36
          5.083    1.85 |11.167    7.86 |17.250    2.45 | 23.33    1.35
          5.167    1.85 |11.250    7.86 |17.333    2.37 | 23.42    1.35
          5.250    1.85 |11.333    9.93 |17.417    2.37 | 23.50    1.35
          5.333    1.91 |11.417    9.93 |17.500    2.37 | 23.58    1.33
          5.417    1.91 |11.500    9.93 |17.583    2.30 | 23.67    1.33
          5.500    1.91 |11.583   12.64 |17.667    2.30 | 23.75    1.33
          5.583    1.97 |11.667   12.64 |17.750    2.30 | 23.83    1.31
          5.667    1.97 |11.750   12.64 |17.833    2.23 | 23.92    1.31
          5.750    1.97 |11.833   51.54 |17.917    2.22 | 24.00    1.31
          5.833    2.03 |11.917   51.54 |18.000    2.22 | 24.08    1.30
          5.917    2.03 |12.000   51.54 |18.083    2.15 | 24.17    1.30
          6.000    2.03 |12.083  127.20 |18.167    2.15 | 24.25    1.30
          6.083    2.09 |12.167  127.21 |18.250    2.15 |

Unit Hyd Qpeak  (cms)=   0.356

PEAK FLOW       (cms)=   0.280 (i)
TIME TO PEAK    (hrs)=  12.333
```

```
     RUNOFF VOLUME    (mm)=  57.370
     TOTAL RAINFALL   (mm)= 117.600
     RUNOFF COEFFICIENT   =   0.488

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.062    12.33    60.10
      + ID2= 2 (  0029):     3.43   0.161    12.67    74.47
        ==================================================
        ID = 3 (  0007):     3.84   0.201    12.42    72.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.201    12.42    72.94
      + ID2= 2 (  0042):     2.05   0.280    12.33    57.37
        ==================================================
        ID = 1 (  0007):     5.89   0.476    12.33    67.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.476    12.33    67.52
      + ID2= 2 (  0005):     5.32   0.689    12.42    74.51
        ==================================================
        ID = 3 (  0007):    11.21   1.156    12.33    70.84

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390      0.1535
                          0.0410     0.0120   |   0.3840      0.1758
                          0.0580     0.0253   |   0.5390      0.1989
                          0.0710     0.0399   |   0.6480      0.2228
```

```
                    0.0830     0.0559   |   0.7320      0.2476
                    0.0920     0.0732   |   0.8050      0.2733
                    0.1010     0.0918   |   0.8710      0.2998
                    0.2130     0.1116   |   0.9320      0.3263
                    0.2860     0.1321   |   0.9880      0.3528

                          AREA     QPEAK     TPEAK       R.V.
                          (ha)     (cms)     (hrs)       (mm)
  INFLOW : ID= 2 (  0007)     11.210      1.156     12.33      70.84
  OUTFLOW: ID= 1 (  0008)     11.210      0.557     12.83      70.83

               PEAK   FLOW   REDUCTION [Qout/Qin](%)= 48.20
               TIME SHIFT OF PEAK FLOW         (min)= 30.00
               MAXIMUM  STORAGE   USED       (ha.m.)=  0.2032

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.128    12.33    60.08
      + ID2= 2 (  0008):    11.21   0.557    12.83    70.83
        ===================================================
        ID = 3 (  0016):    12.04   0.587    12.83    70.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
**********************************************
** SIMULATION:3-10yr 24hr 15min SCS Type II **
**********************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.45	12.250	88.27	18.33	1.44
0.167	0.00	6.250	1.45	12.333	13.99	18.42	1.44
0.250	0.00	6.333	1.49	12.417	13.98	18.50	1.44
0.333	0.83	6.417	1.49	12.500	13.98	18.58	1.39
0.417	0.83	6.500	1.49	12.583	9.52	18.67	1.39
0.500	0.83	6.583	1.53	12.667	9.52	18.75	1.39
0.583	0.85	6.667	1.53	12.750	9.52	18.83	1.34
0.667	0.85	6.750	1.53	12.833	6.55	18.92	1.34
0.750	0.85	6.833	1.57	12.917	6.55	19.00	1.34
0.833	0.87	6.917	1.57	13.000	6.55	19.08	1.29
0.917	0.87	7.000	1.57	13.083	5.53	19.17	1.29
1.000	0.87	7.083	1.61	13.167	5.53	19.25	1.29
1.083	0.89	7.167	1.61	13.250	5.53	19.33	1.24
1.167	0.89	7.250	1.61	13.333	4.68	19.42	1.24
1.250	0.89	7.333	1.65	13.417	4.68	19.50	1.24
1.333	0.91	7.417	1.65	13.500	4.68	19.58	1.19
1.417	0.91	7.500	1.65	13.583	4.13	19.67	1.19
1.500	0.91	7.583	1.69	13.667	4.13	19.75	1.19
1.583	0.93	7.667	1.69	13.750	4.13	19.83	1.14
1.667	0.93	7.750	1.69	13.833	3.62	19.92	1.14
1.750	0.93	7.833	1.73	13.917	3.62	20.00	1.14
1.833	0.95	7.917	1.73	14.000	3.62	20.08	1.09
1.917	0.95	8.000	1.73	14.083	3.23	20.17	1.09
2.000	0.95	8.083	1.77	14.167	3.23	20.25	1.09
2.083	0.97	8.167	1.77	14.250	3.23	20.33	1.06
2.167	0.97	8.250	1.77	14.333	2.95	20.42	1.06
2.250	0.97	8.333	1.90	14.417	2.95	20.50	1.06
2.333	0.99	8.417	1.90	14.500	2.95	20.58	1.05
2.417	0.99	8.500	1.90	14.583	2.81	20.67	1.05
2.500	0.99	8.583	2.10	14.667	2.81	20.75	1.05
2.583	1.01	8.667	2.10	14.750	2.81	20.83	1.03
2.667	1.01	8.750	2.10	14.833	2.66	20.92	1.03
2.750	1.01	8.833	2.31	14.917	2.66	21.00	1.03
2.833	1.03	8.917	2.31	15.000	2.66	21.08	1.02
2.917	1.03	9.000	2.31	15.083	2.52	21.17	1.02
3.000	1.03	9.083	2.51	15.167	2.52	21.25	1.02
3.083	1.05	9.167	2.51	15.250	2.52	21.33	1.02
3.167	1.05	9.250	2.51	15.333	2.37	21.42	1.02
3.250	1.05	9.333	2.61	15.417	2.37	21.50	1.02
3.333	1.07	9.417	2.61	15.500	2.37	21.58	1.01
3.417	1.07	9.500	2.61	15.583	2.24	21.67	1.01
3.500	1.07	9.583	2.61	15.667	2.24	21.75	1.01
3.583	1.09	9.667	2.61	15.750	2.24	21.83	0.99
3.667	1.09	9.750	2.61	15.833	2.09	21.92	0.99
3.750	1.09	9.833	2.78	15.917	2.09	22.00	0.99
3.833	1.11	9.917	2.78	16.000	2.09	22.08	0.98
3.917	1.11	10.000	2.78	16.083	1.95	22.17	0.98
4.000	1.11	10.083	3.09	16.167	1.95	22.25	0.98
4.083	1.13	10.167	3.09	16.250	1.95	22.33	0.97
4.167	1.13	10.250	3.09	16.333	1.85	22.42	0.97
4.250	1.13	10.333	3.52	16.417	1.85	22.50	0.97
4.333	1.16	10.417	3.52	16.500	1.85	22.58	0.96
4.417	1.16	10.500	3.52	16.583	1.80	22.67	0.96
4.500	1.16	10.583	3.99	16.667	1.80	22.75	0.96
4.583	1.20	10.667	3.99	16.750	1.80	22.83	0.95
4.667	1.20	10.750	3.99	16.833	1.75	22.92	0.95
4.750	1.20	10.833	4.67	16.917	1.75	23.00	0.95
4.833	1.25	10.917	4.67	17.000	1.75	23.08	0.94
4.917	1.25	11.000	4.67	17.083	1.70	23.17	0.94
5.000	1.25	11.083	5.45	17.167	1.70	23.25	0.94
5.083	1.28	11.167	5.45	17.250	1.70	23.33	0.93

```
        5.167    1.28 |11.250    5.45 |17.333    1.65 | 23.42    0.93
        5.250    1.28 |11.333    6.89 |17.417    1.65 | 23.50    0.93
        5.333    1.33 |11.417    6.89 |17.500    1.65 | 23.58    0.92
        5.417    1.33 |11.500    6.89 |17.583    1.60 | 23.67    0.92
        5.500    1.33 |11.583    8.77 |17.667    1.60 | 23.75    0.92
        5.583    1.37 |11.667    8.77 |17.750    1.60 | 23.83    0.91
        5.667    1.37 |11.750    8.77 |17.833    1.54 | 23.92    0.91
        5.750    1.37 |11.833   35.76 |17.917    1.54 | 24.00    0.91
        5.833    1.41 |11.917   35.77 |18.000    1.54 | 24.08    0.90
        5.917    1.41 |12.000   35.77 |18.083    1.49 | 24.17    0.90
        6.000    1.41 |12.083   88.26 |18.167    1.49 | 24.25    0.90
        6.083    1.45 |12.167   88.27 |18.250    1.49 |

    Unit Hyd Qpeak  (cms)=   0.167

    PEAK FLOW       (cms)=   0.069 (i)
    TIME TO PEAK    (hrs)=  12.333
    RUNOFF VOLUME    (mm)=  32.730
    TOTAL RAINFALL   (mm)=  81.600
    RUNOFF COEFFICIENT   =   0.401

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                          ---- TRANSFORMED HYETOGRAPH ----
         TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
          hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
        0.083    0.00 | 6.167    1.45 |12.250   88.27 | 18.33    1.44
        0.167    0.00 | 6.250    1.45 |12.333   13.99 | 18.42    1.44
        0.250    0.00 | 6.333    1.49 |12.417   13.98 | 18.50    1.44
        0.333    0.83 | 6.417    1.49 |12.500   13.98 | 18.58    1.39
        0.417    0.83 | 6.500    1.49 |12.583    9.52 | 18.67    1.39
        0.500    0.83 | 6.583    1.53 |12.667    9.52 | 18.75    1.39
        0.583    0.85 | 6.667    1.53 |12.750    9.52 | 18.83    1.34
        0.667    0.85 | 6.750    1.53 |12.833    6.55 | 18.92    1.34
        0.750    0.85 | 6.833    1.57 |12.917    6.55 | 19.00    1.34
        0.833    0.87 | 6.917    1.57 |13.000    6.55 | 19.08    1.29
        0.917    0.87 | 7.000    1.57 |13.083    5.53 | 19.17    1.29
        1.000    0.87 | 7.083    1.61 |13.167    5.53 | 19.25    1.29
        1.083    0.89 | 7.167    1.61 |13.250    5.53 | 19.33    1.24
        1.167    0.89 | 7.250    1.61 |13.333    4.68 | 19.42    1.24
        1.250    0.89 | 7.333    1.65 |13.417    4.68 | 19.50    1.24
        1.333    0.91 | 7.417    1.65 |13.500    4.68 | 19.58    1.19
        1.417    0.91 | 7.500    1.65 |13.583    4.13 | 19.67    1.19
        1.500    0.91 | 7.583    1.69 |13.667    4.13 | 19.75    1.19
        1.583    0.93 | 7.667    1.69 |13.750    4.13 | 19.83    1.14
        1.667    0.93 | 7.750    1.69 |13.833    3.62 | 19.92    1.14
        1.750    0.93 | 7.833    1.73 |13.917    3.62 | 20.00    1.14
        1.833    0.95 | 7.917    1.73 |14.000    3.62 | 20.08    1.09
        1.917    0.95 | 8.000    1.73 |14.083    3.23 | 20.17    1.09
        2.000    0.95 | 8.083    1.77 |14.167    3.23 | 20.25    1.09
        2.083    0.97 | 8.167    1.77 |14.250    3.23 | 20.33    1.06
        2.167    0.97 | 8.250    1.77 |14.333    2.95 | 20.42    1.06
        2.250    0.97 | 8.333    1.90 |14.417    2.95 | 20.50    1.06
        2.333    0.99 | 8.417    1.90 |14.500    2.95 | 20.58    1.05
        2.417    0.99 | 8.500    1.90 |14.583    2.81 | 20.67    1.05
        2.500    0.99 | 8.583    2.10 |14.667    2.81 | 20.75    1.05
        2.583    1.01 | 8.667    2.10 |14.750    2.81 | 20.83    1.03
        2.667    1.01 | 8.750    2.10 |14.833    2.66 | 20.92    1.03
        2.750    1.01 | 8.833    2.31 |14.917    2.66 | 21.00    1.03
        2.833    1.03 | 8.917    2.31 |15.000    2.66 | 21.08    1.02
        2.917    1.03 | 9.000    2.31 |15.083    2.52 | 21.17    1.02
        3.000    1.03 | 9.083    2.51 |15.167    2.52 | 21.25    1.02
        3.083    1.05 | 9.167    2.51 |15.250    2.52 | 21.33    1.02
        3.167    1.05 | 9.250    2.51 |15.333    2.37 | 21.42    1.02
        3.250    1.05 | 9.333    2.61 |15.417    2.37 | 21.50    1.02
        3.333    1.07 | 9.417    2.61 |15.500    2.37 | 21.58    1.01
        3.417    1.07 | 9.500    2.61 |15.583    2.24 | 21.67    1.01
        3.500    1.07 | 9.583    2.61 |15.667    2.24 | 21.75    1.01
        3.583    1.09 | 9.667    2.61 |15.750    2.24 | 21.83    0.99
        3.667    1.09 | 9.750    2.61 |15.833    2.09 | 21.92    0.99
        3.750    1.09 | 9.833    2.78 |15.917    2.09 | 22.00    0.99
        3.833    1.11 | 9.917    2.78 |16.000    2.09 | 22.08    0.98
        3.917    1.11 |10.000    2.78 |16.083    1.95 | 22.17    0.98
        4.000    1.11 |10.083    3.09 |16.167    1.95 | 22.25    0.98
        4.083    1.13 |10.167    3.09 |16.250    1.95 | 22.33    0.97
        4.167    1.13 |10.250    3.09 |16.333    1.85 | 22.42    0.97
        4.250    1.13 |10.333    3.52 |16.417    1.85 | 22.50    0.97
        4.333    1.16 |10.417    3.52 |16.500    1.85 | 22.58    0.96
        4.417    1.16 |10.500    3.52 |16.583    1.80 | 22.67    0.96
        4.500    1.16 |10.583    3.99 |16.667    1.80 | 22.75    0.96
        4.583    1.20 |10.667    3.99 |16.750    1.80 | 22.83    0.95
        4.667    1.20 |10.750    3.99 |16.833    1.75 | 22.92    0.95
        4.750    1.20 |10.833    4.67 |16.917    1.75 | 23.00    0.95
        4.833    1.25 |10.917    4.67 |17.000    1.75 | 23.08    0.94
        4.917    1.25 |11.000    4.67 |17.083    1.70 | 23.17    0.94
        5.000    1.25 |11.083    5.45 |17.167    1.70 | 23.25    0.94
        5.083    1.28 |11.167    5.45 |17.250    1.70 | 23.33    0.93
        5.167    1.28 |11.250    5.45 |17.333    1.65 | 23.42    0.93
        5.250    1.28 |11.333    6.89 |17.417    1.65 | 23.50    0.93
        5.333    1.33 |11.417    6.89 |17.500    1.65 | 23.58    0.92
        5.417    1.33 |11.500    6.89 |17.583    1.60 | 23.67    0.92
        5.500    1.33 |11.583    8.77 |17.667    1.60 | 23.75    0.92
        5.583    1.37 |11.667    8.77 |17.750    1.60 | 23.83    0.91
        5.667    1.37 |11.750    8.77 |17.833    1.54 | 23.92    0.91
```

```
             5.750    1.37 |11.833   35.76 |17.917    1.54 | 24.00    0.91
             5.833    1.41 |11.917   35.77 |18.000    1.54 | 24.08    0.90
             5.917    1.41 |12.000   35.77 |18.083    1.49 | 24.17    0.90
             6.000    1.41 |12.083   88.26 |18.167    1.49 | 24.25    0.90
             6.083    1.45 |12.167   88.27 |18.250    1.49 |

     Unit Hyd Qpeak  (cms)=   0.078

     PEAK FLOW       (cms)=   0.033 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  32.743
     TOTAL RAINFALL   (mm)=  81.600
     RUNOFF COEFFICIENT   =   0.401

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66          2.66
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=     188.33         40.00
     Mannings n          =      0.130         0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
              TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
               hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
             0.083    0.00 | 6.167    1.45 |12.250   88.27 | 18.33    1.44
             0.167    0.00 | 6.250    1.45 |12.333   13.99 | 18.42    1.44
             0.250    0.00 | 6.333    1.49 |12.417   13.98 | 18.50    1.44
             0.333    0.83 | 6.417    1.49 |12.500   13.98 | 18.58    1.39
             0.417    0.83 | 6.500    1.49 |12.583    9.52 | 18.67    1.39
             0.500    0.83 | 6.583    1.53 |12.667    9.52 | 18.75    1.39
             0.583    0.85 | 6.667    1.53 |12.750    9.52 | 18.83    1.34
             0.667    0.85 | 6.750    1.53 |12.833    6.55 | 18.92    1.34
             0.750    0.85 | 6.833    1.57 |12.917    6.55 | 19.00    1.34
             0.833    0.87 | 6.917    1.57 |13.000    6.55 | 19.08    1.29
             0.917    0.87 | 7.000    1.57 |13.083    5.53 | 19.17    1.29
             1.000    0.87 | 7.083    1.61 |13.167    5.53 | 19.25    1.29
             1.083    0.89 | 7.167    1.61 |13.250    5.53 | 19.33    1.24
             1.167    0.89 | 7.250    1.61 |13.333    4.68 | 19.42    1.24
             1.250    0.89 | 7.333    1.65 |13.417    4.68 | 19.50    1.24
             1.333    0.91 | 7.417    1.65 |13.500    4.68 | 19.58    1.19
             1.417    0.91 | 7.500    1.65 |13.583    4.13 | 19.67    1.19
             1.500    0.91 | 7.583    1.69 |13.667    4.13 | 19.75    1.19
             1.583    0.93 | 7.667    1.69 |13.750    4.13 | 19.83    1.14
             1.667    0.93 | 7.750    1.69 |13.833    3.62 | 19.92    1.14
             1.750    0.93 | 7.833    1.73 |13.917    3.62 | 20.00    1.14
             1.833    0.95 | 7.917    1.73 |14.000    3.62 | 20.08    1.09
             1.917    0.95 | 8.000    1.73 |14.083    3.23 | 20.17    1.09
             2.000    0.95 | 8.083    1.77 |14.167    3.23 | 20.25    1.09
             2.083    0.97 | 8.167    1.77 |14.250    3.23 | 20.33    1.06
             2.167    0.97 | 8.250    1.77 |14.333    2.95 | 20.42    1.06
             2.250    0.97 | 8.333    1.90 |14.417    2.95 | 20.50    1.06
             2.333    0.99 | 8.417    1.90 |14.500    2.95 | 20.58    1.05
             2.417    0.99 | 8.500    1.90 |14.583    2.81 | 20.67    1.05
             2.500    0.99 | 8.583    2.10 |14.667    2.81 | 20.75    1.05
             2.583    1.01 | 8.667    2.10 |14.750    2.81 | 20.83    1.03
             2.667    1.01 | 8.750    2.10 |14.833    2.66 | 20.92    1.03
             2.750    1.01 | 8.833    2.31 |14.917    2.66 | 21.00    1.03
             2.833    1.03 | 8.917    2.31 |15.000    2.66 | 21.08    1.02
             2.917    1.03 | 9.000    2.31 |15.083    2.52 | 21.17    1.02
             3.000    1.03 | 9.083    2.51 |15.167    2.52 | 21.25    1.02
             3.083    1.05 | 9.167    2.51 |15.250    2.52 | 21.33    1.02
             3.167    1.05 | 9.250    2.51 |15.333    2.37 | 21.42    1.02
             3.250    1.05 | 9.333    2.61 |15.417    2.37 | 21.50    1.02
             3.333    1.07 | 9.417    2.61 |15.500    2.37 | 21.58    1.01
             3.417    1.07 | 9.500    2.61 |15.583    2.24 | 21.67    1.01
             3.500    1.07 | 9.583    2.61 |15.667    2.24 | 21.75    1.01
             3.583    1.09 | 9.667    2.61 |15.750    2.24 | 21.83    0.99
             3.667    1.09 | 9.750    2.61 |15.833    2.09 | 21.92    0.99
             3.750    1.09 | 9.833    2.78 |15.917    2.09 | 22.00    0.99
             3.833    1.11 | 9.917    2.78 |16.000    2.09 | 22.08    0.98
             3.917    1.11 |10.000    2.78 |16.083    1.95 | 22.17    0.98
             4.000    1.11 |10.083    3.09 |16.167    1.95 | 22.25    0.98
             4.083    1.13 |10.167    3.09 |16.250    1.95 | 22.33    0.97
             4.167    1.13 |10.250    3.09 |16.333    1.85 | 22.42    0.97
             4.250    1.13 |10.333    3.52 |16.417    1.85 | 22.50    0.97
             4.333    1.16 |10.417    3.52 |16.500    1.85 | 22.58    0.96
             4.417    1.16 |10.500    3.52 |16.583    1.80 | 22.67    0.96
             4.500    1.16 |10.583    3.99 |16.667    1.80 | 22.75    0.96
             4.583    1.20 |10.667    3.99 |16.750    1.80 | 22.83    0.95
             4.667    1.20 |10.750    3.99 |16.833    1.75 | 22.92    0.95
             4.750    1.20 |10.833    4.67 |16.917    1.75 | 23.00    0.95
             4.833    1.25 |10.917    4.67 |17.000    1.75 | 23.08    0.94
             4.917    1.25 |11.000    4.67 |17.083    1.70 | 23.17    0.94
             5.000    1.25 |11.083    5.45 |17.167    1.70 | 23.25    0.94
             5.083    1.28 |11.167    5.45 |17.250    1.70 | 23.33    0.93
             5.167    1.28 |11.250    5.45 |17.333    1.65 | 23.42    0.93
             5.250    1.28 |11.333    6.89 |17.417    1.65 | 23.50    0.93
             5.333    1.33 |11.417    6.89 |17.500    1.65 | 23.58    0.92
             5.417    1.33 |11.500    6.89 |17.583    1.60 | 23.67    0.92
             5.500    1.33 |11.583    8.77 |17.667    1.60 | 23.75    0.92
             5.583    1.37 |11.667    8.77 |17.750    1.60 | 23.83    0.91
             5.667    1.37 |11.750    8.77 |17.833    1.54 | 23.92    0.91
             5.750    1.37 |11.833   35.76 |17.917    1.54 | 24.00    0.91
```

```
           5.833    1.41 |11.917   35.77 |18.000    1.54 | 24.08    0.90
           5.917    1.41 |12.000   35.77 |18.083    1.49 | 24.17    0.90
           6.000    1.41 |12.083   88.26 |18.167    1.49 | 24.25    0.90
           6.083    1.45 |12.167   88.27 |18.250    1.49 |

     Max.Eff.Inten.(mm/hr)=      88.26        45.39
                over (min)       15.00        30.00
     Storage Coeff.  (min)=      15.63 (ii)   27.55 (ii)
     Unit Hyd. Tpeak (min)=      15.00        30.00
     Unit Hyd. peak  (cms)=       0.07         0.04
                                                           *TOTALS*
     PEAK FLOW       (cms)=       0.29         0.14          0.390 (iii)
     TIME TO PEAK    (hrs)=      12.33        12.58         12.42
     RUNOFF VOLUME    (mm)=      80.60        28.31         46.61
     TOTAL RAINFALL   (mm)=      81.60        81.60         81.60
     RUNOFF COEFFICIENT   =       0.99         0.35          0.57


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
            TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
             hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
           0.083    0.00 | 6.167    1.45 |12.250   88.27 | 18.33    1.44
           0.167    0.00 | 6.250    1.45 |12.333   13.99 | 18.42    1.44
           0.250    0.00 | 6.333    1.49 |12.417   13.98 | 18.50    1.44
           0.333    0.83 | 6.417    1.49 |12.500   13.98 | 18.58    1.39
           0.417    0.83 | 6.500    1.49 |12.583    9.52 | 18.67    1.39
           0.500    0.83 | 6.583    1.53 |12.667    9.52 | 18.75    1.39
           0.583    0.85 | 6.667    1.53 |12.750    9.52 | 18.83    1.34
           0.667    0.85 | 6.750    1.53 |12.833    6.55 | 18.92    1.34
           0.750    0.85 | 6.833    1.57 |12.917    6.55 | 19.00    1.34
```

```
           0.833    0.87 | 6.917    1.57 |13.000    6.55 | 19.08    1.29
           0.917    0.87 | 7.000    1.57 |13.083    5.53 | 19.17    1.29
           1.000    0.87 | 7.083    1.61 |13.167    5.53 | 19.25    1.29
           1.083    0.89 | 7.167    1.61 |13.250    5.53 | 19.33    1.24
           1.167    0.89 | 7.250    1.61 |13.333    4.68 | 19.42    1.24
           1.250    0.89 | 7.333    1.65 |13.417    4.68 | 19.50    1.24
           1.333    0.91 | 7.417    1.65 |13.500    4.68 | 19.58    1.19
           1.417    0.91 | 7.500    1.65 |13.583    4.13 | 19.67    1.19
           1.500    0.91 | 7.583    1.69 |13.667    4.13 | 19.75    1.19
           1.583    0.93 | 7.667    1.69 |13.750    4.13 | 19.83    1.14
           1.667    0.93 | 7.750    1.69 |13.833    3.62 | 19.92    1.14
           1.750    0.93 | 7.833    1.73 |13.917    3.62 | 20.00    1.14
           1.833    0.95 | 7.917    1.73 |14.000    3.62 | 20.08    1.09
           1.917    0.95 | 8.000    1.73 |14.083    3.23 | 20.17    1.09
           2.000    0.95 | 8.083    1.77 |14.167    3.23 | 20.25    1.09
           2.083    0.97 | 8.167    1.77 |14.250    3.23 | 20.33    1.06
           2.167    0.97 | 8.250    1.77 |14.333    2.95 | 20.42    1.06
           2.250    0.97 | 8.333    1.90 |14.417    2.95 | 20.50    1.06
           2.333    0.99 | 8.417    1.90 |14.500    2.95 | 20.58    1.05
           2.417    0.99 | 8.500    1.90 |14.583    2.81 | 20.67    1.05
           2.500    0.99 | 8.583    2.10 |14.667    2.81 | 20.75    1.05
           2.583    1.01 | 8.667    2.10 |14.750    2.81 | 20.83    1.03
           2.667    1.01 | 8.750    2.10 |14.833    2.66 | 20.92    1.03
           2.750    1.01 | 8.833    2.31 |14.917    2.66 | 21.00    1.03
           2.833    1.03 | 8.917    2.31 |15.000    2.66 | 21.08    1.02
           2.917    1.03 | 9.000    2.31 |15.083    2.52 | 21.17    1.02
           3.000    1.03 | 9.083    2.51 |15.167    2.52 | 21.25    1.02
           3.083    1.05 | 9.167    2.51 |15.250    2.52 | 21.33    1.02
           3.167    1.05 | 9.250    2.51 |15.333    2.37 | 21.42    1.02
           3.250    1.05 | 9.333    2.61 |15.417    2.37 | 21.50    1.02
           3.333    1.07 | 9.417    2.61 |15.500    2.37 | 21.58    1.01
           3.417    1.07 | 9.500    2.61 |15.583    2.24 | 21.67    1.01
           3.500    1.07 | 9.583    2.61 |15.667    2.24 | 21.75    1.01
           3.583    1.09 | 9.667    2.61 |15.750    2.24 | 21.83    0.99
           3.667    1.09 | 9.750    2.61 |15.833    2.09 | 21.92    0.99
           3.750    1.09 | 9.833    2.78 |15.917    2.09 | 22.00    0.99
           3.833    1.11 | 9.917    2.78 |16.000    2.09 | 22.08    0.98
           3.917    1.11 |10.000    2.78 |16.083    1.95 | 22.17    0.98
           4.000    1.11 |10.083    3.09 |16.167    1.95 | 22.25    0.98
           4.083    1.13 |10.167    3.09 |16.250    1.95 | 22.33    0.97
           4.167    1.13 |10.250    3.09 |16.333    1.85 | 22.42    0.97
           4.250    1.13 |10.333    3.52 |16.417    1.85 | 22.50    0.97
           4.333    1.16 |10.417    3.52 |16.500    1.85 | 22.58    0.96
           4.417    1.16 |10.500    3.52 |16.583    1.80 | 22.67    0.96
           4.500    1.16 |10.583    3.99 |16.667    1.80 | 22.75    0.96
           4.583    1.20 |10.667    3.99 |16.750    1.80 | 22.83    0.95
           4.667    1.20 |10.750    3.99 |16.833    1.75 | 22.92    0.95
           4.750    1.20 |10.833    4.67 |16.917    1.75 | 23.00    0.95
           4.833    1.25 |10.917    4.67 |17.000    1.75 | 23.08    0.94
           4.917    1.25 |11.000    4.67 |17.083    1.70 | 23.17    0.94
           5.000    1.25 |11.083    5.45 |17.167    1.70 | 23.25    0.94
           5.083    1.28 |11.167    5.45 |17.250    1.70 | 23.33    0.93
```

```
                5.167    1.28 |11.250    5.45 |17.333    1.65 | 23.42    0.93
                5.250    1.28 |11.333    6.89 |17.417    1.65 | 23.50    0.93
                5.333    1.33 |11.417    6.89 |17.500    1.65 | 23.58    0.92
                5.417    1.33 |11.500    6.89 |17.583    1.60 | 23.67    0.92
                5.500    1.33 |11.583    8.77 |17.667    1.60 | 23.75    0.92
                5.583    1.37 |11.667    8.77 |17.750    1.60 | 23.83    0.91
                5.667    1.37 |11.750    8.77 |17.833    1.54 | 23.92    0.91
                5.750    1.37 |11.833   35.76 |17.917    1.54 | 24.00    0.91
                5.833    1.41 |11.917   35.77 |18.000    1.54 | 24.08    0.90
                5.917    1.41 |12.000   35.77 |18.083    1.49 | 24.17    0.90
                6.000    1.41 |12.083   88.26 |18.167    1.49 | 24.25    0.90
                6.083    1.45 |12.167   88.27 |18.250    1.49 |

     Max.Eff.Inten.(mm/hr)=      88.27        48.37
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.44 (ii)   12.88 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.26         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.29         0.14         0.417 (iii)
     TIME TO PEAK    (hrs)=      12.25        12.33         12.25
     RUNOFF VOLUME    (mm)=      80.60        28.31         46.61
     TOTAL RAINFALL   (mm)=      81.60        81.60         81.60
     RUNOFF COEFFICIENT   =       0.99         0.35          0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200      0.1300
                          0.1100     0.0700   |   0.0000      0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.417     12.25      46.61
   OUTFLOW: ID= 1 (  0029)      3.430      0.095     12.67      46.57

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.71
                   TIME SHIFT OF PEAK FLOW        (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0603

------------------------------------------------------------------------------
```

```
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

                               ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 6.167    1.45 |12.250   88.27 | 18.33    1.44
                 0.167    0.00 | 6.250    1.45 |12.333   13.99 | 18.42    1.44
                 0.250    0.00 | 6.333    1.49 |12.417   13.98 | 18.50    1.44
                 0.333    0.83 | 6.417    1.49 |12.500   13.98 | 18.58    1.39
                 0.417    0.83 | 6.500    1.49 |12.583    9.52 | 18.67    1.39
                 0.500    0.83 | 6.583    1.53 |12.667    9.52 | 18.75    1.39
                 0.583    0.85 | 6.667    1.53 |12.750    9.52 | 18.83    1.34
                 0.667    0.85 | 6.750    1.53 |12.833    6.55 | 18.92    1.34
                 0.750    0.85 | 6.833    1.57 |12.917    6.55 | 19.00    1.34
                 0.833    0.87 | 6.917    1.57 |13.000    6.55 | 19.08    1.29
                 0.917    0.87 | 7.000    1.57 |13.083    5.53 | 19.17    1.29
                 1.000    0.87 | 7.083    1.61 |13.167    5.53 | 19.25    1.29
                 1.083    0.89 | 7.167    1.61 |13.250    5.53 | 19.33    1.24
                 1.167    0.89 | 7.250    1.61 |13.333    4.68 | 19.42    1.24
                 1.250    0.89 | 7.333    1.65 |13.417    4.68 | 19.50    1.24
                 1.333    0.91 | 7.417    1.65 |13.500    4.68 | 19.58    1.19
                 1.417    0.91 | 7.500    1.65 |13.583    4.13 | 19.67    1.19
                 1.500    0.91 | 7.583    1.69 |13.667    4.13 | 19.75    1.19
                 1.583    0.93 | 7.667    1.69 |13.750    4.13 | 19.83    1.14
                 1.667    0.93 | 7.750    1.69 |13.833    3.62 | 19.92    1.14
                 1.750    0.93 | 7.833    1.73 |13.917    3.62 | 20.00    1.14
                 1.833    0.95 | 7.917    1.73 |14.000    3.62 | 20.08    1.09
                 1.917    0.95 | 8.000    1.73 |14.083    3.23 | 20.17    1.09
                 2.000    0.95 | 8.083    1.77 |14.167    3.23 | 20.25    1.09
                 2.083    0.97 | 8.167    1.77 |14.250    3.23 | 20.33    1.06
                 2.167    0.97 | 8.250    1.77 |14.333    2.95 | 20.42    1.06
                 2.250    0.97 | 8.333    1.90 |14.417    2.95 | 20.50    1.06
                 2.333    0.99 | 8.417    1.90 |14.500    2.95 | 20.58    1.05
                 2.417    0.99 | 8.500    1.90 |14.583    2.81 | 20.67    1.05
                 2.500    0.99 | 8.583    2.10 |14.667    2.81 | 20.75    1.05
                 2.583    1.01 | 8.667    2.10 |14.750    2.81 | 20.83    1.03
                 2.667    1.01 | 8.750    2.10 |14.833    2.66 | 20.92    1.03
                 2.750    1.01 | 8.833    2.31 |14.917    2.66 | 21.00    1.03
                 2.833    1.03 | 8.917    2.31 |15.000    2.66 | 21.08    1.02
                 2.917    1.03 | 9.000    2.31 |15.083    2.52 | 21.17    1.02
                 3.000    1.03 | 9.083    2.51 |15.167    2.52 | 21.25    1.02
                 3.083    1.05 | 9.167    2.51 |15.250    2.52 | 21.33    1.02
                 3.167    1.05 | 9.250    2.51 |15.333    2.37 | 21.42    1.02
                 3.250    1.05 | 9.333    2.61 |15.417    2.37 | 21.50    1.02
                 3.333    1.07 | 9.417    2.61 |15.500    2.37 | 21.58    1.01
```

```
  3.417    1.07 | 9.500    2.61 |15.583    2.24 | 21.67    1.01
  3.500    1.07 | 9.583    2.61 |15.667    2.24 | 21.75    1.01
  3.583    1.09 | 9.667    2.61 |15.750    2.24 | 21.83    0.99
  3.667    1.09 | 9.750    2.61 |15.833    2.09 | 21.92    0.99
  3.750    1.09 | 9.833    2.78 |15.917    2.09 | 22.00    0.99
  3.833    1.11 | 9.917    2.78 |16.000    2.09 | 22.08    0.98
  3.917    1.11 |10.000    2.78 |16.083    1.95 | 22.17    0.98
  4.000    1.11 |10.083    3.09 |16.167    1.95 | 22.25    0.98
  4.083    1.13 |10.167    3.09 |16.250    1.95 | 22.33    0.97
  4.167    1.13 |10.250    3.09 |16.333    1.85 | 22.42    0.97
  4.250    1.13 |10.333    3.52 |16.417    1.85 | 22.50    0.97
  4.333    1.16 |10.417    3.52 |16.500    1.85 | 22.58    0.96
  4.417    1.16 |10.500    3.52 |16.583    1.80 | 22.67    0.96
  4.500    1.16 |10.583    3.99 |16.667    1.80 | 22.75    0.96
  4.583    1.20 |10.667    3.99 |16.750    1.80 | 22.83    0.95
  4.667    1.20 |10.750    3.99 |16.833    1.75 | 22.92    0.95
  4.750    1.20 |10.833    4.67 |16.917    1.75 | 23.00    0.95
  4.833    1.25 |10.917    4.67 |17.000    1.75 | 23.08    0.94
  4.917    1.25 |11.000    4.67 |17.083    1.70 | 23.17    0.94
  5.000    1.25 |11.083    5.45 |17.167    1.70 | 23.25    0.94
  5.083    1.28 |11.167    5.45 |17.250    1.70 | 23.33    0.93
  5.167    1.28 |11.250    5.45 |17.333    1.65 | 23.42    0.93
  5.250    1.28 |11.333    6.89 |17.417    1.65 | 23.50    0.93
  5.333    1.33 |11.417    6.89 |17.500    1.65 | 23.58    0.92
  5.417    1.33 |11.500    6.89 |17.583    1.60 | 23.67    0.92
  5.500    1.33 |11.583    8.77 |17.667    1.60 | 23.75    0.92
  5.583    1.37 |11.667    8.77 |17.750    1.60 | 23.83    0.91
  5.667    1.37 |11.750    8.77 |17.833    1.54 | 23.92    0.91
  5.750    1.37 |11.833   35.76 |17.917    1.54 | 24.00    0.91
  5.833    1.41 |11.917   35.77 |18.000    1.54 | 24.08    0.90
  5.917    1.41 |12.000   35.77 |18.083    1.49 | 24.17    0.90
  6.000    1.41 |12.083   88.26 |18.167    1.49 | 24.25    0.90
  6.083    1.45 |12.167   88.27 |18.250    1.49 |

Unit Hyd Qpeak  (cms)=   0.356

PEAK FLOW       (cms)=   0.148 (i)
TIME TO PEAK    (hrs)=  12.333
RUNOFF VOLUME    (mm)=  30.927
TOTAL RAINFALL   (mm)=  81.600
RUNOFF COEFFICIENT   =   0.379

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.033    12.33    32.74
      + ID2= 2 (  0029):     3.43   0.095    12.67    46.57
        ===================================================
        ID = 3 (  0007):     3.84   0.117    12.42    45.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.117    12.42    45.09
      + ID2= 2 (  0042):     2.05   0.148    12.33    30.93
        ===================================================
        ID = 1 (  0007):     5.89   0.263    12.33    40.16

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.263    12.33    40.16
      + ID2= 2 (  0005):     5.32   0.390    12.42    46.61
        ===================================================
        ID = 3 (  0007):    11.21   0.651    12.33    43.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390     0.1535
                          0.0410     0.0120   |   0.3840     0.1758
                          0.0580     0.0253   |   0.5390     0.1989
                          0.0710     0.0399   |   0.6480     0.2228
                          0.0830     0.0559   |   0.7320     0.2476
                          0.0920     0.0732   |   0.8050     0.2733
                          0.1010     0.0918   |   0.8710     0.2998
                          0.2130     0.1116   |   0.9320     0.3263
                          0.2860     0.1321   |   0.9880     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.651     12.33      43.22
   OUTFLOW: ID= 1 (  0008)     11.210      0.275     13.08      43.22

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 42.25
                   TIME SHIFT OF PEAK FLOW         (min)= 45.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1292
```

```
------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0022):     0.83   0.069    12.33    32.73
     + ID2= 2 (  0008):    11.21   0.275    13.08    43.22
       ==================================================
       ID = 3 (  0016):    12.04   0.287    13.00    42.49

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
**********************************************
** SIMULATION:3-25yr 24hr 15min SCS Type II **
**********************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 6.167    1.70 |12.250  103.84 | 18.33    1.70
               0.167    0.00 | 6.250    1.70 |12.333   16.46 | 18.42    1.70
               0.250    0.00 | 6.333    1.75 |12.417   16.45 | 18.50    1.70
               0.333    0.97 | 6.417    1.75 |12.500   16.45 | 18.58    1.64
               0.417    0.97 | 6.500    1.75 |12.583   11.20 | 18.67    1.64
               0.500    0.97 | 6.583    1.80 |12.667   11.20 | 18.75    1.64
               0.583    1.00 | 6.667    1.80 |12.750   11.20 | 18.83    1.58
               0.667    1.00 | 6.750    1.80 |12.833    7.70 | 18.92    1.58
               0.750    1.00 | 6.833    1.85 |12.917    7.70 | 19.00    1.58
               0.833    1.02 | 6.917    1.85 |13.000    7.70 | 19.08    1.52
               0.917    1.02 | 7.000    1.85 |13.083    6.51 | 19.17    1.52
               1.000    1.02 | 7.083    1.90 |13.167    6.50 | 19.25    1.52
               1.083    1.04 | 7.167    1.90 |13.250    6.50 | 19.33    1.46
               1.167    1.04 | 7.250    1.90 |13.333    5.51 | 19.42    1.46
               1.250    1.04 | 7.333    1.94 |13.417    5.51 | 19.50    1.46
               1.333    1.07 | 7.417    1.94 |13.500    5.51 | 19.58    1.40
               1.417    1.07 | 7.500    1.94 |13.583    4.86 | 19.67    1.40
               1.500    1.07 | 7.583    1.99 |13.667    4.86 | 19.75    1.40
               1.583    1.09 | 7.667    1.99 |13.750    4.86 | 19.83    1.34
               1.667    1.09 | 7.750    1.99 |13.833    4.26 | 19.92    1.34
               1.750    1.09 | 7.833    2.04 |13.917    4.26 | 20.00    1.34
               1.833    1.12 | 7.917    2.04 |14.000    4.26 | 20.08    1.28
               1.917    1.12 | 8.000    2.04 |14.083    3.80 | 20.17    1.28
```

```
               2.000    1.12 | 8.083    2.09 |14.167    3.80 | 20.25    1.28
               2.083    1.14 | 8.167    2.09 |14.250    3.80 | 20.33    1.24
               2.167    1.14 | 8.250    2.09 |14.333    3.47 | 20.42    1.24
               2.250    1.14 | 8.333    2.24 |14.417    3.47 | 20.50    1.24
               2.333    1.17 | 8.417    2.24 |14.500    3.47 | 20.58    1.23
               2.417    1.17 | 8.500    2.24 |14.583    3.30 | 20.67    1.23
               2.500    1.17 | 8.583    2.47 |14.667    3.30 | 20.75    1.23
               2.583    1.19 | 8.667    2.47 |14.750    3.30 | 20.83    1.22
               2.667    1.19 | 8.750    2.47 |14.833    3.13 | 20.92    1.22
               2.750    1.19 | 8.833    2.72 |14.917    3.13 | 21.00    1.22
               2.833    1.21 | 8.917    2.72 |15.000    3.13 | 21.08    1.21
               2.917    1.21 | 9.000    2.72 |15.083    2.97 | 21.17    1.21
               3.000    1.21 | 9.083    2.95 |15.167    2.97 | 21.25    1.21
               3.083    1.23 | 9.167    2.95 |15.250    2.97 | 21.33    1.19
               3.167    1.23 | 9.250    2.95 |15.333    2.79 | 21.42    1.19
               3.250    1.23 | 9.333    3.07 |15.417    2.79 | 21.50    1.19
               3.333    1.26 | 9.417    3.07 |15.500    2.79 | 21.58    1.18
               3.417    1.26 | 9.500    3.07 |15.583    2.63 | 21.67    1.18
               3.500    1.26 | 9.583    3.07 |15.667    2.63 | 21.75    1.18
               3.583    1.28 | 9.667    3.07 |15.750    2.63 | 21.83    1.17
               3.667    1.28 | 9.750    3.07 |15.833    2.46 | 21.92    1.17
               3.750    1.28 | 9.833    3.27 |15.917    2.46 | 22.00    1.17
               3.833    1.31 | 9.917    3.27 |16.000    2.46 | 22.08    1.16
               3.917    1.31 |10.000    3.27 |16.083    2.29 | 22.17    1.16
               4.000    1.31 |10.083    3.64 |16.167    2.29 | 22.25    1.16
               4.083    1.33 |10.167    3.64 |16.250    2.29 | 22.33    1.15
               4.167    1.33 |10.250    3.64 |16.333    2.18 | 22.42    1.15
               4.250    1.33 |10.333    4.14 |16.417    2.18 | 22.50    1.15
               4.333    1.37 |10.417    4.14 |16.500    2.18 | 22.58    1.13
               4.417    1.37 |10.500    4.14 |16.583    2.12 | 22.67    1.13
               4.500    1.37 |10.583    4.69 |16.667    2.12 | 22.75    1.13
               4.583    1.42 |10.667    4.69 |16.750    2.12 | 22.83    1.12
               4.667    1.42 |10.750    4.69 |16.833    2.06 | 22.92    1.12
               4.750    1.42 |10.833    5.49 |16.917    2.06 | 23.00    1.12
               4.833    1.46 |10.917    5.49 |17.000    2.06 | 23.08    1.11
               4.917    1.46 |11.000    5.49 |17.083    2.00 | 23.17    1.11
               5.000    1.46 |11.083    6.41 |17.167    2.00 | 23.25    1.11
               5.083    1.51 |11.167    6.41 |17.250    2.00 | 23.33    1.10
               5.167    1.51 |11.250    6.41 |17.333    1.94 | 23.42    1.10
               5.250    1.51 |11.333    8.11 |17.417    1.94 | 23.50    1.10
               5.333    1.56 |11.417    8.11 |17.500    1.94 | 23.58    1.09
               5.417    1.56 |11.500    8.11 |17.583    1.88 | 23.67    1.09
               5.500    1.56 |11.583   10.32 |17.667    1.88 | 23.75    1.09
               5.583    1.61 |11.667   10.32 |17.750    1.88 | 23.83    1.07
               5.667    1.61 |11.750   10.32 |17.833    1.82 | 23.92    1.07
               5.750    1.61 |11.833   42.07 |17.917    1.82 | 24.00    1.07
               5.833    1.66 |11.917   42.08 |18.000    1.82 | 24.08    1.06
               5.917    1.66 |12.000   42.08 |18.083    1.76 | 24.17    1.06
               6.000    1.66 |12.083  103.84 |18.167    1.76 | 24.25    1.06
               6.083    1.70 |12.167  103.84 |18.250    1.76 |

     Unit Hyd Qpeak  (cms)=   0.167
```

```
     PEAK FLOW       (cms)=   0.092 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  43.235
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.450

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.70	12.250	103.84	18.33	1.70
0.167	0.00	6.250	1.70	12.333	16.46	18.42	1.70
0.250	0.00	6.333	1.75	12.417	16.45	18.50	1.70
0.333	0.97	6.417	1.75	12.500	16.45	18.58	1.64
0.417	0.97	6.500	1.75	12.583	11.20	18.67	1.64
0.500	0.97	6.583	1.80	12.667	11.20	18.75	1.64
0.583	1.00	6.667	1.80	12.750	11.20	18.83	1.58
0.667	1.00	6.750	1.80	12.833	7.70	18.92	1.58
0.750	1.00	6.833	1.85	12.917	7.70	19.00	1.58
0.833	1.02	6.917	1.85	13.000	7.70	19.08	1.52
0.917	1.02	7.000	1.85	13.083	6.51	19.17	1.52
1.000	1.02	7.083	1.90	13.167	6.50	19.25	1.52
1.083	1.04	7.167	1.90	13.250	6.50	19.33	1.46
1.167	1.04	7.250	1.90	13.333	5.51	19.42	1.46
1.250	1.04	7.333	1.94	13.417	5.51	19.50	1.46
1.333	1.07	7.417	1.94	13.500	5.51	19.58	1.40
1.417	1.07	7.500	1.94	13.583	4.86	19.67	1.40
1.500	1.07	7.583	1.99	13.667	4.86	19.75	1.40
1.583	1.09	7.667	1.99	13.750	4.86	19.83	1.34
1.667	1.09	7.750	1.99	13.833	4.26	19.92	1.34
1.750	1.09	7.833	2.04	13.917	4.26	20.00	1.34
1.833	1.12	7.917	2.04	14.000	4.26	20.08	1.28
1.917	1.12	8.000	2.04	14.083	3.80	20.17	1.28
2.000	1.12	8.083	2.09	14.167	3.80	20.25	1.28
2.083	1.14	8.167	2.09	14.250	3.80	20.33	1.24
2.167	1.14	8.250	2.09	14.333	3.47	20.42	1.24
2.250	1.14	8.333	2.24	14.417	3.47	20.50	1.24
2.333	1.17	8.417	2.24	14.500	3.47	20.58	1.23
2.417	1.17	8.500	2.24	14.583	3.30	20.67	1.23
2.500	1.17	8.583	2.47	14.667	3.30	20.75	1.23
2.583	1.19	8.667	2.47	14.750	3.30	20.83	1.22
2.667	1.19	8.750	2.47	14.833	3.13	20.92	1.22
2.750	1.19	8.833	2.72	14.917	3.13	21.00	1.22
2.833	1.21	8.917	2.72	15.000	3.13	21.08	1.21
2.917	1.21	9.000	2.72	15.083	2.97	21.17	1.21
3.000	1.21	9.083	2.95	15.167	2.97	21.25	1.21
3.083	1.23	9.167	2.95	15.250	2.97	21.33	1.19
3.167	1.23	9.250	2.95	15.333	2.79	21.42	1.19
3.250	1.23	9.333	3.07	15.417	2.79	21.50	1.19
3.333	1.26	9.417	3.07	15.500	2.79	21.58	1.18
3.417	1.26	9.500	3.07	15.583	2.63	21.67	1.18
3.500	1.26	9.583	3.07	15.667	2.63	21.75	1.18
3.583	1.28	9.667	3.07	15.750	2.63	21.83	1.17
3.667	1.28	9.750	3.07	15.833	2.46	21.92	1.17
3.750	1.28	9.833	3.27	15.917	2.46	22.00	1.17
3.833	1.31	9.917	3.27	16.000	2.46	22.08	1.16
3.917	1.31	10.000	3.27	16.083	2.29	22.17	1.16
4.000	1.31	10.083	3.64	16.167	2.29	22.25	1.16
4.083	1.33	10.167	3.64	16.250	2.29	22.33	1.15
4.167	1.33	10.250	3.64	16.333	2.18	22.42	1.15
4.250	1.33	10.333	4.14	16.417	2.18	22.50	1.15
4.333	1.37	10.417	4.14	16.500	2.18	22.58	1.13
4.417	1.37	10.500	4.14	16.583	2.12	22.67	1.13
4.500	1.37	10.583	4.69	16.667	2.12	22.75	1.13
4.583	1.42	10.667	4.69	16.750	2.12	22.83	1.12
4.667	1.42	10.750	4.69	16.833	2.06	22.92	1.12
4.750	1.42	10.833	5.49	16.917	2.06	23.00	1.12
4.833	1.46	10.917	5.49	17.000	2.06	23.08	1.11
4.917	1.46	11.000	5.49	17.083	2.00	23.17	1.11
5.000	1.46	11.083	6.41	17.167	2.00	23.25	1.11
5.083	1.51	11.167	6.41	17.250	2.00	23.33	1.10
5.167	1.51	11.250	6.41	17.333	1.94	23.42	1.10
5.250	1.51	11.333	8.11	17.417	1.94	23.50	1.10
5.333	1.56	11.417	8.11	17.500	1.94	23.58	1.09
5.417	1.56	11.500	8.11	17.583	1.88	23.67	1.09
5.500	1.56	11.583	10.32	17.667	1.88	23.75	1.09
5.583	1.61	11.667	10.32	17.750	1.88	23.83	1.07
5.667	1.61	11.750	10.32	17.833	1.82	23.92	1.07
5.750	1.61	11.833	42.07	17.917	1.82	24.00	1.07
5.833	1.66	11.917	42.08	18.000	1.82	24.08	1.06
5.917	1.66	12.000	42.08	18.083	1.76	24.17	1.06
6.000	1.66	12.083	103.84	18.167	1.76	24.25	1.06
6.083	1.70	12.167	103.84	18.250	1.76		

```
Unit Hyd Qpeak  (cms)=   0.078

PEAK FLOW       (cms)=   0.044 (i)
TIME TO PEAK    (hrs)=  12.333
RUNOFF VOLUME    (mm)=  43.253
TOTAL RAINFALL   (mm)=  96.000
RUNOFF COEFFICIENT   =   0.451
```

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       2.66         2.66
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=     188.33        40.00
     Mannings n          =      0.130        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.70	12.250	103.84	18.33	1.70
0.167	0.00	6.250	1.70	12.333	16.46	18.42	1.70
0.250	0.00	6.333	1.75	12.417	16.45	18.50	1.70
0.333	0.97	6.417	1.75	12.500	16.45	18.58	1.64
0.417	0.97	6.500	1.75	12.583	11.20	18.67	1.64
0.500	0.97	6.583	1.80	12.667	11.20	18.75	1.64
0.583	1.00	6.667	1.80	12.750	11.20	18.83	1.58
0.667	1.00	6.750	1.80	12.833	7.70	18.92	1.58
0.750	1.00	6.833	1.85	12.917	7.70	19.00	1.58
0.833	1.02	6.917	1.85	13.000	7.70	19.08	1.52
0.917	1.02	7.000	1.85	13.083	6.51	19.17	1.52
1.000	1.02	7.083	1.90	13.167	6.50	19.25	1.52
1.083	1.04	7.167	1.90	13.250	6.50	19.33	1.46
1.167	1.04	7.250	1.90	13.333	5.51	19.42	1.46
1.250	1.04	7.333	1.94	13.417	5.51	19.50	1.46
1.333	1.07	7.417	1.94	13.500	5.51	19.58	1.40
1.417	1.07	7.500	1.94	13.583	4.86	19.67	1.40
1.500	1.07	7.583	1.99	13.667	4.86	19.75	1.40
1.583	1.09	7.667	1.99	13.750	4.86	19.83	1.34
1.667	1.09	7.750	1.99	13.833	4.26	19.92	1.34
1.750	1.09	7.833	2.04	13.917	4.26	20.00	1.34
1.833	1.12	7.917	2.04	14.000	4.26	20.08	1.28
1.917	1.12	8.000	2.04	14.083	3.80	20.17	1.28
2.000	1.12	8.083	2.09	14.167	3.80	20.25	1.28
2.083	1.14	8.167	2.09	14.250	3.80	20.33	1.24
2.167	1.14	8.250	2.09	14.333	3.47	20.42	1.24
2.250	1.14	8.333	2.24	14.417	3.47	20.50	1.24
2.333	1.17	8.417	2.24	14.500	3.47	20.58	1.23
2.417	1.17	8.500	2.24	14.583	3.30	20.67	1.23
2.500	1.17	8.583	2.47	14.667	3.30	20.75	1.23
2.583	1.19	8.667	2.47	14.750	3.30	20.83	1.22
2.667	1.19	8.750	2.47	14.833	3.13	20.92	1.22
2.750	1.19	8.833	2.72	14.917	3.13	21.00	1.22
2.833	1.21	8.917	2.72	15.000	3.13	21.08	1.21
2.917	1.21	9.000	2.72	15.083	2.97	21.17	1.21
3.000	1.21	9.083	2.95	15.167	2.97	21.25	1.21
3.083	1.23	9.167	2.95	15.250	2.97	21.33	1.19
3.167	1.23	9.250	2.95	15.333	2.79	21.42	1.19
3.250	1.23	9.333	3.07	15.417	2.79	21.50	1.19
3.333	1.26	9.417	3.07	15.500	2.79	21.58	1.18
3.417	1.26	9.500	3.07	15.583	2.63	21.67	1.18
3.500	1.26	9.583	3.07	15.667	2.63	21.75	1.18
3.583	1.28	9.667	3.07	15.750	2.63	21.83	1.17
3.667	1.28	9.750	3.07	15.833	2.46	21.92	1.17
3.750	1.28	9.833	3.27	15.917	2.46	22.00	1.17
3.833	1.31	9.917	3.27	16.000	2.46	22.08	1.16
3.917	1.31	10.000	3.27	16.083	2.29	22.17	1.16
4.000	1.31	10.083	3.64	16.167	2.29	22.25	1.16
4.083	1.33	10.167	3.64	16.250	2.29	22.33	1.15
4.167	1.33	10.250	3.64	16.333	2.18	22.42	1.15
4.250	1.33	10.333	4.14	16.417	2.18	22.50	1.15
4.333	1.37	10.417	4.14	16.500	2.18	22.58	1.13
4.417	1.37	10.500	4.14	16.583	2.12	22.67	1.13
4.500	1.37	10.583	4.69	16.667	2.12	22.75	1.13
4.583	1.42	10.667	4.69	16.750	2.12	22.83	1.12
4.667	1.42	10.750	4.69	16.833	2.06	22.92	1.12
4.750	1.42	10.833	5.49	16.917	2.06	23.00	1.12
4.833	1.46	10.917	5.49	17.000	2.06	23.08	1.11
4.917	1.46	11.000	5.49	17.083	2.00	23.17	1.11
5.000	1.46	11.083	6.41	17.167	2.00	23.25	1.11
5.083	1.51	11.167	6.41	17.250	2.00	23.33	1.10
5.167	1.51	11.250	6.41	17.333	1.94	23.42	1.10
5.250	1.51	11.333	8.11	17.417	1.94	23.50	1.10
5.333	1.56	11.417	8.11	17.500	1.94	23.58	1.09
5.417	1.56	11.500	8.11	17.583	1.88	23.67	1.09
5.500	1.56	11.583	10.32	17.667	1.88	23.75	1.09
5.583	1.61	11.667	10.32	17.750	1.88	23.83	1.07
5.667	1.61	11.750	10.32	17.833	1.82	23.92	1.07
5.750	1.61	11.833	42.07	17.917	1.82	24.00	1.07
5.833	1.66	11.917	42.08	18.000	1.82	24.08	1.06
5.917	1.66	12.000	42.08	18.083	1.76	24.17	1.06
6.000	1.66	12.083	103.84	18.167	1.76	24.25	1.06
6.083	1.70	12.167	103.84	18.250	1.76		

Max.Eff.Inten.(mm/hr)=	103.84	59.97	
over (min)	15.00	30.00	
Storage Coeff. (min)=	14.65 (ii)	25.31 (ii)	
Unit Hyd. Tpeak (min)=	15.00	30.00	
Unit Hyd. peak (cms)=	0.08	0.04	
			TOTALS
PEAK FLOW (cms)=	0.35	0.19	0.490 (iii)
TIME TO PEAK (hrs)=	12.33	12.58	12.42
RUNOFF VOLUME (mm)=	95.00	37.26	57.47

```
     TOTAL RAINFALL   (mm)=      96.00        96.00         96.00
     RUNOFF COEFFICIENT   =       0.99         0.39          0.60

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n          =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.70	12.250	103.84	18.33	1.70
0.167	0.00	6.250	1.70	12.333	16.46	18.42	1.70
0.250	0.00	6.333	1.75	12.417	16.45	18.50	1.70
0.333	0.97	6.417	1.75	12.500	16.45	18.58	1.64
0.417	0.97	6.500	1.75	12.583	11.20	18.67	1.64
0.500	0.97	6.583	1.80	12.667	11.20	18.75	1.64
0.583	1.00	6.667	1.80	12.750	11.20	18.83	1.58
0.667	1.00	6.750	1.80	12.833	7.70	18.92	1.58
0.750	1.00	6.833	1.85	12.917	7.70	19.00	1.58
0.833	1.02	6.917	1.85	13.000	7.70	19.08	1.52
0.917	1.02	7.000	1.85	13.083	6.51	19.17	1.52
1.000	1.02	7.083	1.90	13.167	6.50	19.25	1.52
1.083	1.04	7.167	1.90	13.250	6.50	19.33	1.46
1.167	1.04	7.250	1.90	13.333	5.51	19.42	1.46
1.250	1.04	7.333	1.94	13.417	5.51	19.50	1.46
1.333	1.07	7.417	1.94	13.500	5.51	19.58	1.40
1.417	1.07	7.500	1.94	13.583	4.86	19.67	1.40
1.500	1.07	7.583	1.99	13.667	4.86	19.75	1.40
1.583	1.09	7.667	1.99	13.750	4.86	19.83	1.34
1.667	1.09	7.750	1.99	13.833	4.26	19.92	1.34
1.750	1.09	7.833	2.04	13.917	4.26	20.00	1.34
1.833	1.12	7.917	2.04	14.000	4.26	20.08	1.28
1.917	1.12	8.000	2.04	14.083	3.80	20.17	1.28
2.000	1.12	8.083	2.09	14.167	3.80	20.25	1.28
2.083	1.14	8.167	2.09	14.250	3.80	20.33	1.24
2.167	1.14	8.250	2.09	14.333	3.47	20.42	1.24
2.250	1.14	8.333	2.24	14.417	3.47	20.50	1.24
2.333	1.17	8.417	2.24	14.500	3.47	20.58	1.23
2.417	1.17	8.500	2.24	14.583	3.30	20.67	1.23
2.500	1.17	8.583	2.47	14.667	3.30	20.75	1.23
2.583	1.19	8.667	2.47	14.750	3.30	20.83	1.22
2.667	1.19	8.750	2.47	14.833	3.13	20.92	1.22
2.750	1.19	8.833	2.72	14.917	3.13	21.00	1.22
2.833	1.21	8.917	2.72	15.000	3.13	21.08	1.21
2.917	1.21	9.000	2.72	15.083	2.97	21.17	1.21
3.000	1.21	9.083	2.95	15.167	2.97	21.25	1.21
3.083	1.23	9.167	2.95	15.250	2.97	21.33	1.19
3.167	1.23	9.250	2.95	15.333	2.79	21.42	1.19
3.250	1.23	9.333	3.07	15.417	2.79	21.50	1.19
3.333	1.26	9.417	3.07	15.500	2.79	21.58	1.18
3.417	1.26	9.500	3.07	15.583	2.63	21.67	1.18
3.500	1.26	9.583	3.07	15.667	2.63	21.75	1.18
3.583	1.28	9.667	3.07	15.750	2.63	21.83	1.17
3.667	1.28	9.750	3.07	15.833	2.46	21.92	1.17
3.750	1.28	9.833	3.27	15.917	2.46	22.00	1.17
3.833	1.31	9.917	3.27	16.000	2.46	22.08	1.16
3.917	1.31	10.000	3.27	16.083	2.29	22.17	1.16
4.000	1.31	10.083	3.64	16.167	2.29	22.25	1.16
4.083	1.33	10.167	3.64	16.250	2.29	22.33	1.15
4.167	1.33	10.250	3.64	16.333	2.18	22.42	1.15
4.250	1.33	10.333	4.14	16.417	2.18	22.50	1.15
4.333	1.37	10.417	4.14	16.500	2.18	22.58	1.13
4.417	1.37	10.500	4.14	16.583	2.12	22.67	1.13
4.500	1.37	10.583	4.69	16.667	2.12	22.75	1.13
4.583	1.42	10.667	4.69	16.750	2.12	22.83	1.12
4.667	1.42	10.750	4.69	16.833	2.06	22.92	1.12
4.750	1.42	10.833	5.49	16.917	2.06	23.00	1.12
4.833	1.46	10.917	5.49	17.000	2.06	23.08	1.11
4.917	1.46	11.000	5.49	17.083	2.00	23.17	1.11
5.000	1.46	11.083	6.41	17.167	2.00	23.25	1.11
5.083	1.51	11.167	6.41	17.250	2.00	23.33	1.10
5.167	1.51	11.250	6.41	17.333	1.94	23.42	1.10
5.250	1.51	11.333	8.11	17.417	1.94	23.50	1.10
5.333	1.56	11.417	8.11	17.500	1.94	23.58	1.09
5.417	1.56	11.500	8.11	17.583	1.88	23.67	1.09
5.500	1.56	11.583	10.32	17.667	1.88	23.75	1.09
5.583	1.61	11.667	10.32	17.750	1.88	23.83	1.07
5.667	1.61	11.750	10.32	17.833	1.82	23.92	1.07
5.750	1.61	11.833	42.07	17.917	1.82	24.00	1.07
5.833	1.66	11.917	42.08	18.000	1.82	24.08	1.06
5.917	1.66	12.000	42.08	18.083	1.76	24.17	1.06
6.000	1.66	12.083	103.84	18.167	1.76	24.25	1.06
6.083	1.70	12.167	103.84	18.250	1.76		

```
Max.Eff.Inten.(mm/hr)=     103.84        63.62
```

```
              over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.23 (ii)   11.68 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.27         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.34         0.20         0.518 (iii)
     TIME TO PEAK    (hrs)=      12.25        12.33         12.25
     RUNOFF VOLUME    (mm)=      95.00        37.26         57.47
     TOTAL RAINFALL   (mm)=      96.00        96.00         96.00
     RUNOFF COEFFICIENT   =       0.99         0.39          0.60

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200      0.1300
                          0.1100     0.0700   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.518     12.25      57.47
   OUTFLOW: ID= 1 (  0029)      3.430      0.119     12.67      57.42

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.97
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0749

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    0.00 | 6.167    1.70 |12.250  103.84 | 18.33    1.70
               0.167    0.00 | 6.250    1.70 |12.333   16.46 | 18.42    1.70
```

```
               0.250    0.00 | 6.333    1.75 |12.417   16.45 | 18.50    1.70
               0.333    0.97 | 6.417    1.75 |12.500   16.45 | 18.58    1.64
               0.417    0.97 | 6.500    1.75 |12.583   11.20 | 18.67    1.64
               0.500    0.97 | 6.583    1.80 |12.667   11.20 | 18.75    1.64
               0.583    1.00 | 6.667    1.80 |12.750   11.20 | 18.83    1.58
               0.667    1.00 | 6.750    1.80 |12.833    7.70 | 18.92    1.58
               0.750    1.00 | 6.833    1.85 |12.917    7.70 | 19.00    1.58
               0.833    1.02 | 6.917    1.85 |13.000    7.70 | 19.08    1.52
               0.917    1.02 | 7.000    1.85 |13.083    6.51 | 19.17    1.52
               1.000    1.02 | 7.083    1.90 |13.167    6.50 | 19.25    1.52
               1.083    1.04 | 7.167    1.90 |13.250    6.50 | 19.33    1.46
               1.167    1.04 | 7.250    1.90 |13.333    5.51 | 19.42    1.46
               1.250    1.04 | 7.333    1.94 |13.417    5.51 | 19.50    1.46
               1.333    1.07 | 7.417    1.94 |13.500    5.51 | 19.58    1.40
               1.417    1.07 | 7.500    1.94 |13.583    4.86 | 19.67    1.40
               1.500    1.07 | 7.583    1.99 |13.667    4.86 | 19.75    1.40
               1.583    1.09 | 7.667    1.99 |13.750    4.86 | 19.83    1.34
               1.667    1.09 | 7.750    1.99 |13.833    4.26 | 19.92    1.34
               1.750    1.09 | 7.833    2.04 |13.917    4.26 | 20.00    1.34
               1.833    1.12 | 7.917    2.04 |14.000    4.26 | 20.08    1.28
               1.917    1.12 | 8.000    2.04 |14.083    3.80 | 20.17    1.28
               2.000    1.12 | 8.083    2.09 |14.167    3.80 | 20.25    1.28
               2.083    1.14 | 8.167    2.09 |14.250    3.80 | 20.33    1.24
               2.167    1.14 | 8.250    2.09 |14.333    3.47 | 20.42    1.24
               2.250    1.14 | 8.333    2.24 |14.417    3.47 | 20.50    1.24
               2.333    1.17 | 8.417    2.24 |14.500    3.47 | 20.58    1.23
               2.417    1.17 | 8.500    2.24 |14.583    3.30 | 20.67    1.23
               2.500    1.17 | 8.583    2.47 |14.667    3.30 | 20.75    1.23
               2.583    1.19 | 8.667    2.47 |14.750    3.30 | 20.83    1.22
               2.667    1.19 | 8.750    2.47 |14.833    3.13 | 20.92    1.22
               2.750    1.19 | 8.833    2.72 |14.917    3.13 | 21.00    1.22
               2.833    1.21 | 8.917    2.72 |15.000    3.13 | 21.08    1.21
               2.917    1.21 | 9.000    2.72 |15.083    2.97 | 21.17    1.21
               3.000    1.21 | 9.083    2.95 |15.167    2.97 | 21.25    1.21
               3.083    1.23 | 9.167    2.95 |15.250    2.97 | 21.33    1.19
               3.167    1.23 | 9.250    2.95 |15.333    2.79 | 21.42    1.19
               3.250    1.23 | 9.333    3.07 |15.417    2.79 | 21.50    1.19
               3.333    1.26 | 9.417    3.07 |15.500    2.79 | 21.58    1.18
               3.417    1.26 | 9.500    3.07 |15.583    2.63 | 21.67    1.18
               3.500    1.26 | 9.583    3.07 |15.667    2.63 | 21.75    1.18
               3.583    1.28 | 9.667    3.07 |15.750    2.63 | 21.83    1.17
               3.667    1.28 | 9.750    3.07 |15.833    2.46 | 21.92    1.17
               3.750    1.28 | 9.833    3.27 |15.917    2.46 | 22.00    1.17
               3.833    1.31 | 9.917    3.27 |16.000    2.46 | 22.08    1.16
               3.917    1.31 |10.000    3.27 |16.083    2.29 | 22.17    1.16
               4.000    1.31 |10.083    3.64 |16.167    2.29 | 22.25    1.16
               4.083    1.33 |10.167    3.64 |16.250    2.29 | 22.33    1.15
               4.167    1.33 |10.250    3.64 |16.333    2.18 | 22.42    1.15
               4.250    1.33 |10.333    4.14 |16.417    2.18 | 22.50    1.15
               4.333    1.37 |10.417    4.14 |16.500    2.18 | 22.58    1.13
               4.417    1.37 |10.500    4.14 |16.583    2.12 | 22.67    1.13
               4.500    1.37 |10.583    4.69 |16.667    2.12 | 22.75    1.13
```

```
            4.583    1.42 |10.667    4.69 |16.750    2.12 | 22.83    1.12
            4.667    1.42 |10.750    4.69 |16.833    2.06 | 22.92    1.12
            4.750    1.42 |10.833    5.49 |16.917    2.06 | 23.00    1.12
            4.833    1.46 |10.917    5.49 |17.000    2.06 | 23.08    1.11
            4.917    1.46 |11.000    5.49 |17.083    2.00 | 23.17    1.11
            5.000    1.46 |11.083    6.41 |17.167    2.00 | 23.25    1.11
            5.083    1.51 |11.167    6.41 |17.250    2.00 | 23.33    1.10
            5.167    1.51 |11.250    6.41 |17.333    1.94 | 23.42    1.10
            5.250    1.51 |11.333    8.11 |17.417    1.94 | 23.50    1.10
            5.333    1.56 |11.417    8.11 |17.500    1.94 | 23.58    1.09
            5.417    1.56 |11.500    8.11 |17.583    1.88 | 23.67    1.09
            5.500    1.56 |11.583   10.32 |17.667    1.88 | 23.75    1.09
            5.583    1.61 |11.667   10.32 |17.750    1.88 | 23.83    1.07
            5.667    1.61 |11.750   10.32 |17.833    1.82 | 23.92    1.07
            5.750    1.61 |11.833   42.07 |17.917    1.82 | 24.00    1.07
            5.833    1.66 |11.917   42.08 |18.000    1.82 | 24.08    1.06
            5.917    1.66 |12.000   42.08 |18.083    1.76 | 24.17    1.06
            6.000    1.66 |12.083  103.84 |18.167    1.76 | 24.25    1.06
            6.083    1.70 |12.167  103.84 |18.250    1.76 |

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.199 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  41.047
     TOTAL RAINFALL   (mm)=  96.000
     RUNOFF COEFFICIENT   =   0.428

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.044    12.33    43.25
      + ID2= 2 (  0029):     3.43   0.119    12.67    57.42
        ====================================================
        ID = 3 (  0007):     3.84   0.147    12.42    55.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.147    12.42    55.91
      + ID2= 2 (  0042):     2.05   0.199    12.33    41.05
        ====================================================
        ID = 1 (  0007):     5.89   0.343    12.33    50.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.343    12.33    50.74
      + ID2= 2 (  0005):     5.32   0.490    12.42    57.47
        ====================================================
        ID = 3 (  0007):    11.21   0.830    12.33    53.93

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390     0.1535
                          0.0410     0.0120   |   0.3840     0.1758
                          0.0580     0.0253   |   0.5390     0.1989
                          0.0710     0.0399   |   0.6480     0.2228
                          0.0830     0.0559   |   0.7320     0.2476
                          0.0920     0.0732   |   0.8050     0.2733
                          0.1010     0.0918   |   0.8710     0.2998
                          0.2130     0.1116   |   0.9320     0.3263
                          0.2860     0.1321   |   0.9880     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.830     12.33      53.93
   OUTFLOW: ID= 1 (  0008)     11.210      0.350     13.00      53.92

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 42.16
                   TIME SHIFT OF PEAK FLOW        (min)= 40.00
                   MAXIMUM  STORAGE   USED      (ha.m.)=  0.1591

------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.092    12.33    43.23
      + ID2= 2 (  0008):    11.21   0.350    13.00    53.92
        ====================================================
        ID = 3 (  0016):    12.04   0.366    12.92    53.19

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
------------------------------------------------------------------------------
```

```
*********************************************
** SIMULATION:3-2yr 24hr 15min SCS Type II **
*********************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    0.00 | 6.167    0.94 |12.250   57.11 | 18.33    0.93
                  0.167    0.00 | 6.250    0.94 |12.333    9.05 | 18.42    0.93
                  0.250    0.00 | 6.333    0.96 |12.417    9.05 | 18.50    0.93
                  0.333    0.54 | 6.417    0.96 |12.500    9.05 | 18.58    0.90
                  0.417    0.54 | 6.500    0.96 |12.583    6.16 | 18.67    0.90
                  0.500    0.54 | 6.583    0.99 |12.667    6.16 | 18.75    0.90
                  0.583    0.55 | 6.667    0.99 |12.750    6.16 | 18.83    0.87
                  0.667    0.55 | 6.750    0.99 |12.833    4.24 | 18.92    0.87
                  0.750    0.55 | 6.833    1.02 |12.917    4.24 | 19.00    0.87
                  0.833    0.56 | 6.917    1.02 |13.000    4.24 | 19.08    0.84
                  0.917    0.56 | 7.000    1.02 |13.083    3.58 | 19.17    0.84
                  1.000    0.56 | 7.083    1.04 |13.167    3.58 | 19.25    0.84
                  1.083    0.57 | 7.167    1.04 |13.250    3.58 | 19.33    0.80
                  1.167    0.57 | 7.250    1.04 |13.333    3.03 | 19.42    0.80
                  1.250    0.57 | 7.333    1.07 |13.417    3.03 | 19.50    0.80
                  1.333    0.59 | 7.417    1.07 |13.500    3.03 | 19.58    0.77
                  1.417    0.59 | 7.500    1.07 |13.583    2.67 | 19.67    0.77
                  1.500    0.59 | 7.583    1.10 |13.667    2.67 | 19.75    0.77
                  1.583    0.60 | 7.667    1.10 |13.750    2.67 | 19.83    0.73
                  1.667    0.60 | 7.750    1.10 |13.833    2.34 | 19.92    0.73
                  1.750    0.60 | 7.833    1.12 |13.917    2.34 | 20.00    0.73
                  1.833    0.61 | 7.917    1.12 |14.000    2.34 | 20.08    0.70
                  1.917    0.61 | 8.000    1.12 |14.083    2.09 | 20.17    0.70
                  2.000    0.61 | 8.083    1.15 |14.167    2.09 | 20.25    0.70
                  2.083    0.63 | 8.167    1.15 |14.250    2.09 | 20.33    0.68
                  2.167    0.63 | 8.250    1.15 |14.333    1.91 | 20.42    0.68
                  2.250    0.63 | 8.333    1.23 |14.417    1.91 | 20.50    0.68
                  2.333    0.64 | 8.417    1.23 |14.500    1.91 | 20.58    0.68
                  2.417    0.64 | 8.500    1.23 |14.583    1.82 | 20.67    0.68
                  2.500    0.64 | 8.583    1.36 |14.667    1.82 | 20.75    0.68
                  2.583    0.65 | 8.667    1.36 |14.750    1.82 | 20.83    0.67
                  2.667    0.65 | 8.750    1.36 |14.833    1.72 | 20.92    0.67
                  2.750    0.65 | 8.833    1.49 |14.917    1.72 | 21.00    0.67
                  2.833    0.67 | 8.917    1.49 |15.000    1.72 | 21.08    0.66
                  2.917    0.67 | 9.000    1.49 |15.083    1.63 | 21.17    0.66
                  3.000    0.67 | 9.083    1.62 |15.167    1.63 | 21.25    0.66
                  3.083    0.68 | 9.167    1.62 |15.250    1.63 | 21.33    0.66
                  3.167    0.68 | 9.250    1.62 |15.333    1.54 | 21.42    0.66
                  3.250    0.68 | 9.333    1.69 |15.417    1.54 | 21.50    0.66
                  3.333    0.69 | 9.417    1.69 |15.500    1.54 | 21.58    0.65
                  3.417    0.69 | 9.500    1.69 |15.583    1.45 | 21.67    0.65
                  3.500    0.69 | 9.583    1.69 |15.667    1.45 | 21.75    0.65
                  3.583    0.71 | 9.667    1.69 |15.750    1.45 | 21.83    0.64
                  3.667    0.71 | 9.750    1.69 |15.833    1.35 | 21.92    0.64
                  3.750    0.71 | 9.833    1.80 |15.917    1.35 | 22.00    0.64
                  3.833    0.72 | 9.917    1.80 |16.000    1.35 | 22.08    0.64
                  3.917    0.72 |10.000    1.80 |16.083    1.26 | 22.17    0.64
                  4.000    0.72 |10.083    2.00 |16.167    1.26 | 22.25    0.64
                  4.083    0.73 |10.167    2.00 |16.250    1.26 | 22.33    0.63
                  4.167    0.73 |10.250    2.00 |16.333    1.20 | 22.42    0.63
                  4.250    0.73 |10.333    2.28 |16.417    1.20 | 22.50    0.63
                  4.333    0.75 |10.417    2.28 |16.500    1.20 | 22.58    0.62
                  4.417    0.75 |10.500    2.28 |16.583    1.17 | 22.67    0.62
                  4.500    0.75 |10.583    2.58 |16.667    1.17 | 22.75    0.62
                  4.583    0.78 |10.667    2.58 |16.750    1.17 | 22.83    0.62
                  4.667    0.78 |10.750    2.58 |16.833    1.13 | 22.92    0.62
                  4.750    0.78 |10.833    3.02 |16.917    1.13 | 23.00    0.62
                  4.833    0.81 |10.917    3.02 |17.000    1.13 | 23.08    0.61
                  4.917    0.81 |11.000    3.02 |17.083    1.10 | 23.17    0.61
                  5.000    0.81 |11.083    3.53 |17.167    1.10 | 23.25    0.61
                  5.083    0.83 |11.167    3.53 |17.250    1.10 | 23.33    0.60
                  5.167    0.83 |11.250    3.53 |17.333    1.07 | 23.42    0.60
                  5.250    0.83 |11.333    4.46 |17.417    1.07 | 23.50    0.60
                  5.333    0.86 |11.417    4.46 |17.500    1.07 | 23.58    0.60
                  5.417    0.86 |11.500    4.46 |17.583    1.03 | 23.67    0.60
                  5.500    0.86 |11.583    5.68 |17.667    1.03 | 23.75    0.60
                  5.583    0.88 |11.667    5.68 |17.750    1.03 | 23.83    0.59
                  5.667    0.88 |11.750    5.68 |17.833    1.00 | 23.92    0.59
                  5.750    0.88 |11.833   23.14 |17.917    1.00 | 24.00    0.59
                  5.833    0.91 |11.917   23.14 |18.000    1.00 | 24.08    0.58
                  5.917    0.91 |12.000   23.14 |18.083    0.97 | 24.17    0.58
                  6.000    0.91 |12.083   57.11 |18.167    0.97 | 24.25    0.58
                  6.083    0.94 |12.167   57.11 |18.250    0.97 |

     Unit Hyd Qpeak  (cms)=   0.167

     PEAK FLOW       (cms)=   0.029 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  14.337
     TOTAL RAINFALL   (mm)=  52.800
     RUNOFF COEFFICIENT   =   0.272

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
```

```
--------------------   U.H. Tp(hrs)=   0.20

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	0.94	12.250	57.11	18.33	0.93
0.167	0.00	6.250	0.94	12.333	9.05	18.42	0.93
0.250	0.00	6.333	0.96	12.417	9.05	18.50	0.93
0.333	0.54	6.417	0.96	12.500	9.05	18.58	0.90
0.417	0.54	6.500	0.96	12.583	6.16	18.67	0.90
0.500	0.54	6.583	0.99	12.667	6.16	18.75	0.90
0.583	0.55	6.667	0.99	12.750	6.16	18.83	0.87
0.667	0.55	6.750	0.99	12.833	4.24	18.92	0.87
0.750	0.55	6.833	1.02	12.917	4.24	19.00	0.87
0.833	0.56	6.917	1.02	13.000	4.24	19.08	0.84
0.917	0.56	7.000	1.02	13.083	3.58	19.17	0.84
1.000	0.56	7.083	1.04	13.167	3.58	19.25	0.84
1.083	0.57	7.167	1.04	13.250	3.58	19.33	0.80
1.167	0.57	7.250	1.04	13.333	3.03	19.42	0.80
1.250	0.57	7.333	1.07	13.417	3.03	19.50	0.80
1.333	0.59	7.417	1.07	13.500	3.03	19.58	0.77
1.417	0.59	7.500	1.07	13.583	2.67	19.67	0.77
1.500	0.59	7.583	1.10	13.667	2.67	19.75	0.77
1.583	0.60	7.667	1.10	13.750	2.67	19.83	0.73
1.667	0.60	7.750	1.10	13.833	2.34	19.92	0.73
1.750	0.60	7.833	1.12	13.917	2.34	20.00	0.73
1.833	0.61	7.917	1.12	14.000	2.34	20.08	0.70
1.917	0.61	8.000	1.12	14.083	2.09	20.17	0.70
2.000	0.61	8.083	1.15	14.167	2.09	20.25	0.70
2.083	0.63	8.167	1.15	14.250	2.09	20.33	0.68
2.167	0.63	8.250	1.15	14.333	1.91	20.42	0.68
2.250	0.63	8.333	1.23	14.417	1.91	20.50	0.68
2.333	0.64	8.417	1.23	14.500	1.91	20.58	0.68
2.417	0.64	8.500	1.23	14.583	1.82	20.67	0.68
2.500	0.64	8.583	1.36	14.667	1.82	20.75	0.68
2.583	0.65	8.667	1.36	14.750	1.82	20.83	0.67
2.667	0.65	8.750	1.36	14.833	1.72	20.92	0.67
2.750	0.65	8.833	1.49	14.917	1.72	21.00	0.67
2.833	0.67	8.917	1.49	15.000	1.72	21.08	0.66
2.917	0.67	9.000	1.49	15.083	1.63	21.17	0.66
3.000	0.67	9.083	1.62	15.167	1.63	21.25	0.66
3.083	0.68	9.167	1.62	15.250	1.63	21.33	0.66
3.167	0.68	9.250	1.62	15.333	1.54	21.42	0.66
3.250	0.68	9.333	1.69	15.417	1.54	21.50	0.66
3.333	0.69	9.417	1.69	15.500	1.54	21.58	0.65
3.417	0.69	9.500	1.69	15.583	1.45	21.67	0.65
3.500	0.69	9.583	1.69	15.667	1.45	21.75	0.65
3.583	0.71	9.667	1.69	15.750	1.45	21.83	0.64
3.667	0.71	9.750	1.69	15.833	1.35	21.92	0.64
3.750	0.71	9.833	1.80	15.917	1.35	22.00	0.64
3.833	0.72	9.917	1.80	16.000	1.35	22.08	0.64
3.917	0.72	10.000	1.80	16.083	1.26	22.17	0.64
4.000	0.72	10.083	2.00	16.167	1.26	22.25	0.64
4.083	0.73	10.167	2.00	16.250	1.26	22.33	0.63
4.167	0.73	10.250	2.00	16.333	1.20	22.42	0.63
4.250	0.73	10.333	2.28	16.417	1.20	22.50	0.63
4.333	0.75	10.417	2.28	16.500	1.20	22.58	0.62
4.417	0.75	10.500	2.28	16.583	1.17	22.67	0.62
4.500	0.75	10.583	2.58	16.667	1.17	22.75	0.62
4.583	0.78	10.667	2.58	16.750	1.17	22.83	0.62
4.667	0.78	10.750	2.58	16.833	1.13	22.92	0.62
4.750	0.78	10.833	3.02	16.917	1.13	23.00	0.62
4.833	0.81	10.917	3.02	17.000	1.13	23.08	0.61
4.917	0.81	11.000	3.02	17.083	1.10	23.17	0.61
5.000	0.81	11.083	3.53	17.167	1.10	23.25	0.61
5.083	0.83	11.167	3.53	17.250	1.10	23.33	0.60
5.167	0.83	11.250	3.53	17.333	1.07	23.42	0.60
5.250	0.83	11.333	4.46	17.417	1.07	23.50	0.60
5.333	0.86	11.417	4.46	17.500	1.07	23.58	0.60
5.417	0.86	11.500	4.46	17.583	1.03	23.67	0.60
5.500	0.86	11.583	5.68	17.667	1.03	23.75	0.60
5.583	0.88	11.667	5.68	17.750	1.03	23.83	0.59
5.667	0.88	11.750	5.68	17.833	1.00	23.92	0.59
5.750	0.88	11.833	23.14	17.917	1.00	24.00	0.59
5.833	0.91	11.917	23.14	18.000	1.00	24.08	0.58
5.917	0.91	12.000	23.14	18.083	0.97	24.17	0.58
6.000	0.91	12.083	57.11	18.167	0.97	24.25	0.58
6.083	0.94	12.167	57.11	18.250	0.97		

```
    Unit Hyd Qpeak  (cms)=   0.078

    PEAK FLOW       (cms)=   0.014 (i)
    TIME TO PEAK    (hrs)=  12.333
    RUNOFF VOLUME    (mm)=  14.343
    TOTAL RAINFALL   (mm)=  52.800
    RUNOFF COEFFICIENT   =   0.272

    (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
    Surface Area     (ha)=       2.66         2.66
    Dep. Storage     (mm)=       1.00         5.00
    Average Slope     (%)=       1.00         1.00
    Length            (m)=     188.33        40.00
    Mannings n          =      0.130        0.250
```

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	0.94	12.250	57.11	18.33	0.93
0.167	0.00	6.250	0.94	12.333	9.05	18.42	0.93
0.250	0.00	6.333	0.96	12.417	9.05	18.50	0.93
0.333	0.54	6.417	0.96	12.500	9.05	18.58	0.90
0.417	0.54	6.500	0.96	12.583	6.16	18.67	0.90
0.500	0.54	6.583	0.99	12.667	6.16	18.75	0.90
0.583	0.55	6.667	0.99	12.750	6.16	18.83	0.87
0.667	0.55	6.750	0.99	12.833	4.24	18.92	0.87
0.750	0.55	6.833	1.02	12.917	4.24	19.00	0.87
0.833	0.56	6.917	1.02	13.000	4.24	19.08	0.84
0.917	0.56	7.000	1.02	13.083	3.58	19.17	0.84
1.000	0.56	7.083	1.04	13.167	3.58	19.25	0.84
1.083	0.57	7.167	1.04	13.250	3.58	19.33	0.80
1.167	0.57	7.250	1.04	13.333	3.03	19.42	0.80
1.250	0.57	7.333	1.07	13.417	3.03	19.50	0.80
1.333	0.59	7.417	1.07	13.500	3.03	19.58	0.77
1.417	0.59	7.500	1.07	13.583	2.67	19.67	0.77
1.500	0.59	7.583	1.10	13.667	2.67	19.75	0.77
1.583	0.60	7.667	1.10	13.750	2.67	19.83	0.73
1.667	0.60	7.750	1.10	13.833	2.34	19.92	0.73
1.750	0.60	7.833	1.12	13.917	2.34	20.00	0.73
1.833	0.61	7.917	1.12	14.000	2.34	20.08	0.70
1.917	0.61	8.000	1.12	14.083	2.09	20.17	0.70
2.000	0.61	8.083	1.15	14.167	2.09	20.25	0.70
2.083	0.63	8.167	1.15	14.250	2.09	20.33	0.68
2.167	0.63	8.250	1.15	14.333	1.91	20.42	0.68
2.250	0.63	8.333	1.23	14.417	1.91	20.50	0.68
2.333	0.64	8.417	1.23	14.500	1.91	20.58	0.68
2.417	0.64	8.500	1.23	14.583	1.82	20.67	0.68
2.500	0.64	8.583	1.36	14.667	1.82	20.75	0.68
2.583	0.65	8.667	1.36	14.750	1.82	20.83	0.67
2.667	0.65	8.750	1.36	14.833	1.72	20.92	0.67
2.750	0.65	8.833	1.49	14.917	1.72	21.00	0.67
2.833	0.67	8.917	1.49	15.000	1.72	21.08	0.66
2.917	0.67	9.000	1.49	15.083	1.63	21.17	0.66
3.000	0.67	9.083	1.62	15.167	1.63	21.25	0.66
3.083	0.68	9.167	1.62	15.250	1.63	21.33	0.66
3.167	0.68	9.250	1.62	15.333	1.54	21.42	0.66
3.250	0.68	9.333	1.69	15.417	1.54	21.50	0.66
3.333	0.69	9.417	1.69	15.500	1.54	21.58	0.65
3.417	0.69	9.500	1.69	15.583	1.45	21.67	0.65
3.500	0.69	9.583	1.69	15.667	1.45	21.75	0.65
3.583	0.71	9.667	1.69	15.750	1.45	21.83	0.64
3.667	0.71	9.750	1.69	15.833	1.35	21.92	0.64
3.750	0.71	9.833	1.80	15.917	1.35	22.00	0.64
3.833	0.72	9.917	1.80	16.000	1.35	22.08	0.64
3.917	0.72	10.000	1.80	16.083	1.26	22.17	0.64
4.000	0.72	10.083	2.00	16.167	1.26	22.25	0.64
4.083	0.73	10.167	2.00	16.250	1.26	22.33	0.63
4.167	0.73	10.250	2.00	16.333	1.20	22.42	0.63
4.250	0.73	10.333	2.28	16.417	1.20	22.50	0.63
4.333	0.75	10.417	2.28	16.500	1.20	22.58	0.62
4.417	0.75	10.500	2.28	16.583	1.17	22.67	0.62
4.500	0.75	10.583	2.58	16.667	1.17	22.75	0.62
4.583	0.78	10.667	2.58	16.750	1.17	22.83	0.62
4.667	0.78	10.750	2.58	16.833	1.13	22.92	0.62
4.750	0.78	10.833	3.02	16.917	1.13	23.00	0.62
4.833	0.81	10.917	3.02	17.000	1.13	23.08	0.61
4.917	0.81	11.000	3.02	17.083	1.10	23.17	0.61
5.000	0.81	11.083	3.53	17.167	1.10	23.25	0.61
5.083	0.83	11.167	3.53	17.250	1.10	23.33	0.60
5.167	0.83	11.250	3.53	17.333	1.07	23.42	0.60
5.250	0.83	11.333	4.46	17.417	1.07	23.50	0.60
5.333	0.86	11.417	4.46	17.500	1.07	23.58	0.60
5.417	0.86	11.500	4.46	17.583	1.03	23.67	0.60
5.500	0.86	11.583	5.68	17.667	1.03	23.75	0.60
5.583	0.88	11.667	5.68	17.750	1.03	23.83	0.59
5.667	0.88	11.750	5.68	17.833	1.00	23.92	0.59
5.750	0.88	11.833	23.14	17.917	1.00	24.00	0.59
5.833	0.91	11.917	23.14	18.000	1.00	24.08	0.58
5.917	0.91	12.000	23.14	18.083	0.97	24.17	0.58
6.000	0.91	12.083	57.11	18.167	0.97	24.25	0.58
6.083	0.94	12.167	57.11	18.250	0.97		

Max.Eff.Inten.(mm/hr)=	48.62	16.90	
over (min)	20.00	40.00	
Storage Coeff. (min)=	19.84 (ii)	37.54 (ii)	
Unit Hyd. Tpeak (min)=	20.00	40.00	
Unit Hyd. peak (cms)=	0.06	0.03	
			TOTALS
PEAK FLOW (cms)=	0.16	0.05	0.197 (iii)
TIME TO PEAK (hrs)=	12.42	12.75	12.42
RUNOFF VOLUME (mm)=	51.80	12.97	26.56
TOTAL RAINFALL (mm)=	52.80	52.80	52.80
RUNOFF COEFFICIENT =	0.98	0.25	0.50

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 59.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

| CALIB |
| STANDHYD (0028)| Area (ha)= 3.43

|ID= 1 DT= 5.0 min | Total Imp(%)= 50.00   Dir. Conn.(%)= 35.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.71	1.71
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	151.22	40.00
Mannings n	=	0.013	0.250

NOTE: RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	0.94	12.250	57.11	18.33	0.93
0.167	0.00	6.250	0.94	12.333	9.05	18.42	0.93
0.250	0.00	6.333	0.96	12.417	9.05	18.50	0.93
0.333	0.54	6.417	0.96	12.500	9.05	18.58	0.90
0.417	0.54	6.500	0.96	12.583	6.16	18.67	0.90
0.500	0.54	6.583	0.99	12.667	6.16	18.75	0.90
0.583	0.55	6.667	0.99	12.750	6.16	18.83	0.87
0.667	0.55	6.750	0.99	12.833	4.24	18.92	0.87
0.750	0.55	6.833	1.02	12.917	4.24	19.00	0.87
0.833	0.56	6.917	1.02	13.000	4.24	19.08	0.84
0.917	0.56	7.000	1.02	13.083	3.58	19.17	0.84
1.000	0.56	7.083	1.04	13.167	3.58	19.25	0.84
1.083	0.57	7.167	1.04	13.250	3.58	19.33	0.80
1.167	0.57	7.250	1.04	13.333	3.03	19.42	0.80
1.250	0.57	7.333	1.07	13.417	3.03	19.50	0.80
1.333	0.59	7.417	1.07	13.500	3.03	19.58	0.77
1.417	0.59	7.500	1.07	13.583	2.67	19.67	0.77
1.500	0.59	7.583	1.10	13.667	2.67	19.75	0.77
1.583	0.60	7.667	1.10	13.750	2.67	19.83	0.73
1.667	0.60	7.750	1.10	13.833	2.34	19.92	0.73
1.750	0.60	7.833	1.12	13.917	2.34	20.00	0.73
1.833	0.61	7.917	1.12	14.000	2.34	20.08	0.70
1.917	0.61	8.000	1.12	14.083	2.09	20.17	0.70
2.000	0.61	8.083	1.15	14.167	2.09	20.25	0.70
2.083	0.63	8.167	1.15	14.250	2.09	20.33	0.68
2.167	0.63	8.250	1.15	14.333	1.91	20.42	0.68
2.250	0.63	8.333	1.23	14.417	1.91	20.50	0.68
2.333	0.64	8.417	1.23	14.500	1.91	20.58	0.68
2.417	0.64	8.500	1.23	14.583	1.82	20.67	0.68
2.500	0.64	8.583	1.36	14.667	1.82	20.75	0.68
2.583	0.65	8.667	1.36	14.750	1.82	20.83	0.67
2.667	0.65	8.750	1.36	14.833	1.72	20.92	0.67
2.750	0.65	8.833	1.49	14.917	1.72	21.00	0.67
2.833	0.67	8.917	1.49	15.000	1.72	21.08	0.66
2.917	0.67	9.000	1.49	15.083	1.63	21.17	0.66
3.000	0.67	9.083	1.62	15.167	1.63	21.25	0.66
3.083	0.68	9.167	1.62	15.250	1.63	21.33	0.66
3.167	0.68	9.250	1.62	15.333	1.54	21.42	0.66
3.250	0.68	9.333	1.69	15.417	1.54	21.50	0.66
3.333	0.69	9.417	1.69	15.500	1.54	21.58	0.65
3.417	0.69	9.500	1.69	15.583	1.45	21.67	0.65
3.500	0.69	9.583	1.69	15.667	1.45	21.75	0.65
3.583	0.71	9.667	1.69	15.750	1.45	21.83	0.64
3.667	0.71	9.750	1.69	15.833	1.35	21.92	0.64
3.750	0.71	9.833	1.80	15.917	1.35	22.00	0.64
3.833	0.72	9.917	1.80	16.000	1.35	22.08	0.64
3.917	0.72	10.000	1.80	16.083	1.26	22.17	0.64
4.000	0.72	10.083	2.00	16.167	1.26	22.25	0.64
4.083	0.73	10.167	2.00	16.250	1.26	22.33	0.63
4.167	0.73	10.250	2.00	16.333	1.20	22.42	0.63
4.250	0.73	10.333	2.28	16.417	1.20	22.50	0.63
4.333	0.75	10.417	2.28	16.500	1.20	22.58	0.62
4.417	0.75	10.500	2.28	16.583	1.17	22.67	0.62
4.500	0.75	10.583	2.58	16.667	1.17	22.75	0.62
4.583	0.78	10.667	2.58	16.750	1.17	22.83	0.62
4.667	0.78	10.750	2.58	16.833	1.13	22.92	0.62
4.750	0.78	10.833	3.02	16.917	1.13	23.00	0.62
4.833	0.81	10.917	3.02	17.000	1.13	23.08	0.61
4.917	0.81	11.000	3.02	17.083	1.10	23.17	0.61
5.000	0.81	11.083	3.53	17.167	1.10	23.25	0.61
5.083	0.83	11.167	3.53	17.250	1.10	23.33	0.60
5.167	0.83	11.250	3.53	17.333	1.07	23.42	0.60
5.250	0.83	11.333	4.46	17.417	1.07	23.50	0.60
5.333	0.86	11.417	4.46	17.500	1.07	23.58	0.60
5.417	0.86	11.500	4.46	17.583	1.03	23.67	0.60
5.500	0.86	11.583	5.68	17.667	1.03	23.75	0.60
5.583	0.88	11.667	5.68	17.750	1.03	23.83	0.59
5.667	0.88	11.750	5.68	17.833	1.00	23.92	0.59
5.750	0.88	11.833	23.14	17.917	1.00	24.00	0.59
5.833	0.91	11.917	23.14	18.000	1.00	24.08	0.58
5.917	0.91	12.000	23.14	18.083	0.97	24.17	0.58
6.000	0.91	12.083	57.11	18.167	0.97	24.25	0.58
6.083	0.94	12.167	57.11	18.250	0.97		

				TOTALS
Max.Eff.Inten.(mm/hr)=		57.11	20.54	
over (min)		5.00	20.00	
Storage Coeff.	(min)=	4.10 (ii)	17.39 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	20.00	
Unit Hyd. peak	(cms)=	0.24	0.06	
PEAK FLOW	(cms)=	0.19	0.05	0.225 (iii)
TIME TO PEAK	(hrs)=	12.25	12.42	12.25
RUNOFF VOLUME	(mm)=	51.80	12.97	26.56
TOTAL RAINFALL	(mm)=	52.80	52.80	52.80
RUNOFF COEFFICIENT	=	0.98	0.25	0.50

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

```
           CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200      0.1300
                          0.1100     0.0700   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.225     12.25      26.56
   OUTFLOW: ID= 1 (  0029)      3.430      0.052     12.75      26.51

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.24
                   TIME SHIFT OF PEAK FLOW         (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0333

-------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	0.94	12.250	57.11	18.33	0.93
0.167	0.00	6.250	0.94	12.333	9.05	18.42	0.93
0.250	0.00	6.333	0.96	12.417	9.05	18.50	0.93
0.333	0.54	6.417	0.96	12.500	9.05	18.58	0.90
0.417	0.54	6.500	0.96	12.583	6.16	18.67	0.90
0.500	0.54	6.583	0.99	12.667	6.16	18.75	0.90
0.583	0.55	6.667	0.99	12.750	6.16	18.83	0.87
0.667	0.55	6.750	0.99	12.833	4.24	18.92	0.87
0.750	0.55	6.833	1.02	12.917	4.24	19.00	0.87
0.833	0.56	6.917	1.02	13.000	4.24	19.08	0.84
0.917	0.56	7.000	1.02	13.083	3.58	19.17	0.84
1.000	0.56	7.083	1.04	13.167	3.58	19.25	0.84
1.083	0.57	7.167	1.04	13.250	3.58	19.33	0.80
1.167	0.57	7.250	1.04	13.333	3.03	19.42	0.80
1.250	0.57	7.333	1.07	13.417	3.03	19.50	0.80
1.333	0.59	7.417	1.07	13.500	3.03	19.58	0.77
1.417	0.59	7.500	1.07	13.583	2.67	19.67	0.77
1.500	0.59	7.583	1.10	13.667	2.67	19.75	0.77
1.583	0.60	7.667	1.10	13.750	2.67	19.83	0.73
1.667	0.60	7.750	1.10	13.833	2.34	19.92	0.73
1.750	0.60	7.833	1.12	13.917	2.34	20.00	0.73
1.833	0.61	7.917	1.12	14.000	2.34	20.08	0.70
1.917	0.61	8.000	1.12	14.083	2.09	20.17	0.70
2.000	0.61	8.083	1.15	14.167	2.09	20.25	0.70
2.083	0.63	8.167	1.15	14.250	2.09	20.33	0.68
2.167	0.63	8.250	1.15	14.333	1.91	20.42	0.68
2.250	0.63	8.333	1.23	14.417	1.91	20.50	0.68
2.333	0.64	8.417	1.23	14.500	1.91	20.58	0.68
2.417	0.64	8.500	1.23	14.583	1.82	20.67	0.68
2.500	0.64	8.583	1.36	14.667	1.82	20.75	0.68
2.583	0.65	8.667	1.36	14.750	1.82	20.83	0.67
2.667	0.65	8.750	1.36	14.833	1.72	20.92	0.67
2.750	0.65	8.833	1.49	14.917	1.72	21.00	0.67
2.833	0.67	8.917	1.49	15.000	1.72	21.08	0.66
2.917	0.67	9.000	1.49	15.083	1.63	21.17	0.66
3.000	0.67	9.083	1.62	15.167	1.63	21.25	0.66
3.083	0.68	9.167	1.62	15.250	1.63	21.33	0.66
3.167	0.68	9.250	1.62	15.333	1.54	21.42	0.66
3.250	0.68	9.333	1.69	15.417	1.54	21.50	0.66
3.333	0.69	9.417	1.69	15.500	1.54	21.58	0.65
3.417	0.69	9.500	1.69	15.583	1.45	21.67	0.65
3.500	0.69	9.583	1.69	15.667	1.45	21.75	0.65
3.583	0.71	9.667	1.69	15.750	1.45	21.83	0.64
3.667	0.71	9.750	1.69	15.833	1.35	21.92	0.64
3.750	0.71	9.833	1.80	15.917	1.35	22.00	0.64
3.833	0.72	9.917	1.80	16.000	1.35	22.08	0.64
3.917	0.72	10.000	1.80	16.083	1.26	22.17	0.64
4.000	0.72	10.083	2.00	16.167	1.26	22.25	0.64
4.083	0.73	10.167	2.00	16.250	1.26	22.33	0.63
4.167	0.73	10.250	2.00	16.333	1.20	22.42	0.63
4.250	0.73	10.333	2.28	16.417	1.20	22.50	0.63
4.333	0.75	10.417	2.28	16.500	1.20	22.58	0.62
4.417	0.75	10.500	2.28	16.583	1.17	22.67	0.62
4.500	0.75	10.583	2.58	16.667	1.17	22.75	0.62
4.583	0.78	10.667	2.58	16.750	1.17	22.83	0.62
4.667	0.78	10.750	2.58	16.833	1.13	22.92	0.62
4.750	0.78	10.833	3.02	16.917	1.13	23.00	0.62
4.833	0.81	10.917	3.02	17.000	1.13	23.08	0.61
4.917	0.81	11.000	3.02	17.083	1.10	23.17	0.61
5.000	0.81	11.083	3.53	17.167	1.10	23.25	0.61
5.083	0.83	11.167	3.53	17.250	1.10	23.33	0.60
5.167	0.83	11.250	3.53	17.333	1.07	23.42	0.60
5.250	0.83	11.333	4.46	17.417	1.07	23.50	0.60
5.333	0.86	11.417	4.46	17.500	1.07	23.58	0.60
5.417	0.86	11.500	4.46	17.583	1.03	23.67	0.60
5.500	0.86	11.583	5.68	17.667	1.03	23.75	0.60
5.583	0.88	11.667	5.68	17.750	1.03	23.83	0.59
5.667	0.88	11.750	5.68	17.833	1.00	23.92	0.59

```
              5.750    0.88 |11.833   23.14 |17.917    1.00 | 24.00    0.59
              5.833    0.91 |11.917   23.14 |18.000    1.00 | 24.08    0.58
              5.917    0.91 |12.000   23.14 |18.083    0.97 | 24.17    0.58
              6.000    0.91 |12.083   57.11 |18.167    0.97 | 24.25    0.58
              6.083    0.94 |12.167   57.11 |18.250    0.97 |

     Unit Hyd Qpeak  (cms)=   0.356

     PEAK FLOW       (cms)=   0.061 (i)
     TIME TO PEAK    (hrs)=  12.333
     RUNOFF VOLUME    (mm)=  13.378
     TOTAL RAINFALL   (mm)=  52.800
     RUNOFF COEFFICIENT   =   0.253

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.014    12.33    14.34
      + ID2= 2 (  0029):     3.43   0.052    12.75    26.51
        ====================================================
        ID = 3 (  0007):     3.84   0.061    12.42    25.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.061    12.42    25.21
      + ID2= 2 (  0042):     2.05   0.061    12.33    13.38
        ====================================================
        ID = 1 (  0007):     5.89   0.120    12.33    21.09

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.120    12.33    21.09
      + ID2= 2 (  0005):     5.32   0.197    12.42    26.56
        ====================================================
        ID = 3 (  0007):    11.21   0.315    12.42    23.69

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390     0.1535
                          0.0410     0.0120   |   0.3840     0.1758
                          0.0580     0.0253   |   0.5390     0.1989
                          0.0710     0.0399   |   0.6480     0.2228
                          0.0830     0.0559   |   0.7320     0.2476
                          0.0920     0.0732   |   0.8050     0.2733
                          0.1010     0.0918   |   0.8710     0.2998
                          0.2130     0.1116   |   0.9320     0.3263
                          0.2860     0.1321   |   0.9880     0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.315     12.42      23.69
   OUTFLOW: ID= 1 (  0008)     11.210      0.094     13.75      23.68

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 29.81
                   TIME SHIFT OF PEAK FLOW         (min)= 80.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0771

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.029    12.33    14.34
      + ID2= 2 (  0008):    11.21   0.094    13.75    23.68
        ====================================================
        ID = 3 (  0016):    12.04   0.097    13.58    23.04

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
**********************************************
** SIMULATION:3-50yr 24hr 15min SCS Type II **
**********************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	1.92	12.250	116.82	18.33	1.91
0.167	0.00	6.250	1.92	12.333	18.52	18.42	1.91
0.250	0.00	6.333	1.97	12.417	18.51	18.50	1.91
0.333	1.10	6.417	1.97	12.500	18.51	18.58	1.84
0.417	1.10	6.500	1.97	12.583	12.60	18.67	1.84
0.500	1.10	6.583	2.02	12.667	12.60	18.75	1.84
0.583	1.12	6.667	2.02	12.750	12.60	18.83	1.77
0.667	1.12	6.750	2.02	12.833	8.67	18.92	1.77
0.750	1.12	6.833	2.08	12.917	8.67	19.00	1.77
0.833	1.15	6.917	2.08	13.000	8.67	19.08	1.71
0.917	1.15	7.000	2.08	13.083	7.32	19.17	1.71
1.000	1.15	7.083	2.13	13.167	7.32	19.25	1.71
1.083	1.17	7.167	2.13	13.250	7.32	19.33	1.64
1.167	1.17	7.250	2.13	13.333	6.20	19.42	1.64
1.250	1.17	7.333	2.19	13.417	6.19	19.50	1.64
1.333	1.20	7.417	2.19	13.500	6.19	19.58	1.57
1.417	1.20	7.500	2.19	13.583	5.47	19.67	1.57
1.500	1.20	7.583	2.24	13.667	5.47	19.75	1.57
1.583	1.23	7.667	2.24	13.750	5.47	19.83	1.50
1.667	1.23	7.750	2.24	13.833	4.80	19.92	1.50
1.750	1.23	7.833	2.30	13.917	4.80	20.00	1.50
1.833	1.25	7.917	2.30	14.000	4.80	20.08	1.44
1.917	1.25	8.000	2.30	14.083	4.28	20.17	1.44
2.000	1.25	8.083	2.35	14.167	4.28	20.25	1.44
2.083	1.28	8.167	2.35	14.250	4.28	20.33	1.40
2.167	1.28	8.250	2.35	14.333	3.90	20.42	1.40
2.250	1.28	8.333	2.52	14.417	3.90	20.50	1.40
2.333	1.31	8.417	2.52	14.500	3.90	20.58	1.38
2.417	1.31	8.500	2.52	14.583	3.72	20.67	1.38
2.500	1.31	8.583	2.78	14.667	3.72	20.75	1.38
2.583	1.34	8.667	2.78	14.750	3.72	20.83	1.37
2.667	1.34	8.750	2.78	14.833	3.52	20.92	1.37
2.750	1.34	8.833	3.06	14.917	3.52	21.00	1.37
2.833	1.36	8.917	3.06	15.000	3.52	21.08	1.36
2.917	1.36	9.000	3.06	15.083	3.34	21.17	1.36
3.000	1.36	9.083	3.32	15.167	3.34	21.25	1.36
3.083	1.39	9.167	3.32	15.250	3.34	21.33	1.34
3.167	1.39	9.250	3.32	15.333	3.14	21.42	1.34
3.250	1.39	9.333	3.46	15.417	3.14	21.50	1.34
3.333	1.42	9.417	3.46	15.500	3.14	21.58	1.33
3.417	1.42	9.500	3.46	15.583	2.96	21.67	1.33
3.500	1.42	9.583	3.46	15.667	2.96	21.75	1.33
3.583	1.45	9.667	3.46	15.750	2.96	21.83	1.32
3.667	1.45	9.750	3.46	15.833	2.76	21.92	1.32
3.750	1.45	9.833	3.68	15.917	2.76	22.00	1.32
3.833	1.47	9.917	3.68	16.000	2.76	22.08	1.30
3.917	1.47	10.000	3.68	16.083	2.58	22.17	1.30
4.000	1.47	10.083	4.10	16.167	2.58	22.25	1.30
4.083	1.50	10.167	4.10	16.250	2.58	22.33	1.29
4.167	1.50	10.250	4.10	16.333	2.45	22.42	1.29
4.250	1.50	10.333	4.66	16.417	2.45	22.50	1.29
4.333	1.54	10.417	4.66	16.500	2.45	22.58	1.28
4.417	1.54	10.500	4.66	16.583	2.38	22.67	1.28
4.500	1.54	10.583	5.28	16.667	2.38	22.75	1.28
4.583	1.59	10.667	5.28	16.750	2.38	22.83	1.26
4.667	1.59	10.750	5.28	16.833	2.31	22.92	1.26
4.750	1.59	10.833	6.18	16.917	2.31	23.00	1.26
4.833	1.65	10.917	6.18	17.000	2.31	23.08	1.25
4.917	1.65	11.000	6.18	17.083	2.25	23.17	1.25
5.000	1.65	11.083	7.21	17.167	2.25	23.25	1.25
5.083	1.70	11.167	7.21	17.250	2.25	23.33	1.24
5.167	1.70	11.250	7.21	17.333	2.18	23.42	1.24
5.250	1.70	11.333	9.12	17.417	2.18	23.50	1.24
5.333	1.76	11.417	9.12	17.500	2.18	23.58	1.22
5.417	1.76	11.500	9.12	17.583	2.11	23.67	1.22
5.500	1.76	11.583	11.61	17.667	2.11	23.75	1.22
5.583	1.81	11.667	11.61	17.750	2.11	23.83	1.21
5.667	1.81	11.750	11.61	17.833	2.04	23.92	1.21
5.750	1.81	11.833	47.33	17.917	2.04	24.00	1.21
5.833	1.86	11.917	47.34	18.000	2.04	24.08	1.19
5.917	1.86	12.000	47.34	18.083	1.98	24.17	1.19
6.000	1.86	12.083	116.82	18.167	1.98	24.25	1.19
6.083	1.92	12.167	116.82	18.250	1.98		

```
Unit Hyd Qpeak  (cms)=   0.167

PEAK FLOW       (cms)=   0.111 (i)
TIME TO PEAK    (hrs)=  12.333
RUNOFF VOLUME    (mm)=  52.454
TOTAL RAINFALL   (mm)= 108.000
RUNOFF COEFFICIENT   =   0.486

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	1.92	12.250	116.82	18.33	1.91
0.167	0.00	6.250	1.92	12.333	18.52	18.42	1.91
0.250	0.00	6.333	1.97	12.417	18.51	18.50	1.91
0.333	1.10	6.417	1.97	12.500	18.51	18.58	1.84
0.417	1.10	6.500	1.97	12.583	12.60	18.67	1.84
0.500	1.10	6.583	2.02	12.667	12.60	18.75	1.84

0.583	1.12	6.667	2.02	12.750	12.60	18.83	1.77
0.667	1.12	6.750	2.02	12.833	8.67	18.92	1.77
0.750	1.12	6.833	2.08	12.917	8.67	19.00	1.77
0.833	1.15	6.917	2.08	13.000	8.67	19.08	1.71
0.917	1.15	7.000	2.08	13.083	7.32	19.17	1.71
1.000	1.15	7.083	2.13	13.167	7.32	19.25	1.71
1.083	1.17	7.167	2.13	13.250	7.32	19.33	1.64
1.167	1.17	7.250	2.13	13.333	6.20	19.42	1.64
1.250	1.17	7.333	2.19	13.417	6.19	19.50	1.64
1.333	1.20	7.417	2.19	13.500	6.19	19.58	1.57
1.417	1.20	7.500	2.19	13.583	5.47	19.67	1.57
1.500	1.20	7.583	2.24	13.667	5.47	19.75	1.57
1.583	1.23	7.667	2.24	13.750	5.47	19.83	1.50
1.667	1.23	7.750	2.24	13.833	4.80	19.92	1.50
1.750	1.23	7.833	2.30	13.917	4.80	20.00	1.50
1.833	1.25	7.917	2.30	14.000	4.80	20.08	1.44
1.917	1.25	8.000	2.30	14.083	4.28	20.17	1.44
2.000	1.25	8.083	2.35	14.167	4.28	20.25	1.44
2.083	1.28	8.167	2.35	14.250	4.28	20.33	1.40
2.167	1.28	8.250	2.35	14.333	3.90	20.42	1.40
2.250	1.28	8.333	2.52	14.417	3.90	20.50	1.40
2.333	1.31	8.417	2.52	14.500	3.90	20.58	1.38
2.417	1.31	8.500	2.52	14.583	3.72	20.67	1.38
2.500	1.31	8.583	2.78	14.667	3.72	20.75	1.38
2.583	1.34	8.667	2.78	14.750	3.72	20.83	1.37
2.667	1.34	8.750	2.78	14.833	3.52	20.92	1.37
2.750	1.34	8.833	3.06	14.917	3.52	21.00	1.37
2.833	1.36	8.917	3.06	15.000	3.52	21.08	1.36
2.917	1.36	9.000	3.06	15.083	3.34	21.17	1.36
3.000	1.36	9.083	3.32	15.167	3.34	21.25	1.36
3.083	1.39	9.167	3.32	15.250	3.34	21.33	1.34
3.167	1.39	9.250	3.32	15.333	3.14	21.42	1.34
3.250	1.39	9.333	3.46	15.417	3.14	21.50	1.34
3.333	1.42	9.417	3.46	15.500	3.14	21.58	1.33
3.417	1.42	9.500	3.46	15.583	2.96	21.67	1.33
3.500	1.42	9.583	3.46	15.667	2.96	21.75	1.33
3.583	1.45	9.667	3.46	15.750	2.96	21.83	1.32
3.667	1.45	9.750	3.46	15.833	2.76	21.92	1.32
3.750	1.45	9.833	3.68	15.917	2.76	22.00	1.32
3.833	1.47	9.917	3.68	16.000	2.76	22.08	1.30
3.917	1.47	10.000	3.68	16.083	2.58	22.17	1.30
4.000	1.47	10.083	4.10	16.167	2.58	22.25	1.30
4.083	1.50	10.167	4.10	16.250	2.58	22.33	1.29
4.167	1.50	10.250	4.10	16.333	2.45	22.42	1.29
4.250	1.50	10.333	4.66	16.417	2.45	22.50	1.29
4.333	1.54	10.417	4.66	16.500	2.45	22.58	1.28
4.417	1.54	10.500	4.66	16.583	2.38	22.67	1.28
4.500	1.54	10.583	5.28	16.667	2.38	22.75	1.28
4.583	1.59	10.667	5.28	16.750	2.38	22.83	1.26
4.667	1.59	10.750	5.28	16.833	2.31	22.92	1.26
4.750	1.59	10.833	6.18	16.917	2.31	23.00	1.26
4.833	1.65	10.917	6.18	17.000	2.31	23.08	1.25
4.917	1.65	11.000	6.18	17.083	2.25	23.17	1.25
5.000	1.65	11.083	7.21	17.167	2.25	23.25	1.25
5.083	1.70	11.167	7.21	17.250	2.25	23.33	1.24
5.167	1.70	11.250	7.21	17.333	2.18	23.42	1.24
5.250	1.70	11.333	9.12	17.417	2.18	23.50	1.24
5.333	1.76	11.417	9.12	17.500	2.18	23.58	1.22
5.417	1.76	11.500	9.12	17.583	2.11	23.67	1.22
5.500	1.76	11.583	11.61	17.667	2.11	23.75	1.22
5.583	1.81	11.667	11.61	17.750	2.11	23.83	1.21
5.667	1.81	11.750	11.61	17.833	2.04	23.92	1.21
5.750	1.81	11.833	47.33	17.917	2.04	24.00	1.21
5.833	1.86	11.917	47.34	18.000	2.04	24.08	1.19
5.917	1.86	12.000	47.34	18.083	1.98	24.17	1.19
6.000	1.86	12.083	116.82	18.167	1.98	24.25	1.19
6.083	1.92	12.167	116.82	18.250	1.98		

Unit Hyd Qpeak (cms)= 0.078

PEAK FLOW (cms)= 0.054 (i)
TIME TO PEAK (hrs)= 12.333
RUNOFF VOLUME (mm)= 52.476
TOTAL RAINFALL (mm)= 108.000
RUNOFF COEFFICIENT = 0.486

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
-------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.66	2.66
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	1.00
Length	(m)=	188.33	40.00
Mannings n	=	0.130	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.92	12.250	116.82	18.33	1.91
0.167	0.00	6.250	1.92	12.333	18.52	18.42	1.91
0.250	0.00	6.333	1.97	12.417	18.51	18.50	1.91
0.333	1.10	6.417	1.97	12.500	18.51	18.58	1.84
0.417	1.10	6.500	1.97	12.583	12.60	18.67	1.84
0.500	1.10	6.583	2.02	12.667	12.60	18.75	1.84
0.583	1.12	6.667	2.02	12.750	12.60	18.83	1.77

```
 0.667    1.12 | 6.750    2.02 |12.833    8.67 | 18.92    1.77
 0.750    1.12 | 6.833    2.08 |12.917    8.67 | 19.00    1.77
 0.833    1.15 | 6.917    2.08 |13.000    8.67 | 19.08    1.71
 0.917    1.15 | 7.000    2.08 |13.083    7.32 | 19.17    1.71
 1.000    1.15 | 7.083    2.13 |13.167    7.32 | 19.25    1.71
 1.083    1.17 | 7.167    2.13 |13.250    7.32 | 19.33    1.64
 1.167    1.17 | 7.250    2.13 |13.333    6.20 | 19.42    1.64
 1.250    1.17 | 7.333    2.19 |13.417    6.19 | 19.50    1.64
 1.333    1.20 | 7.417    2.19 |13.500    6.19 | 19.58    1.57
 1.417    1.20 | 7.500    2.19 |13.583    5.47 | 19.67    1.57
 1.500    1.20 | 7.583    2.24 |13.667    5.47 | 19.75    1.57
 1.583    1.23 | 7.667    2.24 |13.750    5.47 | 19.83    1.50
 1.667    1.23 | 7.750    2.24 |13.833    4.80 | 19.92    1.50
 1.750    1.23 | 7.833    2.30 |13.917    4.80 | 20.00    1.50
 1.833    1.25 | 7.917    2.30 |14.000    4.80 | 20.08    1.44
 1.917    1.25 | 8.000    2.30 |14.083    4.28 | 20.17    1.44
 2.000    1.25 | 8.083    2.35 |14.167    4.28 | 20.25    1.44
 2.083    1.28 | 8.167    2.35 |14.250    4.28 | 20.33    1.40
 2.167    1.28 | 8.250    2.35 |14.333    3.90 | 20.42    1.40
 2.250    1.28 | 8.333    2.52 |14.417    3.90 | 20.50    1.40
 2.333    1.31 | 8.417    2.52 |14.500    3.90 | 20.58    1.38
 2.417    1.31 | 8.500    2.52 |14.583    3.72 | 20.67    1.38
 2.500    1.31 | 8.583    2.78 |14.667    3.72 | 20.75    1.38
 2.583    1.34 | 8.667    2.78 |14.750    3.72 | 20.83    1.37
 2.667    1.34 | 8.750    2.78 |14.833    3.52 | 20.92    1.37
 2.750    1.34 | 8.833    3.06 |14.917    3.52 | 21.00    1.37
 2.833    1.36 | 8.917    3.06 |15.000    3.52 | 21.08    1.36
 2.917    1.36 | 9.000    3.06 |15.083    3.34 | 21.17    1.36
 3.000    1.36 | 9.083    3.32 |15.167    3.34 | 21.25    1.36
 3.083    1.39 | 9.167    3.32 |15.250    3.34 | 21.33    1.34
 3.167    1.39 | 9.250    3.32 |15.333    3.14 | 21.42    1.34
 3.250    1.39 | 9.333    3.46 |15.417    3.14 | 21.50    1.34
 3.333    1.42 | 9.417    3.46 |15.500    3.14 | 21.58    1.33
 3.417    1.42 | 9.500    3.46 |15.583    2.96 | 21.67    1.33
 3.500    1.42 | 9.583    3.46 |15.667    2.96 | 21.75    1.33
 3.583    1.45 | 9.667    3.46 |15.750    2.96 | 21.83    1.32
 3.667    1.45 | 9.750    3.46 |15.833    2.76 | 21.92    1.32
 3.750    1.45 | 9.833    3.68 |15.917    2.76 | 22.00    1.32
 3.833    1.47 | 9.917    3.68 |16.000    2.76 | 22.08    1.30
 3.917    1.47 |10.000    3.68 |16.083    2.58 | 22.17    1.30
 4.000    1.47 |10.083    4.10 |16.167    2.58 | 22.25    1.30
 4.083    1.50 |10.167    4.10 |16.250    2.58 | 22.33    1.29
 4.167    1.50 |10.250    4.10 |16.333    2.45 | 22.42    1.29
 4.250    1.50 |10.333    4.66 |16.417    2.45 | 22.50    1.29
 4.333    1.54 |10.417    4.66 |16.500    2.45 | 22.58    1.28
 4.417    1.54 |10.500    4.66 |16.583    2.38 | 22.67    1.28
 4.500    1.54 |10.583    5.28 |16.667    2.38 | 22.75    1.28
 4.583    1.59 |10.667    5.28 |16.750    2.38 | 22.83    1.26
 4.667    1.59 |10.750    5.28 |16.833    2.31 | 22.92    1.26
 4.750    1.59 |10.833    6.18 |16.917    2.31 | 23.00    1.26
 4.833    1.65 |10.917    6.18 |17.000    2.31 | 23.08    1.25
 4.917    1.65 |11.000    6.18 |17.083    2.25 | 23.17    1.25
 5.000    1.65 |11.083    7.21 |17.167    2.25 | 23.25    1.25
 5.083    1.70 |11.167    7.21 |17.250    2.25 | 23.33    1.24
 5.167    1.70 |11.250    7.21 |17.333    2.18 | 23.42    1.24
 5.250    1.70 |11.333    9.12 |17.417    2.18 | 23.50    1.24
 5.333    1.76 |11.417    9.12 |17.500    2.18 | 23.58    1.22
 5.417    1.76 |11.500    9.12 |17.583    2.11 | 23.67    1.22
 5.500    1.76 |11.583   11.61 |17.667    2.11 | 23.75    1.22
 5.583    1.81 |11.667   11.61 |17.750    2.11 | 23.83    1.21
 5.667    1.81 |11.750   11.61 |17.833    2.04 | 23.92    1.21
 5.750    1.81 |11.833   47.33 |17.917    2.04 | 24.00    1.21
 5.833    1.86 |11.917   47.34 |18.000    2.04 | 24.08    1.19
 5.917    1.86 |12.000   47.34 |18.083    1.98 | 24.17    1.19
 6.000    1.86 |12.083  116.82 |18.167    1.98 | 24.25    1.19
 6.083    1.92 |12.167  116.82 |18.250    1.98 |

     Max.Eff.Inten.(mm/hr)=     116.82        77.14
                over (min)       15.00        25.00
     Storage Coeff.  (min)=      13.97 (ii)   23.61 (ii)
     Unit Hyd. Tpeak (min)=      15.00        25.00
     Unit Hyd. peak  (cms)=       0.08         0.05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.41         0.25         0.611 (iii)
     TIME TO PEAK    (hrs)=      12.33        12.50         12.42
     RUNOFF VOLUME    (mm)=     107.00        45.21         66.84
     TOTAL RAINFALL   (mm)=     108.00       108.00        108.00
     RUNOFF COEFFICIENT   =       0.99         0.42          0.62


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                 TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
```

hrs	mm/hr	hrs	mm/hr	' hrs	mm/hr	hrs	mm/hr
0.083	0.00	6.167	1.92	12.250	116.82	18.33	1.91
0.167	0.00	6.250	1.92	12.333	18.52	18.42	1.91
0.250	0.00	6.333	1.97	12.417	18.51	18.50	1.91
0.333	1.10	6.417	1.97	12.500	18.51	18.58	1.84
0.417	1.10	6.500	1.97	12.583	12.60	18.67	1.84
0.500	1.10	6.583	2.02	12.667	12.60	18.75	1.84
0.583	1.12	6.667	2.02	12.750	12.60	18.83	1.77
0.667	1.12	6.750	2.02	12.833	8.67	18.92	1.77
0.750	1.12	6.833	2.08	12.917	8.67	19.00	1.77
0.833	1.15	6.917	2.08	13.000	8.67	19.08	1.71
0.917	1.15	7.000	2.08	13.083	7.32	19.17	1.71
1.000	1.15	7.083	2.13	13.167	7.32	19.25	1.71
1.083	1.17	7.167	2.13	13.250	7.32	19.33	1.64
1.167	1.17	7.250	2.13	13.333	6.20	19.42	1.64
1.250	1.17	7.333	2.19	13.417	6.19	19.50	1.64
1.333	1.20	7.417	2.19	13.500	6.19	19.58	1.57
1.417	1.20	7.500	2.19	13.583	5.47	19.67	1.57
1.500	1.20	7.583	2.24	13.667	5.47	19.75	1.57
1.583	1.23	7.667	2.24	13.750	5.47	19.83	1.50
1.667	1.23	7.750	2.24	13.833	4.80	19.92	1.50
1.750	1.23	7.833	2.30	13.917	4.80	20.00	1.50
1.833	1.25	7.917	2.30	14.000	4.80	20.08	1.44
1.917	1.25	8.000	2.30	14.083	4.28	20.17	1.44
2.000	1.25	8.083	2.35	14.167	4.28	20.25	1.44
2.083	1.28	8.167	2.35	14.250	4.28	20.33	1.40
2.167	1.28	8.250	2.35	14.333	3.90	20.42	1.40
2.250	1.28	8.333	2.52	14.417	3.90	20.50	1.40
2.333	1.31	8.417	2.52	14.500	3.90	20.58	1.38
2.417	1.31	8.500	2.52	14.583	3.72	20.67	1.38
2.500	1.31	8.583	2.78	14.667	3.72	20.75	1.38
2.583	1.34	8.667	2.78	14.750	3.72	20.83	1.37
2.667	1.34	8.750	2.78	14.833	3.52	20.92	1.37
2.750	1.34	8.833	3.06	14.917	3.52	21.00	1.37
2.833	1.36	8.917	3.06	15.000	3.52	21.08	1.36
2.917	1.36	9.000	3.06	15.083	3.34	21.17	1.36
3.000	1.36	9.083	3.32	15.167	3.34	21.25	1.36
3.083	1.39	9.167	3.32	15.250	3.34	21.33	1.34
3.167	1.39	9.250	3.32	15.333	3.14	21.42	1.34
3.250	1.39	9.333	3.46	15.417	3.14	21.50	1.34
3.333	1.42	9.417	3.46	15.500	3.14	21.58	1.33
3.417	1.42	9.500	3.46	15.583	2.96	21.67	1.33
3.500	1.42	9.583	3.46	15.667	2.96	21.75	1.33
3.583	1.45	9.667	3.46	15.750	2.96	21.83	1.32
3.667	1.45	9.750	3.46	15.833	2.76	21.92	1.32
3.750	1.45	9.833	3.68	15.917	2.76	22.00	1.32
3.833	1.47	9.917	3.68	16.000	2.76	22.08	1.30
3.917	1.47	10.000	3.68	16.083	2.58	22.17	1.30
4.000	1.47	10.083	4.10	16.167	2.58	22.25	1.30
4.083	1.50	10.167	4.10	16.250	2.58	22.33	1.29
4.167	1.50	10.250	4.10	16.333	2.45	22.42	1.29
4.250	1.50	10.333	4.66	16.417	2.45	22.50	1.29
4.333	1.54	10.417	4.66	16.500	2.45	22.58	1.28
4.417	1.54	10.500	4.66	16.583	2.38	22.67	1.28
4.500	1.54	10.583	5.28	16.667	2.38	22.75	1.28
4.583	1.59	10.667	5.28	16.750	2.38	22.83	1.26
4.667	1.59	10.750	5.28	16.833	2.31	22.92	1.26
4.750	1.59	10.833	6.18	16.917	2.31	23.00	1.26
4.833	1.65	10.917	6.18	17.000	2.31	23.08	1.25
4.917	1.65	11.000	6.18	17.083	2.25	23.17	1.25
5.000	1.65	11.083	7.21	17.167	2.25	23.25	1.25
5.083	1.70	11.167	7.21	17.250	2.25	23.33	1.24
5.167	1.70	11.250	7.21	17.333	2.18	23.42	1.24
5.250	1.70	11.333	9.12	17.417	2.18	23.50	1.24
5.333	1.76	11.417	9.12	17.500	2.18	23.58	1.22
5.417	1.76	11.500	9.12	17.583	2.11	23.67	1.22
5.500	1.76	11.583	11.61	17.667	2.11	23.75	1.22
5.583	1.81	11.667	11.61	17.750	2.11	23.83	1.21
5.667	1.81	11.750	11.61	17.833	2.04	23.92	1.21
5.750	1.81	11.833	47.33	17.917	2.04	24.00	1.21
5.833	1.86	11.917	47.34	18.000	2.04	24.08	1.19
5.917	1.86	12.000	47.34	18.083	1.98	24.17	1.19
6.000	1.86	12.083	116.82	18.167	1.98	24.25	1.19
6.083	1.92	12.167	116.82	18.250	1.98		

```
     Max.Eff.Inten.(mm/hr)=     116.82        77.14
                over (min)       5.00        15.00
     Storage Coeff.  (min)=      3.08 (ii)   10.91 (ii)
     Unit Hyd. Tpeak (min)=      5.00        15.00
     Unit Hyd. peak  (cms)=      0.27         0.09
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.39         0.25          0.606 (iii)
     TIME TO PEAK    (hrs)=     12.25        12.33         12.25
     RUNOFF VOLUME    (mm)=    107.00        45.21         66.84
     TOTAL RAINFALL   (mm)=    108.00       108.00        108.00
     RUNOFF COEFFICIENT   =      0.99         0.42          0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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(  0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200     0.1300
                          0.1100     0.0700   |   0.0000     0.0000
```

```
                         AREA     QPEAK     TPEAK       R.V.
                         (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.606     12.25      66.84
   OUTFLOW: ID= 1 (  0029)      3.430      0.142     12.67      66.79

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.39
                   TIME SHIFT OF PEAK FLOW         (min)= 25.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0874

------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.22

        NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                                  ---- TRANSFORMED HYETOGRAPH ----
                   TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                    hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                  0.083    0.00 | 6.167    1.92 |12.250  116.82 | 18.33    1.91
                  0.167    0.00 | 6.250    1.92 |12.333   18.52 | 18.42    1.91
                  0.250    0.00 | 6.333    1.97 |12.417   18.51 | 18.50    1.91
                  0.333    1.10 | 6.417    1.97 |12.500   18.51 | 18.58    1.84
                  0.417    1.10 | 6.500    1.97 |12.583   12.60 | 18.67    1.84
                  0.500    1.10 | 6.583    2.02 |12.667   12.60 | 18.75    1.84
                  0.583    1.12 | 6.667    2.02 |12.750   12.60 | 18.83    1.77
                  0.667    1.12 | 6.750    2.02 |12.833    8.67 | 18.92    1.77
                  0.750    1.12 | 6.833    2.08 |12.917    8.67 | 19.00    1.77
                  0.833    1.15 | 6.917    2.08 |13.000    8.67 | 19.08    1.71
                  0.917    1.15 | 7.000    2.08 |13.083    7.32 | 19.17    1.71
                  1.000    1.15 | 7.083    2.13 |13.167    7.32 | 19.25    1.71
                  1.083    1.17 | 7.167    2.13 |13.250    7.32 | 19.33    1.64
                  1.167    1.17 | 7.250    2.13 |13.333    6.20 | 19.42    1.64
                  1.250    1.17 | 7.333    2.19 |13.417    6.19 | 19.50    1.64
                  1.333    1.20 | 7.417    2.19 |13.500    6.19 | 19.58    1.57
                  1.417    1.20 | 7.500    2.19 |13.583    5.47 | 19.67    1.57
                  1.500    1.20 | 7.583    2.24 |13.667    5.47 | 19.75    1.57
                  1.583    1.23 | 7.667    2.24 |13.750    5.47 | 19.83    1.50
                  1.667    1.23 | 7.750    2.24 |13.833    4.80 | 19.92    1.50
                  1.750    1.23 | 7.833    2.30 |13.917    4.80 | 20.00    1.50
                  1.833    1.25 | 7.917    2.30 |14.000    4.80 | 20.08    1.44
                  1.917    1.25 | 8.000    2.30 |14.083    4.28 | 20.17    1.44
                  2.000    1.25 | 8.083    2.35 |14.167    4.28 | 20.25    1.44
                  2.083    1.28 | 8.167    2.35 |14.250    4.28 | 20.33    1.40
                  2.167    1.28 | 8.250    2.35 |14.333    3.90 | 20.42    1.40
                  2.250    1.28 | 8.333    2.52 |14.417    3.90 | 20.50    1.40
                  2.333    1.31 | 8.417    2.52 |14.500    3.90 | 20.58    1.38
                  2.417    1.31 | 8.500    2.52 |14.583    3.72 | 20.67    1.38
                  2.500    1.31 | 8.583    2.78 |14.667    3.72 | 20.75    1.38
                  2.583    1.34 | 8.667    2.78 |14.750    3.72 | 20.83    1.37
                  2.667    1.34 | 8.750    2.78 |14.833    3.52 | 20.92    1.37
                  2.750    1.34 | 8.833    3.06 |14.917    3.52 | 21.00    1.37
                  2.833    1.36 | 8.917    3.06 |15.000    3.52 | 21.08    1.36
                  2.917    1.36 | 9.000    3.06 |15.083    3.34 | 21.17    1.36
                  3.000    1.36 | 9.083    3.32 |15.167    3.34 | 21.25    1.36
                  3.083    1.39 | 9.167    3.32 |15.250    3.34 | 21.33    1.34
                  3.167    1.39 | 9.250    3.32 |15.333    3.14 | 21.42    1.34
                  3.250    1.39 | 9.333    3.46 |15.417    3.14 | 21.50    1.34
                  3.333    1.42 | 9.417    3.46 |15.500    3.14 | 21.58    1.33
                  3.417    1.42 | 9.500    3.46 |15.583    2.96 | 21.67    1.33
                  3.500    1.42 | 9.583    3.46 |15.667    2.96 | 21.75    1.33
                  3.583    1.45 | 9.667    3.46 |15.750    2.96 | 21.83    1.32
                  3.667    1.45 | 9.750    3.46 |15.833    2.76 | 21.92    1.32
                  3.750    1.45 | 9.833    3.68 |15.917    2.76 | 22.00    1.32
                  3.833    1.47 | 9.917    3.68 |16.000    2.76 | 22.08    1.30
                  3.917    1.47 |10.000    3.68 |16.083    2.58 | 22.17    1.30
                  4.000    1.47 |10.083    4.10 |16.167    2.58 | 22.25    1.30
                  4.083    1.50 |10.167    4.10 |16.250    2.58 | 22.33    1.29
                  4.167    1.50 |10.250    4.10 |16.333    2.45 | 22.42    1.29
                  4.250    1.50 |10.333    4.66 |16.417    2.45 | 22.50    1.29
                  4.333    1.54 |10.417    4.66 |16.500    2.45 | 22.58    1.28
                  4.417    1.54 |10.500    4.66 |16.583    2.38 | 22.67    1.28
                  4.500    1.54 |10.583    5.28 |16.667    2.38 | 22.75    1.28
                  4.583    1.59 |10.667    5.28 |16.750    2.38 | 22.83    1.26
                  4.667    1.59 |10.750    5.28 |16.833    2.31 | 22.92    1.26
                  4.750    1.59 |10.833    6.18 |16.917    2.31 | 23.00    1.26
                  4.833    1.65 |10.917    6.18 |17.000    2.31 | 23.08    1.25
                  4.917    1.65 |11.000    6.18 |17.083    2.25 | 23.17    1.25
                  5.000    1.65 |11.083    7.21 |17.167    2.25 | 23.25    1.25
                  5.083    1.70 |11.167    7.21 |17.250    2.25 | 23.33    1.24
                  5.167    1.70 |11.250    7.21 |17.333    2.18 | 23.42    1.24
                  5.250    1.70 |11.333    9.12 |17.417    2.18 | 23.50    1.24
                  5.333    1.76 |11.417    9.12 |17.500    2.18 | 23.58    1.22
                  5.417    1.76 |11.500    9.12 |17.583    2.11 | 23.67    1.22
                  5.500    1.76 |11.583   11.61 |17.667    2.11 | 23.75    1.22
                  5.583    1.81 |11.667   11.61 |17.750    2.11 | 23.83    1.21
                  5.667    1.81 |11.750   11.61 |17.833    2.04 | 23.92    1.21
                  5.750    1.81 |11.833   47.33 |17.917    2.04 | 24.00    1.21
                  5.833    1.86 |11.917   47.34 |18.000    2.04 | 24.08    1.19
                  5.917    1.86 |12.000   47.34 |18.083    1.98 | 24.17    1.19
                  6.000    1.86 |12.083  116.82 |18.167    1.98 | 24.25    1.19
                  6.083    1.92 |12.167  116.82 |18.250    1.98 |

      Unit Hyd Qpeak  (cms)=   0.356

      PEAK FLOW       (cms)=   0.243 (i)
      TIME TO PEAK    (hrs)=  12.333
      RUNOFF VOLUME    (mm)=  49.969
      TOTAL RAINFALL   (mm)= 108.000
      RUNOFF COEFFICIENT   =   0.463
```

```
     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0023):     0.41   0.054    12.33    52.48
      + ID2= 2 (  0029):     3.43   0.142    12.67    66.79
        ====================================================
        ID = 3 (  0007):     3.84   0.177    12.42    65.26

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.177    12.42    65.26
      + ID2= 2 (  0042):     2.05   0.243    12.33    49.97
        ====================================================
        ID = 1 (  0007):     5.89   0.415    12.33    59.94

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.415    12.33    59.94
      + ID2= 2 (  0005):     5.32   0.611    12.42    66.84
        ====================================================
        ID = 3 (  0007):    11.21   1.018    12.33    63.21

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390      0.1535
                          0.0410     0.0120   |   0.3840      0.1758
                          0.0580     0.0253   |   0.5390      0.1989
                          0.0710     0.0399   |   0.6480      0.2228
                          0.0830     0.0559   |   0.7320      0.2476
                          0.0920     0.0732   |   0.8050      0.2733
                          0.1010     0.0918   |   0.8710      0.2998
                          0.2130     0.1116   |   0.9320      0.3263
```

```
                          0.2860     0.1321   |   0.9880      0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210     1.018     12.33      63.21
   OUTFLOW: ID= 1 (  0008)     11.210     0.452     12.92      63.21

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 44.44
                   TIME SHIFT OF PEAK FLOW         (min)= 35.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1861

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.111    12.33    52.45
      + ID2= 2 (  0008):    11.21   0.452    12.92    63.21
        ====================================================
        ID = 3 (  0016):    12.04   0.474    12.92    62.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
*********************************************
** SIMULATION:3-5yr 24hr 15min SCS Type II **
*********************************************
--------------------
| CALIB            |
| NASHYD   (  0022)|   Area    (ha)=   0.83   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.19

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                               ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 6.167    1.23 |12.250   75.29 | 18.33    1.23
                 0.167    0.00 | 6.250    1.23 |12.333   11.93 | 18.42    1.23
                 0.250    0.00 | 6.333    1.27 |12.417   11.93 | 18.50    1.23
                 0.333    0.71 | 6.417    1.27 |12.500   11.93 | 18.58    1.19
                 0.417    0.71 | 6.500    1.27 |12.583    8.12 | 18.67    1.19
                 0.500    0.71 | 6.583    1.30 |12.667    8.12 | 18.75    1.19
                 0.583    0.72 | 6.667    1.30 |12.750    8.12 | 18.83    1.14
                 0.667    0.72 | 6.750    1.30 |12.833    5.59 | 18.92    1.14
                 0.750    0.72 | 6.833    1.34 |12.917    5.58 | 19.00    1.14
                 0.833    0.74 | 6.917    1.34 |13.000    5.58 | 19.08    1.10
                 0.917    0.74 | 7.000    1.34 |13.083    4.72 | 19.17    1.10
                 1.000    0.74 | 7.083    1.37 |13.167    4.72 | 19.25    1.10
                 1.083    0.76 | 7.167    1.37 |13.250    4.72 | 19.33    1.06
```

1.167	0.76	7.250	1.37	13.333	3.99	19.42	1.06
1.250	0.76	7.333	1.41	13.417	3.99	19.50	1.06
1.333	0.78	7.417	1.41	13.500	3.99	19.58	1.01
1.417	0.78	7.500	1.41	13.583	3.52	19.67	1.01
1.500	0.78	7.583	1.44	13.667	3.52	19.75	1.01
1.583	0.79	7.667	1.44	13.750	3.52	19.83	0.97
1.667	0.79	7.750	1.44	13.833	3.09	19.92	0.97
1.750	0.79	7.833	1.48	13.917	3.09	20.00	0.97
1.833	0.81	7.917	1.48	14.000	3.09	20.08	0.93
1.917	0.81	8.000	1.48	14.083	2.76	20.17	0.93
2.000	0.81	8.083	1.51	14.167	2.76	20.25	0.93
2.083	0.83	8.167	1.51	14.250	2.76	20.33	0.90
2.167	0.83	8.250	1.51	14.333	2.51	20.42	0.90
2.250	0.83	8.333	1.62	14.417	2.51	20.50	0.90
2.333	0.84	8.417	1.62	14.500	2.51	20.58	0.89
2.417	0.84	8.500	1.62	14.583	2.40	20.67	0.89
2.500	0.84	8.583	1.79	14.667	2.40	20.75	0.89
2.583	0.86	8.667	1.79	14.750	2.40	20.83	0.88
2.667	0.86	8.750	1.79	14.833	2.27	20.92	0.88
2.750	0.86	8.833	1.97	14.917	2.27	21.00	0.88
2.833	0.88	8.917	1.97	15.000	2.27	21.08	0.87
2.917	0.88	9.000	1.97	15.083	2.15	21.17	0.87
3.000	0.88	9.083	2.14	15.167	2.15	21.25	0.87
3.083	0.90	9.167	2.14	15.250	2.15	21.33	0.87
3.167	0.90	9.250	2.14	15.333	2.03	21.42	0.87
3.250	0.90	9.333	2.23	15.417	2.03	21.50	0.87
3.333	0.91	9.417	2.23	15.500	2.03	21.58	0.86
3.417	0.91	9.500	2.23	15.583	1.91	21.67	0.86
3.500	0.91	9.583	2.23	15.667	1.91	21.75	0.86
3.583	0.93	9.667	2.23	15.750	1.91	21.83	0.85
3.667	0.93	9.750	2.23	15.833	1.78	21.92	0.85
3.750	0.93	9.833	2.37	15.917	1.78	22.00	0.85
3.833	0.95	9.917	2.37	16.000	1.78	22.08	0.84
3.917	0.95	10.000	2.37	16.083	1.66	22.17	0.84
4.000	0.95	10.083	2.64	16.167	1.66	22.25	0.84
4.083	0.96	10.167	2.64	16.250	1.66	22.33	0.83
4.167	0.96	10.250	2.64	16.333	1.58	22.42	0.83
4.250	0.96	10.333	3.00	16.417	1.58	22.50	0.83
4.333	0.99	10.417	3.00	16.500	1.58	22.58	0.82
4.417	0.99	10.500	3.00	16.583	1.54	22.67	0.82
4.500	0.99	10.583	3.40	16.667	1.54	22.75	0.82
4.583	1.03	10.667	3.40	16.750	1.54	22.83	0.81
4.667	1.03	10.750	3.40	16.833	1.49	22.92	0.81
4.750	1.03	10.833	3.98	16.917	1.49	23.00	0.81
4.833	1.06	10.917	3.98	17.000	1.49	23.08	0.80
4.917	1.06	11.000	3.98	17.083	1.45	23.17	0.80
5.000	1.06	11.083	4.65	17.167	1.45	23.25	0.80
5.083	1.10	11.167	4.65	17.250	1.45	23.33	0.80
5.167	1.10	11.250	4.65	17.333	1.40	23.42	0.80
5.250	1.10	11.333	5.88	17.417	1.40	23.50	0.80
5.333	1.13	11.417	5.88	17.500	1.40	23.58	0.79
5.417	1.13	11.500	5.88	17.583	1.36	23.67	0.79
5.500	1.13	11.583	7.48	17.667	1.36	23.75	0.79
5.583	1.17	11.667	7.48	17.750	1.36	23.83	0.78
5.667	1.17	11.750	7.48	17.833	1.32	23.92	0.78
5.750	1.17	11.833	30.50	17.917	1.32	24.00	0.78
5.833	1.20	11.917	30.51	18.000	1.32	24.08	0.77
5.917	1.20	12.000	30.51	18.083	1.28	24.17	0.77
6.000	1.20	12.083	75.28	18.167	1.28	24.25	0.77
6.083	1.23	12.167	75.29	18.250	1.28		

```
Unit Hyd Qpeak  (cms)=   0.167

PEAK FLOW       (cms)=   0.051 (i)
TIME TO PEAK    (hrs)=  12.333
RUNOFF VOLUME    (mm)=  24.565
TOTAL RAINFALL   (mm)=  69.600
RUNOFF COEFFICIENT   =   0.353

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
--------------------
| CALIB             |
| NASHYD   (  0023)|   Area    (ha)=   0.41   Curve Number   (CN)= 75.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.20

    NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.
```

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.23	12.250	75.29	18.33	1.23
0.167	0.00	6.250	1.23	12.333	11.93	18.42	1.23
0.250	0.00	6.333	1.27	12.417	11.93	18.50	1.23
0.333	0.71	6.417	1.27	12.500	11.93	18.58	1.19
0.417	0.71	6.500	1.27	12.583	8.12	18.67	1.19
0.500	0.71	6.583	1.30	12.667	8.12	18.75	1.19
0.583	0.72	6.667	1.30	12.750	8.12	18.83	1.14
0.667	0.72	6.750	1.30	12.833	5.59	18.92	1.14
0.750	0.72	6.833	1.34	12.917	5.58	19.00	1.14
0.833	0.74	6.917	1.34	13.000	5.58	19.08	1.10
0.917	0.74	7.000	1.34	13.083	4.72	19.17	1.10
1.000	0.74	7.083	1.37	13.167	4.72	19.25	1.10
1.083	0.76	7.167	1.37	13.250	4.72	19.33	1.06
1.167	0.76	7.250	1.37	13.333	3.99	19.42	1.06
1.250	0.76	7.333	1.41	13.417	3.99	19.50	1.06
1.333	0.78	7.417	1.41	13.500	3.99	19.58	1.01
1.417	0.78	7.500	1.41	13.583	3.52	19.67	1.01
1.500	0.78	7.583	1.44	13.667	3.52	19.75	1.01
1.583	0.79	7.667	1.44	13.750	3.52	19.83	0.97
1.667	0.79	7.750	1.44	13.833	3.09	19.92	0.97

1.750	0.79	7.833	1.48	13.917	3.09	20.00	0.97
1.833	0.81	7.917	1.48	14.000	3.09	20.08	0.93
1.917	0.81	8.000	1.48	14.083	2.76	20.17	0.93
2.000	0.81	8.083	1.51	14.167	2.76	20.25	0.93
2.083	0.83	8.167	1.51	14.250	2.76	20.33	0.90
2.167	0.83	8.250	1.51	14.333	2.51	20.42	0.90
2.250	0.83	8.333	1.62	14.417	2.51	20.50	0.90
2.333	0.84	8.417	1.62	14.500	2.51	20.58	0.89
2.417	0.84	8.500	1.62	14.583	2.40	20.67	0.89
2.500	0.84	8.583	1.79	14.667	2.40	20.75	0.89
2.583	0.86	8.667	1.79	14.750	2.40	20.83	0.88
2.667	0.86	8.750	1.79	14.833	2.27	20.92	0.88
2.750	0.86	8.833	1.97	14.917	2.27	21.00	0.88
2.833	0.88	8.917	1.97	15.000	2.27	21.08	0.87
2.917	0.88	9.000	1.97	15.083	2.15	21.17	0.87
3.000	0.88	9.083	2.14	15.167	2.15	21.25	0.87
3.083	0.90	9.167	2.14	15.250	2.15	21.33	0.87
3.167	0.90	9.250	2.14	15.333	2.03	21.42	0.87
3.250	0.90	9.333	2.23	15.417	2.03	21.50	0.87
3.333	0.91	9.417	2.23	15.500	2.03	21.58	0.86
3.417	0.91	9.500	2.23	15.583	1.91	21.67	0.86
3.500	0.91	9.583	2.23	15.667	1.91	21.75	0.86
3.583	0.93	9.667	2.23	15.750	1.91	21.83	0.85
3.667	0.93	9.750	2.23	15.833	1.78	21.92	0.85
3.750	0.93	9.833	2.37	15.917	1.78	22.00	0.85
3.833	0.95	9.917	2.37	16.000	1.78	22.08	0.84
3.917	0.95	10.000	2.37	16.083	1.66	22.17	0.84
4.000	0.95	10.083	2.64	16.167	1.66	22.25	0.84
4.083	0.96	10.167	2.64	16.250	1.66	22.33	0.83
4.167	0.96	10.250	2.64	16.333	1.58	22.42	0.83
4.250	0.96	10.333	3.00	16.417	1.58	22.50	0.83
4.333	0.99	10.417	3.00	16.500	1.58	22.58	0.82
4.417	0.99	10.500	3.00	16.583	1.54	22.67	0.82
4.500	0.99	10.583	3.40	16.667	1.54	22.75	0.82
4.583	1.03	10.667	3.40	16.750	1.54	22.83	0.81
4.667	1.03	10.750	3.40	16.833	1.49	22.92	0.81
4.750	1.03	10.833	3.98	16.917	1.49	23.00	0.81
4.833	1.06	10.917	3.98	17.000	1.49	23.08	0.80
4.917	1.06	11.000	3.98	17.083	1.45	23.17	0.80
5.000	1.06	11.083	4.65	17.167	1.45	23.25	0.80
5.083	1.10	11.167	4.65	17.250	1.45	23.33	0.80
5.167	1.10	11.250	4.65	17.333	1.40	23.42	0.80
5.250	1.10	11.333	5.88	17.417	1.40	23.50	0.80
5.333	1.13	11.417	5.88	17.500	1.40	23.58	0.79
5.417	1.13	11.500	5.88	17.583	1.36	23.67	0.79
5.500	1.13	11.583	7.48	17.667	1.36	23.75	0.79
5.583	1.17	11.667	7.48	17.750	1.36	23.83	0.78
5.667	1.17	11.750	7.48	17.833	1.32	23.92	0.78
5.750	1.17	11.833	30.50	17.917	1.32	24.00	0.78
5.833	1.20	11.917	30.51	18.000	1.32	24.08	0.77
5.917	1.20	12.000	30.51	18.083	1.28	24.17	0.77
6.000	1.20	12.083	75.28	18.167	1.28	24.25	0.77

6.083	1.23	12.167	75.29	18.250	1.28		

Unit Hyd Qpeak (cms)= 0.078

PEAK FLOW (cms)= 0.025 (i)
TIME TO PEAK (hrs)= 12.333
RUNOFF VOLUME (mm)= 24.574
TOTAL RAINFALL (mm)= 69.600
RUNOFF COEFFICIENT = 0.353

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD ( 0005)|   Area    (ha)=   5.32
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.66	2.66
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	1.00
Length	(m)=	188.33	40.00
Mannings n	=	0.130	0.250

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	' TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.23	12.250	75.29	18.33	1.23
0.167	0.00	6.250	1.23	12.333	11.93	18.42	1.23
0.250	0.00	6.333	1.27	12.417	11.93	18.50	1.23
0.333	0.71	6.417	1.27	12.500	11.93	18.58	1.19
0.417	0.71	6.500	1.27	12.583	8.12	18.67	1.19
0.500	0.71	6.583	1.30	12.667	8.12	18.75	1.19
0.583	0.72	6.667	1.30	12.750	8.12	18.83	1.14
0.667	0.72	6.750	1.30	12.833	5.59	18.92	1.14
0.750	0.72	6.833	1.34	12.917	5.58	19.00	1.14
0.833	0.74	6.917	1.34	13.000	5.58	19.08	1.10
0.917	0.74	7.000	1.34	13.083	4.72	19.17	1.10
1.000	0.74	7.083	1.37	13.167	4.72	19.25	1.10
1.083	0.76	7.167	1.37	13.250	4.72	19.33	1.06
1.167	0.76	7.250	1.37	13.333	3.99	19.42	1.06
1.250	0.76	7.333	1.41	13.417	3.99	19.50	1.06
1.333	0.78	7.417	1.41	13.500	3.99	19.58	1.01
1.417	0.78	7.500	1.41	13.583	3.52	19.67	1.01
1.500	0.78	7.583	1.44	13.667	3.52	19.75	1.01
1.583	0.79	7.667	1.44	13.750	3.52	19.83	0.97
1.667	0.79	7.750	1.44	13.833	3.09	19.92	0.97
1.750	0.79	7.833	1.48	13.917	3.09	20.00	0.97

```
1.833    0.81 | 7.917    1.48 |14.000    3.09 | 20.08    0.93
1.917    0.81 | 8.000    1.48 |14.083    2.76 | 20.17    0.93
2.000    0.81 | 8.083    1.51 |14.167    2.76 | 20.25    0.93
2.083    0.83 | 8.167    1.51 |14.250    2.76 | 20.33    0.90
2.167    0.83 | 8.250    1.51 |14.333    2.51 | 20.42    0.90
2.250    0.83 | 8.333    1.62 |14.417    2.51 | 20.50    0.90
2.333    0.84 | 8.417    1.62 |14.500    2.51 | 20.58    0.89
2.417    0.84 | 8.500    1.62 |14.583    2.40 | 20.67    0.89
2.500    0.84 | 8.583    1.79 |14.667    2.40 | 20.75    0.89
2.583    0.86 | 8.667    1.79 |14.750    2.40 | 20.83    0.88
2.667    0.86 | 8.750    1.79 |14.833    2.27 | 20.92    0.88
2.750    0.86 | 8.833    1.97 |14.917    2.27 | 21.00    0.88
2.833    0.88 | 8.917    1.97 |15.000    2.27 | 21.08    0.87
2.917    0.88 | 9.000    1.97 |15.083    2.15 | 21.17    0.87
3.000    0.88 | 9.083    2.14 |15.167    2.15 | 21.25    0.87
3.083    0.90 | 9.167    2.14 |15.250    2.15 | 21.33    0.87
3.167    0.90 | 9.250    2.14 |15.333    2.03 | 21.42    0.87
3.250    0.90 | 9.333    2.23 |15.417    2.03 | 21.50    0.87
3.333    0.91 | 9.417    2.23 |15.500    2.03 | 21.58    0.86
3.417    0.91 | 9.500    2.23 |15.583    1.91 | 21.67    0.86
3.500    0.91 | 9.583    2.23 |15.667    1.91 | 21.75    0.86
3.583    0.93 | 9.667    2.23 |15.750    1.91 | 21.83    0.85
3.667    0.93 | 9.750    2.23 |15.833    1.78 | 21.92    0.85
3.750    0.93 | 9.833    2.37 |15.917    1.78 | 22.00    0.85
3.833    0.95 | 9.917    2.37 |16.000    1.78 | 22.08    0.84
3.917    0.95 |10.000    2.37 |16.083    1.66 | 22.17    0.84
4.000    0.95 |10.083    2.64 |16.167    1.66 | 22.25    0.84
4.083    0.96 |10.167    2.64 |16.250    1.66 | 22.33    0.83
4.167    0.96 |10.250    2.64 |16.333    1.58 | 22.42    0.83
4.250    0.96 |10.333    3.00 |16.417    1.58 | 22.50    0.83
4.333    0.99 |10.417    3.00 |16.500    1.58 | 22.58    0.82
4.417    0.99 |10.500    3.00 |16.583    1.54 | 22.67    0.82
4.500    0.99 |10.583    3.40 |16.667    1.54 | 22.75    0.82
4.583    1.03 |10.667    3.40 |16.750    1.54 | 22.83    0.81
4.667    1.03 |10.750    3.40 |16.833    1.49 | 22.92    0.81
4.750    1.03 |10.833    3.98 |16.917    1.49 | 23.00    0.81
4.833    1.06 |10.917    3.98 |17.000    1.49 | 23.08    0.80
4.917    1.06 |11.000    3.98 |17.083    1.45 | 23.17    0.80
5.000    1.06 |11.083    4.65 |17.167    1.45 | 23.25    0.80
5.083    1.10 |11.167    4.65 |17.250    1.45 | 23.33    0.80
5.167    1.10 |11.250    4.65 |17.333    1.40 | 23.42    0.80
5.250    1.10 |11.333    5.88 |17.417    1.40 | 23.50    0.80
5.333    1.13 |11.417    5.88 |17.500    1.40 | 23.58    0.79
5.417    1.13 |11.500    5.88 |17.583    1.36 | 23.67    0.79
5.500    1.13 |11.583    7.48 |17.667    1.36 | 23.75    0.79
5.583    1.17 |11.667    7.48 |17.750    1.36 | 23.83    0.78
5.667    1.17 |11.750    7.48 |17.833    1.32 | 23.92    0.78
5.750    1.17 |11.833   30.50 |17.917    1.32 | 24.00    0.78
5.833    1.20 |11.917   30.51 |18.000    1.32 | 24.08    0.77
5.917    1.20 |12.000   30.51 |18.083    1.28 | 24.17    0.77
6.000    1.20 |12.083   75.28 |18.167    1.28 | 24.25    0.77
6.083    1.23 |12.167   75.29 |18.250    1.28 |
```

```
     Max.Eff.Inten.(mm/hr)=      64.09        34.25
                over (min)       20.00        35.00
     Storage Coeff.  (min)=      17.77 (ii)   31.10 (ii)
     Unit Hyd. Tpeak (min)=      20.00        35.00
     Unit Hyd. peak  (cms)=       0.06         0.03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.23         0.10          0.296 (iii)
     TIME TO PEAK    (hrs)=      12.42        12.67          12.42
     RUNOFF VOLUME    (mm)=      68.60        21.45          37.95
     TOTAL RAINFALL   (mm)=      69.60        69.60          69.60
     RUNOFF COEFFICIENT   =       0.99         0.31           0.55


       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0028)|   Area    (ha)=   3.43
|ID= 1 DT= 5.0 min |   Total Imp(%)=  50.00   Dir. Conn.(%)=  35.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       1.71         1.71
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         2.00
     Length            (m)=     151.22        40.00
     Mannings n           =      0.013        0.250

         NOTE:  RAINFALL WAS TRANSFORMED TO   5.0 MIN. TIME STEP.


                              ---- TRANSFORMED HYETOGRAPH ----
                  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                 0.083    0.00 | 6.167    1.23 |12.250   75.29 | 18.33    1.23
                 0.167    0.00 | 6.250    1.23 |12.333   11.93 | 18.42    1.23
                 0.250    0.00 | 6.333    1.27 |12.417   11.93 | 18.50    1.23
                 0.333    0.71 | 6.417    1.27 |12.500   11.93 | 18.58    1.19
                 0.417    0.71 | 6.500    1.27 |12.583    8.12 | 18.67    1.19
                 0.500    0.71 | 6.583    1.30 |12.667    8.12 | 18.75    1.19
                 0.583    0.72 | 6.667    1.30 |12.750    8.12 | 18.83    1.14
                 0.667    0.72 | 6.750    1.30 |12.833    5.59 | 18.92    1.14
                 0.750    0.72 | 6.833    1.34 |12.917    5.58 | 19.00    1.14
                 0.833    0.74 | 6.917    1.34 |13.000    5.58 | 19.08    1.10
                 0.917    0.74 | 7.000    1.34 |13.083    4.72 | 19.17    1.10
                 1.000    0.74 | 7.083    1.37 |13.167    4.72 | 19.25    1.10
                 1.083    0.76 | 7.167    1.37 |13.250    4.72 | 19.33    1.06
```

```
 1.167    0.76 | 7.250    1.37 |13.333    3.99 | 19.42    1.06
 1.250    0.76 | 7.333    1.41 |13.417    3.99 | 19.50    1.06
 1.333    0.78 | 7.417    1.41 |13.500    3.99 | 19.58    1.01
 1.417    0.78 | 7.500    1.41 |13.583    3.52 | 19.67    1.01
 1.500    0.78 | 7.583    1.44 |13.667    3.52 | 19.75    1.01
 1.583    0.79 | 7.667    1.44 |13.750    3.52 | 19.83    0.97
 1.667    0.79 | 7.750    1.44 |13.833    3.09 | 19.92    0.97
 1.750    0.79 | 7.833    1.48 |13.917    3.09 | 20.00    0.97
 1.833    0.81 | 7.917    1.48 |14.000    3.09 | 20.08    0.93
 1.917    0.81 | 8.000    1.48 |14.083    2.76 | 20.17    0.93
 2.000    0.81 | 8.083    1.51 |14.167    2.76 | 20.25    0.93
 2.083    0.83 | 8.167    1.51 |14.250    2.76 | 20.33    0.90
 2.167    0.83 | 8.250    1.51 |14.333    2.51 | 20.42    0.90
 2.250    0.83 | 8.333    1.62 |14.417    2.51 | 20.50    0.90
 2.333    0.84 | 8.417    1.62 |14.500    2.51 | 20.58    0.89
 2.417    0.84 | 8.500    1.62 |14.583    2.40 | 20.67    0.89
 2.500    0.84 | 8.583    1.79 |14.667    2.40 | 20.75    0.89
 2.583    0.86 | 8.667    1.79 |14.750    2.40 | 20.83    0.88
 2.667    0.86 | 8.750    1.79 |14.833    2.27 | 20.92    0.88
 2.750    0.86 | 8.833    1.97 |14.917    2.27 | 21.00    0.88
 2.833    0.88 | 8.917    1.97 |15.000    2.27 | 21.08    0.87
 2.917    0.88 | 9.000    1.97 |15.083    2.15 | 21.17    0.87
 3.000    0.88 | 9.083    2.14 |15.167    2.15 | 21.25    0.87
 3.083    0.90 | 9.167    2.14 |15.250    2.15 | 21.33    0.87
 3.167    0.90 | 9.250    2.14 |15.333    2.03 | 21.42    0.87
 3.250    0.90 | 9.333    2.23 |15.417    2.03 | 21.50    0.87
 3.333    0.91 | 9.417    2.23 |15.500    2.03 | 21.58    0.86
 3.417    0.91 | 9.500    2.23 |15.583    1.91 | 21.67    0.86
 3.500    0.91 | 9.583    2.23 |15.667    1.91 | 21.75    0.86
 3.583    0.93 | 9.667    2.23 |15.750    1.91 | 21.83    0.85
 3.667    0.93 | 9.750    2.23 |15.833    1.78 | 21.92    0.85
 3.750    0.93 | 9.833    2.37 |15.917    1.78 | 22.00    0.85
 3.833    0.95 | 9.917    2.37 |16.000    1.78 | 22.08    0.84
 3.917    0.95 |10.000    2.37 |16.083    1.66 | 22.17    0.84
 4.000    0.95 |10.083    2.64 |16.167    1.66 | 22.25    0.84
 4.083    0.96 |10.167    2.64 |16.250    1.66 | 22.33    0.83
 4.167    0.96 |10.250    2.64 |16.333    1.58 | 22.42    0.83
 4.250    0.96 |10.333    3.00 |16.417    1.58 | 22.50    0.83
 4.333    0.99 |10.417    3.00 |16.500    1.58 | 22.58    0.82
 4.417    0.99 |10.500    3.00 |16.583    1.54 | 22.67    0.82
 4.500    0.99 |10.583    3.40 |16.667    1.54 | 22.75    0.82
 4.583    1.03 |10.667    3.40 |16.750    1.54 | 22.83    0.81
 4.667    1.03 |10.750    3.40 |16.833    1.49 | 22.92    0.81
 4.750    1.03 |10.833    3.98 |16.917    1.49 | 23.00    0.81
 4.833    1.06 |10.917    3.98 |17.000    1.49 | 23.08    0.80
 4.917    1.06 |11.000    3.98 |17.083    1.45 | 23.17    0.80
 5.000    1.06 |11.083    4.65 |17.167    1.45 | 23.25    0.80
 5.083    1.10 |11.167    4.65 |17.250    1.45 | 23.33    0.80
 5.167    1.10 |11.250    4.65 |17.333    1.40 | 23.42    0.80
 5.250    1.10 |11.333    5.88 |17.417    1.40 | 23.50    0.80
 5.333    1.13 |11.417    5.88 |17.500    1.40 | 23.58    0.79
 5.417    1.13 |11.500    5.88 |17.583    1.36 | 23.67    0.79
                 5.500    1.13 |11.583    7.48 |17.667    1.36 | 23.75    0.79
                 5.583    1.17 |11.667    7.48 |17.750    1.36 | 23.83    0.78
                 5.667    1.17 |11.750    7.48 |17.833    1.32 | 23.92    0.78
                 5.750    1.17 |11.833   30.50 |17.917    1.32 | 24.00    0.78
                 5.833    1.20 |11.917   30.51 |18.000    1.32 | 24.08    0.77
                 5.917    1.20 |12.000   30.51 |18.083    1.28 | 24.17    0.77
                 6.000    1.20 |12.083   75.28 |18.167    1.28 | 24.25    0.77
                 6.083    1.23 |12.167   75.29 |18.250    1.28 |

     Max.Eff.Inten.(mm/hr)=      75.29        34.25
                over (min)        5.00        15.00
     Storage Coeff.  (min)=       3.67 (ii)   14.50 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.25         0.08
                                                            *TOTALS*
     PEAK FLOW       (cms)=       0.25         0.10          0.336 (iii)
     TIME TO PEAK    (hrs)=      12.25        12.33          12.25
     RUNOFF VOLUME    (mm)=      68.60        21.45          37.95
     TOTAL RAINFALL   (mm)=      69.60        69.60          69.60
     RUNOFF COEFFICIENT   =       0.99         0.31           0.55

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  59.0    Ia = Dep. 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( 0029)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.2200      0.1300
                          0.1100     0.0700   |   0.0000      0.0000

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0028)      3.430      0.336     12.25      37.95
   OUTFLOW: ID= 1 (  0029)      3.430      0.076     12.75      37.91

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 22.68
                   TIME SHIFT OF PEAK FLOW        (min)= 30.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.0486

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0042)|   Area    (ha)=   2.05   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=  10.00   # of Linear Res.(N)= 3.00
```

-------------------- U.H. Tp(hrs)= 0.22

NOTE: RAINFALL WAS TRANSFORMED TO 5.0 MIN. TIME STEP.

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	0.00	6.167	1.23	12.250	75.29	18.33	1.23
0.167	0.00	6.250	1.23	12.333	11.93	18.42	1.23
0.250	0.00	6.333	1.27	12.417	11.93	18.50	1.23
0.333	0.71	6.417	1.27	12.500	11.93	18.58	1.19
0.417	0.71	6.500	1.27	12.583	8.12	18.67	1.19
0.500	0.71	6.583	1.30	12.667	8.12	18.75	1.19
0.583	0.72	6.667	1.30	12.750	8.12	18.83	1.14
0.667	0.72	6.750	1.30	12.833	5.59	18.92	1.14
0.750	0.72	6.833	1.34	12.917	5.58	19.00	1.14
0.833	0.74	6.917	1.34	13.000	5.58	19.08	1.10
0.917	0.74	7.000	1.34	13.083	4.72	19.17	1.10
1.000	0.74	7.083	1.37	13.167	4.72	19.25	1.10
1.083	0.76	7.167	1.37	13.250	4.72	19.33	1.06
1.167	0.76	7.250	1.37	13.333	3.99	19.42	1.06
1.250	0.76	7.333	1.41	13.417	3.99	19.50	1.06
1.333	0.78	7.417	1.41	13.500	3.99	19.58	1.01
1.417	0.78	7.500	1.41	13.583	3.52	19.67	1.01
1.500	0.78	7.583	1.44	13.667	3.52	19.75	1.01
1.583	0.79	7.667	1.44	13.750	3.52	19.83	0.97
1.667	0.79	7.750	1.44	13.833	3.09	19.92	0.97
1.750	0.79	7.833	1.48	13.917	3.09	20.00	0.97
1.833	0.81	7.917	1.48	14.000	3.09	20.08	0.93
1.917	0.81	8.000	1.48	14.083	2.76	20.17	0.93
2.000	0.81	8.083	1.51	14.167	2.76	20.25	0.93
2.083	0.83	8.167	1.51	14.250	2.76	20.33	0.90
2.167	0.83	8.250	1.51	14.333	2.51	20.42	0.90
2.250	0.83	8.333	1.62	14.417	2.51	20.50	0.90
2.333	0.84	8.417	1.62	14.500	2.51	20.58	0.89
2.417	0.84	8.500	1.62	14.583	2.40	20.67	0.89
2.500	0.84	8.583	1.79	14.667	2.40	20.75	0.89
2.583	0.86	8.667	1.79	14.750	2.40	20.83	0.88
2.667	0.86	8.750	1.79	14.833	2.27	20.92	0.88
2.750	0.86	8.833	1.97	14.917	2.27	21.00	0.88
2.833	0.88	8.917	1.97	15.000	2.27	21.08	0.87
2.917	0.88	9.000	1.97	15.083	2.15	21.17	0.87
3.000	0.88	9.083	2.14	15.167	2.15	21.25	0.87
3.083	0.90	9.167	2.14	15.250	2.15	21.33	0.87
3.167	0.90	9.250	2.14	15.333	2.03	21.42	0.87
3.250	0.90	9.333	2.23	15.417	2.03	21.50	0.87
3.333	0.91	9.417	2.23	15.500	2.03	21.58	0.86
3.417	0.91	9.500	2.23	15.583	1.91	21.67	0.86
3.500	0.91	9.583	2.23	15.667	1.91	21.75	0.86
3.583	0.93	9.667	2.23	15.750	1.91	21.83	0.85
3.667	0.93	9.750	2.23	15.833	1.78	21.92	0.85
3.750	0.93	9.833	2.37	15.917	1.78	22.00	0.85
3.833	0.95	9.917	2.37	16.000	1.78	22.08	0.84
3.917	0.95	10.000	2.37	16.083	1.66	22.17	0.84
4.000	0.95	10.083	2.64	16.167	1.66	22.25	0.84
4.083	0.96	10.167	2.64	16.250	1.66	22.33	0.83
4.167	0.96	10.250	2.64	16.333	1.58	22.42	0.83
4.250	0.96	10.333	3.00	16.417	1.58	22.50	0.83
4.333	0.99	10.417	3.00	16.500	1.58	22.58	0.82
4.417	0.99	10.500	3.00	16.583	1.54	22.67	0.82
4.500	0.99	10.583	3.40	16.667	1.54	22.75	0.82
4.583	1.03	10.667	3.40	16.750	1.54	22.83	0.81
4.667	1.03	10.750	3.40	16.833	1.49	22.92	0.81
4.750	1.03	10.833	3.98	16.917	1.49	23.00	0.81
4.833	1.06	10.917	3.98	17.000	1.49	23.08	0.80
4.917	1.06	11.000	3.98	17.083	1.45	23.17	0.80
5.000	1.06	11.083	4.65	17.167	1.45	23.25	0.80
5.083	1.10	11.167	4.65	17.250	1.45	23.33	0.80
5.167	1.10	11.250	4.65	17.333	1.40	23.42	0.80
5.250	1.10	11.333	5.88	17.417	1.40	23.50	0.80
5.333	1.13	11.417	5.88	17.500	1.40	23.58	0.79
5.417	1.13	11.500	5.88	17.583	1.36	23.67	0.79
5.500	1.13	11.583	7.48	17.667	1.36	23.75	0.79
5.583	1.17	11.667	7.48	17.750	1.36	23.83	0.78
5.667	1.17	11.750	7.48	17.833	1.32	23.92	0.78
5.750	1.17	11.833	30.50	17.917	1.32	24.00	0.78
5.833	1.20	11.917	30.51	18.000	1.32	24.08	0.77
5.917	1.20	12.000	30.51	18.083	1.28	24.17	0.77
6.000	1.20	12.083	75.28	18.167	1.28	24.25	0.77
6.083	1.23	12.167	75.29	18.250	1.28		

```
Unit Hyd Qpeak  (cms)=   0.356

PEAK FLOW       (cms)=   0.109 (i)
TIME TO PEAK    (hrs)=  12.333
RUNOFF VOLUME    (mm)=  23.104
TOTAL RAINFALL   (mm)=  69.600
RUNOFF COEFFICIENT   =   0.332

(i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------
| ADD HYD  (  0007)|
|  1 +  2 =  3    |        AREA    QPEAK    TPEAK     R.V.
--------------------       (ha)    (cms)    (hrs)     (mm)
     ID1= 1 (  0023):      0.41   0.025    12.33    24.57
   + ID2= 2 (  0029):      3.43   0.076    12.75    37.91
     ==================================================
     ID = 3 (  0007):      3.84   0.093    12.42    36.48

NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0007):     3.84   0.093    12.42    36.48
      + ID2= 2 (  0042):     2.05   0.109    12.33    23.10
        ====================================================
        ID = 1 (  0007):     5.89   0.200    12.33    31.83

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0007):     5.89   0.200    12.33    31.83
      + ID2= 2 (  0005):     5.32   0.296    12.42    37.95
        ====================================================
        ID = 3 (  0007):    11.21   0.491    12.42    34.73

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0008)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT=  5.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.3390      0.1535
                          0.0410     0.0120   |   0.3840      0.1758
                          0.0580     0.0253   |   0.5390      0.1989
                          0.0710     0.0399   |   0.6480      0.2228
                          0.0830     0.0559   |   0.7320      0.2476
                          0.0920     0.0732   |   0.8050      0.2733
                          0.1010     0.0918   |   0.8710      0.2998
                          0.2130     0.1116   |   0.9320      0.3263
                          0.2860     0.1321   |   0.9880      0.3528

                                AREA     QPEAK     TPEAK       R.V.
                                (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     11.210      0.491     12.42      34.73
   OUTFLOW: ID= 1 (  0008)     11.210      0.199     13.25      34.73

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)= 40.60
                   TIME SHIFT OF PEAK FLOW         (min)= 50.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=  0.1093

-------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0016)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0022):     0.83   0.051    12.33    24.56
      + ID2= 2 (  0008):    11.21   0.199    13.25    34.73
        ====================================================
        ID = 3 (  0016):    12.04   0.207    13.17    34.03

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
-------------------------------------------------------------------------------
```

APPENDIX G

WATER BALANCE

McINTOSH PERRY

CCO-13-9668-01 - PERTHMORE SUBDIVISION - Water Balance Information - Monthly Review

The site exhibits five primary types of pervious land use / soil combinations:

	Values from Thornthwaite-Mather Table 10				Table 10 Values Applied to Site Conditions		
Pre-development / Post-development	Soil Type	Available Water (mm)	Root Zone (m)	Applicable Soil Moisture Rentention Table	Available Average Soil Depth (m)	Soil Moisture Retention Table Given Soil Depth (mm)	Values to use (mm)
Pasture overtopping sandy soils (class B soils)	Sandy Loam	150	1	150	0.6	90	100
Pasture overtopping sandy soils (class C soils)	Silty/Clay Loam	250	1	250	0.6	150	150
Forest overtopping sandy soils (class B soils)	Sandy Loam	150	2	300	0.6	180	200
Forest overtopping sandy soils (class C soils)	Silty/Clay Loam	250	1.6	400	0.6	240	250

Summary of data below:

Soil Moisture Storage	Surplus
75	398
100	391
125	387
150	384
200	380
250	377
350	373
400	371

Soil Moisture Storage Data

75mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		217	0	0	0	0	11	0	11	228
February	-8.1	0	0	54	54		271	0	0	0	0	5	0	5	276
March	-2.3	0	0	64	64		336	0	0	0	0	2	0	2	338
April	6.3	1.4	32	75	43		75	0	32	0	43	22	26	48	166
May	13.3	4.4	79	80	2		75	0	79	0	2	12	117	129	206
June	18.5	7.2	112	93	-19	-19	57	-18	111	1	0	6	59	65	122
July	21	8.8	133	92	-41	-60	33	-24	116	17	0	3	29	32	65
August	19.8	8.0	114	86	-29	-88	22	-11	97	18	0	2	15	17	39
September	15	5.3	73	90	17		39	17	73	0	0	1	7	8	47
October	8	2.0	34	86	52		75	36	34	0	17	9	4	13	105
November	1.5	0.2	5	82	77		75	0	5	0	77	43	2	45	197
December	-6.2	0	0	76	76		151	0	0	0	0	22	1	23	174
		37.4	580	944				0	545	35	138	138	260	398	

Monthly T and P from Environment Canada — Table 25 - 75mm soil moisture retention in Thornthwaite [1957]

Heat Index (I) 37.4

a: 1.06

1-1329 Gardiners Road, Kingston, ON K7P 0L8 | T. 613.542.3788 | F. 613.542.7583
info@mcintoshperry.com | www.mcintoshperry.com

100mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		241	0	0	0	0	11	0	11	252
February	-8.1	0	0	54	54		296	0	0	0	0	5	0	5	301
March	-2.3	0	0	64	64		360	0	0	0	0	2	0	2	362
April	6.3	1.4	32	75	43		100	0	32	0	43	22	26	48	191
May	13.3	4.4	79	80	2		100	0	79	0	2	12	117	129	231
June	18.5	7.2	112	93	-19	-19	82	-18	111	1	0	6	59	65	147
July	21	8.8	133	92	-41	-60	54	-28	120	13	0	3	29	32	86
August	19.8	8.0	114	86	-29	-88	40	-14	100	15	0	2	15	17	57
September	15	5.3	73	90	17		57	17	73	0	0	1	7	8	65
October	8	2.0	34	86	52		100	43	34	0	10	5	4	9	119
November	1.5	0.2	5	82	77		100	0	5	0	77	41	2	43	220
December	-6.2	0	0	76	76		176	0	0	0	0	21	1	22	198
		37.4	580	944				0	552	28	131	131	260	391	

Monthly T and P from Environment Canada

Table 26 - 100mm soil moisture retention in Thornthwaite [1957]

Heat Index (I)

a: 37.4

125mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		267	0	0	0	0	10	0	10	277
February	-8.1	0	0	54	54		321	0	0	0	0	5	0	5	326
March	-2.3	0	0	64	64		386	0	0	0	0	2	0	2	388
April	6.3	1.4	32	75	43		125	0	32	0	43	23	26	49	217
May	13.3	4.4	79	80	2		125	0	79	0	2	12	117	129	256
June	18.5	7.2	112	93	-19	-19	106	-19	112	0	0	6	59	65	171
July	21	8.8	133	92	-41	-60	76	-30	122	11	0	3	29	32	108
August	19.8	8.0	114	86	-29	-88	61	-15	101	14	0	2	15	17	78
September	15	5.3	73	90	17		78	17	73	0	0	1	7	8	86
October	8	2.0	34	86	52		125	47	34	0	6	3	4	7	138
November	1.5	0.2	5	82	77		125	0	5	0	77	40	2	42	244
December	-6.2	0	0	76	76		201	0	0	0	0	20	1	21	222
		37.4	580	944				0	556	24	127	127	260	387	

Monthly T from Environment Canada

Table 27 - 100mm soil moisture retention in Thornthwaite [1957]

Heat Index (I) 37.4

a: 1.06

150mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		292	0	0	0	0	10	0	10	302
February	-8.1	0	0	54	54		346	0	0	0	0	5	0	5	351
March	-2.3	0	0	64	64		411	0	0	0	0	2	0	2	413
April	6.3	1.4	32	75	43		150	0	32	0	43	23	26	49	242
May	13.3	4.4	79	80	2		150	0	79	0	2	12	117	129	281
June	18.5	7.2	112	93	-19	-19	132	-18	111	1	0	6	59	65	197
July	21	8.8	133	92	-41	-60	100	-32	124	9	0	3	29	32	132
August	19.8	8.0	114	86	-29	-88	83	-17	103	12	0	2	15	17	100
September	15	5.3	73	90	17		100	17	73	0	0	1	7	8	108
October	8	2.0	34	86	52		150	50	34	0	3	2	4	6	159
November	1.5	0.2	5	82	77		150	0	5	0	77	39	2	41	268
December	-6.2	0	0	76	76		226	0	0	0	0	19	1	20	246
		37.4	580	944				0	559	21	124	124	260	384	

Monthly T from Environment Canada

Heat Index (I) 37.4

a: 1.06

Table 28 - 150mm soil moisture retention in Thornthwaite [1957]

200mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		341	0	0	0	0	10	0	10	351
February	-8.1	0	0	54	54		396	0	0	0	0	5	0	5	401
March	-2.3	0	0	64	64		460	0	0	0	0	2	0	2	462
April	6.3	1.4	32	75	43		200	0	32	0	43	22	26	48	291
May	13.3	4.4	79	80	2		200	0	79	0	2	12	117	129	331
June	18.5	7.2	112	93	-19	-19	182	-18	111	1	0	6	59	65	247
July	21	8.8	133	92	-41	-60	148	-34	126	7	0	3	29	32	180
August	19.8	8.0	114	86	-29	-88	128	-20	106	9	0	2	15	17	145
September	15	5.3	73	90	17		145	17	73	0	0	1	7	8	153
October	8	2.0	34	86	52		198	52	34	0	0	0	4	4	202
November	1.5	0.2	5	82	77		200	2	5	0	75	38	2	40	315
December	-6.2	0	0	76	76		276	0	0	0	0	19	1	20	296
		37.4	580	944				0	564	16	120	120	260	380	

Monthly T from Environment Canada

Heat Index (I) 37.4

a: 1.06

Table 29 - 200mm soil moisture retention in Thornthwaite [1957]

250mm														
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		392	0	0	0	0	9	0	9	401
February	-8.1	0	0	54	54		446	0	0	0	0	5	0	5	451
March	-2.3	0	0	64	64		511	0	0	0	0	2	0	2	513
April	6.3	1.4	32	75	43		250	0	32	0	43	23	26	49	342
May	13.3	4.4	79	80	2		250	0	79	0	2	12	117	129	381
June	18.5	7.2	112	93	-19	-19	231	-19	112	0	0	6	59	65	296
July	21	8.8	133	92	-41	-60	196	-35	127	6	0	3	29	32	228
August	19.8	8.0	114	86	-29	-88	175	-21	107	8	0	2	15	17	192
September	15	5.3	73	90	17		192	17	73	0	0	1	7	8	200
October	8	2.0	34	86	52		245	52	34	0	0	0	4	4	249
November	1.5	0.2	5	82	77		250	5	5	0	72	36	2	38	360
December	-6.2	0	0	76	76		326	0	0	0	0	18	1	19	345
		37.4	580	944				0	567	13	117	117	260	377	

Monthly T from Environment Canada

Heat Index (I) 37.4

a: 1.06

Table 30 - 250mm soil moisture retention in Thornthwaite [1957]

350mm														
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		492	0	0	0	0	9	0	9	501
February	-8.1	0	0	54	54		546	0	0	0	0	4	0	4	550
March	-2.3	0	0	64	64		611	0	0	0	0	2	0	2	613
April	6.3	1.4	32	75	43		350	0	32	0	43	23	26	49	442
May	13.3	4.4	79	80	2		350	0	79	0	2	12	117	129	481
June	18.5	7.2	112	93	-19	-19	331	-19	112	0	0	6	59	65	396
July	21	8.8	133	92	-41	-60	294	-37	129	4	0	3	29	32	326
August	19.8	8.0	114	86	-29	-88	271	-23	109	6	0	2	15	17	288
September	15	5.3	73	90	17		288	17	73	0	0	1	7	8	296
October	8	2.0	34	86	52		341	52	34	0	0	0	4	4	345
November	1.5	0.2	5	82	77		350	9	5	0	68	34	2	36	454
December	-6.2	0	0	76	76		426	0	0	0	0	17	1	18	444
		37.4	580	944				0	571	9	113	113	260	373	

Monthly T from Environment Canada

Heat Index (I) 37.4

a: 1.06

Table 32 - 350mm soil moisture retention in Thornthwaite [1957]

400mm															
Month	Temperature	Heat Index	PET	P = Total Precipitation	ΔP = P-PET	Acc Pot WL	ST= Storage	ΔS = Soil Moisture Storage	AET	Soil Moisture Deficit (D)	Soil Moisture Surplus (S)	Water Runoff RO	Snow Melt Runoff	Total Runoff	Total Moisture Detention
January	-10.3	0	0	65	65		542	0	0	0	0	8	0	8	550
February	-8.1	0	0	54	54		596	0	0	0	0	4	0	4	600
March	-2.3	0	0	64	64		661	0	0	0	0	2	0	2	663
April	6.3	1.4	32	75	43		400	0	32	0	43	23	26	49	492
May	13.3	4.4	79	80	2		400	0	79	0	2	12	117	129	531
June	18.5	7.2	112	93	-19	-19	381	-19	112	0	0	6	59	65	446
July	21	8.8	133	92	-41	-60	344	-37	129	4	0	3	29	32	376
August	19.8	8.0	114	86	-29	-88	320	-24	110	5	0	2	15	17	337
September	15	5.3	73	90	17		337	17	73	0	0	1	7	8	345
October	8	2.0	34	86	52		390	52	34	0	0	0	4	4	394
November	1.5	0.2	5	82	77		400	10	5	0	66	33	2	35	501
December	-6.2	0	0	76	76		476	0	0	0	0	17	1	18	494
		37.4	580	944				0	572	8	111	111	260	371	

Monthly T from Environment Canada

Table 33 - 450mm soil moisture retention in Thornthwaite [1957]

Heat Index (I) 37.4

a: 1.06

CCO-13-9668-01 - PERTHMORE SUBDIVISION - WATER BUDGET - PRE-DEVELOPMENT

Water Balance / Water Budget Assessment

	Development Lands to Perth Long Swamp (A1)						
Land Use	Forest		Pasture		Gravel	Asphalt	Total
Soil (HSG)	C	B	C	B			
Soil Characterization	*Silt/Clay Loam (250)*	*Sandy Loam (200)*	*Silt/Clay Loam (150)*	*Sandy Loam (100)*			
Area (m^2)	34300	15600	17600	54500	-	-	122000
Pervious Area (m^2)	34300	15600	17600	54500	-	-	122000
Impervious Area (m^2)	-	-	-	-	-	-	-
Infiltration Factors							
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	-	-	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	-	-	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	-	-	
MOE infiltration Factor	0.522	0.572	0.422	0.472	-	-	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	-	-	
Run-off Coefficient	0.478	0.428	0.578	0.528	-	-	
Runoff from Impervious Surfaces*	0	0	0	0	-	-	
Inputs (per Unit Area)							
Precipitation (mm/year)	944	944	944	944	-	-	944
Run-on (mm/year)	0	0	0	0	-	-	0
Other Inputs (mm/year)	0	0	0	0	-	-	0
Total Inputs (mm/year)	944	944	944	944	-	-	944
Outputs (per Unit Area)							
Precipitation Surplus (mm/year)	377	380	384	391	-	-	385
Net Surplus (mm/year)	377	380	384	391	-	-	385
Evapotranspiration (mm/year)	567	564	560	553	-	-	559
Infiltration (mm/year)	197	217	162	185	-	-	189
Rooftop Infiltration (mm/year)	0	0	0	0	-	-	0
Total Infiltration (mm/year)	197	217	162	185	-	-	189
Runoff Pervious Areas	180	163	222	206	-	-	771
Runoff Impervious Areas	0	0	0	0	-	-	0
Total Runoff (mm/year)	180	163	222	206	-	-	196
Total Outputs (mm/year)	944	944	944	944	-	-	944
Difference (Inputs - Outputs)	0	0	0	0	-	-	0
Inputs (Volume)							
Precipitation (m^3/year)	32379	14726	16614	51448	-	-	115168
Run-on (m^3/year)	0	0	0	0	-	-	0
Other Inputs m^3/year)	0	0	0	0	-	-	0
Total Inputs (m^3/year)	32379	14726	16614	51448	-	-	115168
Outputs (Volume)							
Precipitation Surplus (m^3/year)	12931	5928	6758	21310	-	-	46927
Net Surplus (m^3/year)	12931	5928	6758	21310	-	-	46927
Evapotranspiration (m^3/year)	19448	8798	9856	30139	-	-	68241
Infiltration (m^3/year)	6750	3391	2852	10058	-	-	23051
Rooftop infiltration (m^3/year)	0	0	0	0	-	-	0
Total Infiltration (m^3/year)	6750	3391	2852	10058	-	-	23051
Runoff Pervious Areas (m^3/year)	6181	2537	3906	11251	-	-	23876
Runoff Impervious Areas (m^3/year)	0	0	0	0	-	-	0
Total Runoff (m^3/year)	6181	2537	3906	11251	-	-	23876
Total Outputs (m^3/year)	32379	14726	16614	51448	-	-	115168
Difference (Inputs - Outputs)	0	0	0	0	-	-	0

CCO-13-9668-01 - PERTHMORE SUBDIVISION - WATER BUDGET - POST-DEVELOPMENT

Water Balance / Water Budget Assessment

Development Lands to Perth Long Swamp (Block 70, SWM Block, Residential Lots and Roadway)

Land Use	Forest		Pasture					
Soil (HSG)	C	B	C	B				
Soil Characterization	*Silt/Clay Loam (250)*	*Sandy Loam (200)*	*Silt/Clay Loam (150)*	*Sandy Loam (100)*	*Sand (75)*	Gravel	Asphalt	Total
Area (m^2)	8300	0	17400	13300	0	0	26600	65600
Pervious Area (m^2)	8300	0	17400	13300	0	-	-	39000
Impervious Area (m^2)	-	-	-	-	-	0	26600	26600
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.35	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0.1	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.43	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	573
Net Surplus (mm/year)	377	380	384	391	398	398	850	573
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	371
Infiltration (mm/year)	197	217	162	185	227	88	85	140
Rooftop and Trench Infiltration (mm/year)	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	197	217	162	185	227	88	85	140
Runoff Pervious Areas	180	163	222	206	171	0	0	942
Runoff Impervious Areas	0	0	0	0	0	310	765	1075
Total Runoff (mm/year)	180	163	222	206	171	310	765	434
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	7835	0	16426	12555	0	0	25110	61926
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	7835	0	16426	12555	0	0	25110	61926
Outputs (Volume)								
Precipitation Surplus (m^3/year)	3129	0	6682	5200	0	0	22599	37610
Net Surplus (m^3/year)	3129	0	6682	5200	0	0	22599	37610
Evapotranspiration (m^3/year)	4706	0	9744	7355	0	0	2511	24316
Infiltration (m^3/year)	1633	0	2820	2455	0	0	2260	9168
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	1633	0	2820	2455	0	0	2260	9168
Runoff Pervious Areas (m^3/year)	1496	0	3862	2746	0	0	0	8103
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	20339	20339
Total Runoff (m^3/year)	1496	0	3862	2746	0	0	20339	28443
Total Outputs (m^3/year)	7835	0	16426	12555	0	0	25110	61926
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Development Lands to Perth Long Swamp (West Block)

Land Use	Forest		Pasture					
Soil (HSG)	C	B	C	B				
Soil Characterization	*Silt/Clay Loam (250)*	*Sandy Loam (200)*	*Silt/Clay Loam (150)*	*Sandy Loam (100)*	*Sand (75)*	Gravel	Asphalt	Total
Area (m^2)	0	0	0	17150	0	0	17150	34300
Pervious Area (m^2)	0	0	0	17150	0	-	-	17150
Impervious Area (m^2)	-	-	-	-	-	0	17150	17150
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.3	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.52	0.22	0	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.52	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.48	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	620
Net Surplus (mm/year)	377	380	384	391	398	398	850	620
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	324
Infiltration (mm/year)	197	217	162	185	207	88	0	92
Rooftop and Trench Infiltration (mm/year)	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	197	217	162	185	207	88	0	92
Runoff Pervious Areas	180	163	222	206	191	0	0	962
Runoff Impervious Areas	0	0	0	0	0	310	850	1160
Total Runoff (mm/year)	180	163	222	206	191	310	850	528
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	0	0	0	16190	0	0	16190	32379
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	0	0	0	16190	0	0	16190	32379
Outputs (Volume)								
Precipitation Surplus (m^3/year)	0	0	0	6706	0	0	14571	21276
Net Surplus (m^3/year)	0	0	0	6706	0	0	14571	21276
Evapotranspiration (m^3/year)	0	0	0	9484	0	0	1619	11103
Infiltration (m^3/year)	0	0	0	3165	0	0	0	3165
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	0	0	0	3165	0	0	0	3165
Runoff Pervious Areas (m^3/year)	0	0	0	3541	0	0	0	3541
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	14571	14571
Total Runoff (m^3/year)	0	0	0	3541	0	0	14571	18111
Total Outputs (m^3/year)	0	0	0	16190	0	0	16190	32379
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Undeveloped Lands to Perth Long Swamp (UND)

Land Use	Forest		Pasture					
Soil (HSG)	C	B	C	B				
Soil Characterization	*Silt/Clay Loam (250)*	*Sandy Loam (200)*	*Silt/Clay Loam (150)*	*Sandy Loam (100)*	*Sand (75)*	Gravel	Asphalt	Total
Area (m^2)	20500	0	0	0	0	0	0	20500
Pervious Area (m^2)	20500	0	0	0	0	-	-	20500
Impervious Area (m^2)	-	-	-	-	-	0	0	0
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.3	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.52	0.22	0	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.52	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.48	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	377
Net Surplus (mm/year)	377	380	384	391	398	398	850	377
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	567
Infiltration (mm/year)	197	217	162	185	207	88	0	197
Rooftop and Trench Infiltration (mm/year)	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	197	217	162	185	207	88	0	197
Runoff Pervious Areas	180	163	222	206	191	0	0	962
Runoff Impervious Areas	0	0	0	0	0	310	850	1160
Total Runoff (mm/year)	180	163	222	206	191	310	850	180
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	19352	0	0	0	0	0	0	19352
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	19352	0	0	0	0	0	0	19352
Outputs (Volume)								
Precipitation Surplus (m^3/year)	7729	0	0	0	0	0	0	7729
Net Surplus (m^3/year)	7729	0	0	0	0	0	0	7729
Evapotranspiration (m^3/year)	11624	0	0	0	0	0	0	11624
Infiltration (m^3/year)	4034	0	0	0	0	0	0	4034
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	4034	0	0	0	0	0	0	4034
Runoff Pervious Areas (m^3/year)	3694	0	0	0	0	0	0	3694
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	0	0
Total Runoff (m^3/year)	3694	0	0	0	0	0	0	3694
Total Outputs (m^3/year)	19352	0	0	0	0	0	0	19352
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

CCO-13-9668-01 - PERTHMORE SUBDIVISION - WATER BUDGET - MITIGATION REQUIRED

Water Balance / Water Budget Assessment

Data Input	
944	mm of precipitation per year avg.
118.4	days with precipitation per year avg.
10	mm design rainfall event

1981 to 2010 Canadian Climate Normals station data

Days with Rainfall

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	Code
>= 0.2 mm	4.4	3.9	6.7	10.9	13.4	13.2	11.9	11	12.3	13.7	11	6	118.4	A
>= 5 mm	1.6	1.2	2.1	4	4.9	5.8	5.4	4.8	5.1	5	4.2	2.3	46.5	A
>= 10 mm	0.87	0.57	1	2	2.7	2.9	3.1	2.8	3.2	2.7	2.1	1.2	25.2	A
>= 25 mm	0.13	0.07	0.10	0.33	0.47	0.73	0.77	0.67	0.60	0.47	0.43	0.13	4.9	A

Environment Canada	Days exceeding rainfall noted	Days per section	Minimum volume of rain (mm)
0.2 mm	118.4	71.9	14
5 mm	46.5	21.3	107
10 mm	25.2	25.2	252
		Total	373

*Example - Days per section over 5mm = 46.5 - 25.2 = 21.3 days (which are more than 5 mm but, less than 10 mm).
21.3 days x 5 mm = 107 mm

	Development Lands to Perth Long Swamp (Block 70, SWM Block, Residential Lots and Roadway)	Development Lands to Perth Long Swamp (West Block #67)
Area of Asphalt (m^2)	26600	17150
Asphalt Runoff Coefficient	0.9	0.9
Volume of Runoff in 5 mm Event (m^3) to be infiltrated	120	77
Mitigation Required (m^3/year)	2873	1852
Annual Volume to be infiltrated by designing for 5 mm Event	2897	1868

By installing trenches sized for the 5 mm event, the annual volume to be infiltrated will exceed that of the mitigation required by the water balance mitigation.

Infiltration Area Footprint Calculation

	For 0.5m depth		For 0.75m depth	
Phase 6:				
Infiltration Target=	120	m^3	120	m^3
Assumed trench depth=	0.5	m^3	0.75	m^3
Porosity =	0.4		0.4	
Trench footprint area required=	600	m^2	400	m^2

	For 0.5m depth		For 0.75m depth	
West Block:				
Infiltration Target=	108	m^3	108	m^3
Assumed trench depth=	0.5	m^3	0.75	m^3
Porosity =	0.4		0.4	
Trench footprint area required=	540	m^2	360	m^2

CCO-13-9668-01 - PERTHMORE SUBDIVISION - WATER BUDGET - POST-DEVELOPMENT WITH MITIGATION

Water Balance / Water Budget Assessment

Development Lands to Perth Long Swamp (Block 70, SWM Block, Residential Lots and Roadway)

Land Use	Forest		Pasture					
Soil (HSG)	C	B	C	B				
Soil Characterization	Silt/Clay Loam (250)	Sandy Loam (200)	Silt/Clay Loam (150)	Sandy Loam (100)	Sand (75)	Gravel	Asphalt	Total
Area (m^2)	8300	0	17400	13300	0	0	26600	65600
Pervious Area (m^2)	8300	0	17400	13300	0	-	-	39000
Impervious Area (m^2)	-	-	-	-	-	0	26600	26600
Infiltration Factors								
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.35	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0.1	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.43	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Inputs (per Unit Area)								
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Outputs (per Unit Area)								
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	573
Net Surplus (mm/year)	377	380	384	391	398	398	850	573
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	371
Infiltration (mm/year)	197	217	162	185	227	88	85	140
Rooftop and Infiltration Basin (mm/year)	0	0	0	0	0	0	108	44
Total Infiltration (mm/year)	197	217	162	185	227	88	193	184
Runoff Pervious Areas	180	163	222	206	171	0	0	942
Runoff Impervious Areas	0	0	0	0	0	310	657	967
Total Runoff (mm/year)	180	163	222	206	171	310	657	390
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Inputs (Volume)								
Precipitation (m^3/year)	7835	0	16426	12555	0	0	25110	61926
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	7835	0	16426	12555	0	0	25110	61926
Outputs (Volume)								
Precipitation Surplus (m^3/year)	3129	0	6682	5200	0	0	22599	37610
Net Surplus (m^3/year)	3129	0	6682	5200	0	0	22599	37610
Evapotranspiration (m^3/year)	4706	0	9744	7355	0	0	2511	24316
Infiltration (m^3/year)	1633	0	2820	2455	0	0	2260	9168
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	2873	2873
Total Infiltration (m^3/year)	1633	0	2820	2455	0	0	5133	12040
Runoff Pervious Areas (m^3/year)	1496	0	3862	2746	0	0	0	8103
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	17467	17467
Total Runoff (m^3/year)	1496	0	3862	2746	0	0	17467	25570
Total Outputs (m^3/year)	7835	0	16426	12555	0	0	25110	61926
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Development Lands to Perth Long Swamp (West Block)

Land Use	Forest		Pasture					
Soil (HSG)	C	B	C	B				
Soil Characterization	Silt/Clay Loam (250)	Sandy Loam (200)	Silt/Clay Loam (150)	Sandy Loam (100)	Sand (75)	Gravel	Asphalt	Total
Area (m^2)	0	0	0	17150	0	0	17150	34300
Pervious Area (m^2)	0	0	0	17150	0	-	-	17150
Impervious Area (m^2)	-	-	-	-	-	0	17150	17150
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.35	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0.1	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.43	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	620
Net Surplus (mm/year)	377	380	384	391	398	398	850	620
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	324
Infiltration (mm/year)	197	217	162	185	227	88	85	135
Rooftop and Infiltration Basin (mm/year)	0	0	0	0	0	0	108	54
Total Infiltration (mm/year)	197	217	162	185	227	88	193	189
Runoff Pervious Areas	180	163	222	206	171	0	0	942
Runoff Impervious Areas	0	0	0	0	0	310	657	967
Total Runoff (mm/year)	180	163	222	206	171	310	657	432
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Precipitation (m^3/year)	0	0	0	16190	0	0	16190	32379
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	0	0	0	16190	0	0	16190	32379
Precipitation Surplus (m^3/year)	0	0	0	6706	0	0	14571	21276
Net Surplus (m^3/year)	0	0	0	6706	0	0	14571	21276
Evapotranspiration (m^3/year)	0	0	0	9484	0	0	1619	11103
Infiltration (m^3/year)	0	0	0	3165	0	0	1457	4622
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	1852	1852
Total Infiltration (m^3/year)	0	0	0	3165	0	0	3309	6474
Runoff Pervious Areas (m^3/year)	0	0	0	3541	0	0	0	3541
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	11261	11261
Total Runoff (m^3/year)	0	0	0	3541	0	0	11261	14802
Total Outputs (m^3/year)	0	0	0	16190	0	0	16190	32379
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

Undeveloped to Perth Long Swamp (UND)

Land Use	Forest		Pasture					
Soil (HSG)	C	B	C	B				
Soil Characterization	Silt/Clay Loam (250)	Sandy Loam (200)	Silt/Clay Loam (150)	Sandy Loam (100)	Sand (75)	Gravel	Asphalt	Total
Area (m^2)	20500	0	0	0	0	0	0	20500
Pervious Area (m^2)	20500	0	0	0	0	-	-	20500
Impervious Area (m^2)	-	-	-	-	-	0	0	0
Topographic Infiltration Factor	0.172	0.172	0.172	0.172	0.12	0.12	0	
Soil Infiltration Factor	0.15	0.2	0.15	0.2	0.35	0.05	0	
Land Cover Infiltration Factor	0.2	0.2	0.1	0.1	0.1	0.05	0	
MOE infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0.1	
Actual Infiltration Factor	0.522	0.572	0.422	0.472	0.57	0.22	0	
Run-off Coefficient	0.478	0.428	0.578	0.528	0.43	0.78	0.9	
Runoff from Impervious Surfaces*	0	0	0	0	0	0.78	0.9	
Precipitation (mm/year)	944	944	944	944	944	944	944	944
Run-on (mm/year)	0	0	0	0	0	0	0	0
Other Inputs (mm/year)	0	0	0	0	0	0	0	0
Total Inputs (mm/year)	944	944	944	944	944	944	944	944
Precipitation Surplus (mm/year)	377	380	384	391	398	398	850	377
Net Surplus (mm/year)	377	380	384	391	398	398	850	377
Evapotranspiration (mm/year)	567	564	560	553	546	546	94	567
Infiltration (mm/year)	197	217	162	185	227	88	85	197
Rooftop and Infiltration Basin (mm/year)	0	0	0	0	0	0	0	0
Total Infiltration (mm/year)	197	217	162	185	227	88	85	197
Runoff Pervious Areas	180	163	222	206	171	0	0	942
Runoff Impervious Areas	0	0	0	0	0	310	765	1075
Total Runoff (mm/year)	180	163	222	206	171	310	765	180
Total Outputs (mm/year)	944	944	944	944	944	944	944	944
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0
Precipitation (m^3/year)	19352	0	0	0	0	0	0	19352
Run-on (m^3/year)	0	0	0	0	0	0	0	0
Other Inputs m^3/year)	0	0	0	0	0	0	0	0
Total Inputs (m^3/year)	19352	0	0	0	0	0	0	19352
Precipitation Surplus (m^3/year)	7729	0	0	0	0	0	0	7729
Net Surplus (m^3/year)	7729	0	0	0	0	0	0	7729
Evapotranspiration (m^3/year)	11624	0	0	0	0	0	0	11624
Infiltration (m^3/year)	4034	0	0	0	0	0	0	4034
Rooftop and Trench Infiltration (m^3/year)	0	0	0	0	0	0	0	0
Total Infiltration (m^3/year)	4034	0	0	0	0	0	0	4034
Runoff Pervious Areas (m^3/year)	3694	0	0	0	0	0	0	3694
Runoff Impervious Areas (m^3/year)	0	0	0	0	0	0	0	0
Total Runoff (m^3/year)	3694	0	0	0	0	0	0	3694
Total Outputs (m^3/year)	19352	0	0	0	0	0	0	19352
Difference (Inputs - Outputs)	0	0	0	0	0	0	0	0

CCO-13-9668-01 - PERTHMORE SUBDIVISION - WATER BUDGET - SUMMARY

Water Balance / Water Budget Assessment

Phase 6, West Block and Undeveloped lands to Perth Long Swamp Pre = Post					
Characteristic	Pre-Development	Post-Development	Change (Pre- to Post)	Post-Development with Mitigation	Change (Pre- to Post-with Mitigation
Inputs (Volumes)					
Precipitation (m^3/year)	115168	113658	-1%	113658	-1%
Run-on (m^3/year)	0	0	0%	0	0%
Other Inputs m^3/year)	0	0	0%	0	0%
Total Inputs (m^3/year)	115168	113658	-1%	113658	-1%
Outputs (Volumes)					
Precipitation Surplus (m^3/year)	46927	66615	42%	66615	42%
Net Surplus (m^3/year)	46927	66615	42%	66615	42%
Evapotranspiration (m^3/year)	68241	47042	-31%	47042	-31%
Infiltration (m^3/year)	23051	16367	-29%	17824	-23%
Rooftop infiltration (m^3/year)	0	0	0%	4725	0%
Total Infiltration (m^3/year)	23051	16367	-29%	22549	-2%
Runoff Pervious Areas (m^3/year)	23876	15338	-36%	15338	-36%
Runoff Impervious Areas (m^3/year)	0	34910	0%	28728	0%
Total Runoff (m^3/year)	23876	50248	110%	44066	85%
Total Outputs (m^3/year)	115168	113658	-1%	113658	-1%