Functional Stormwater Management Report

Norwood Park Subdivision – Phase 4
Engage Project No. 20120

Engage Engineering Ltd.
June 2022
Issued for Draft Plan Approval

REVISION SUMMARY

Revision No.	Revision Title	Date	Revision Summary
1	Issued for 1st Draft Plan	January 14th, 2022	Final
2	Issued for 2nd Draft Plan	June 29th, 2022	Final

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1.0 Introduction

1.1 Purpose

Engage Engineering Limited (Engage) has been retained by DPH Developments Inc. (DPH) to prepare a Stormwater Management (SWM) Report to support a Draft Plan Application for Phase 4 of the Norwood Park residential subdivision in the Township of Asphodel-Norwood (Township). Phase 4 of the development will consist of 96 single family homes, and 52 townhomes, an extension of Albine Street right of way (ROW), and the construction of three internal ROW's. This report will quantify the impact that the proposed development will have on runoff rates and recommend stormwater management measures required to maintain post-development flows to pre-development levels while providing appropriate quality control.

The first three phases of the subdivision have been individually serviced by stormwater management (SWM) facilities. There was no additional allocation provided in any of the previous phases to service any future development, and an individual SWM facility is required to service the proposed development

Recommendations made in this report will be in accordance with the MECP and Township of Asphodel-Norwood requirements, in addition to current stormwater management best practices and the Credit Valley Conservation Low Impact Development Stormwater Management Planning and Design Guide (CVC LIDSWMPDG).

1.2 Site Description

The subject development is a 14.1 ha parcel of land in the Township of Asphodel-Norwood (Town). The property is bounded to the north by the hydro corridor and agricultural lands, the west by agricultural lands, to the south by Albine Street and agricultural lands, and to the east by the Norwood Park Phase 3 Subdivision. The location of the subject property is identified on the **Location Plan** attached as **Figure 1**.

2.0 Stormwater Management

The proposed development of the site will increase site imperviousness and increase post-development runoff rates. To mitigate these effects, a stormwater management strategy is being proposed to provide the required quantity and quality control.

2.1 Hydrologic Model

As part of this study, a hydrologic model for the site under both existing and proposed conditions was developed using Visual OTTHYMO (VO) software. The model was used to simulate peak flows from the site under both pre and post-development conditions for a variety of storm distributions and durations, as well as to verify stormwater management storage requirements and performance. The model and detailed output are included in **Appendix C**.

City of Peterborough rainfall data was utilized to develop the storm distributions in the model. The geotechnical report prepared by GHD (June 2021) was utilized to determine land use and soil types for the hydrologic model. According to the geotechnical report which is included in **Appendix J**, the underlying soils are generally characterized as sandy silt or silty sand. This type of soil is classified as Hydrologic Soils Group B for the purposes of this report. This soil group along with the crop and other improved land use suggest a CN value of 74. Bedrock was encountered within the 1.1 – 3.2 mbgs and no permanent groundwater table was encountered during the geotechnical investigation.

2.2 Existing Conditions

The existing site is a 14.1 hectare parcel of land and is located directly west of the Phase 3 lands. The topography and legal limits of the property are shown on the **Topographic Survey Plan** prepared by JD Barnes which is included as **Figure 3**. The topographic survey was utilized to determine existing elevations, locations of existing features on the site, and to establish a proposed grading and servicing design for the proposed development of the site.

The site cover consists of gently rolling vacant agricultural land. Based on the topographic survey, County of Peterborough GIS contours, and site reconnaissance by Engage, flows from the site sheet flow from north to south across the site and continue to sheet flow across the agricultural land to the south, into an existing box culvert under the CN rail line. Once passed through the culvert, the flows continue to sheet flow into the un-evaluated wetland south of the railway.

For the purposes of this report the site was divided into two (2) sub-catchment areas and two (2) external drainage areas. The existing catchment areas have been identified as shown on the **Pre-Development Drainage Area Plan** included as **Figure 4**.

- Existing catchment area **EX1** is 12.27ha and includes drainage for the central portion of the site. This area generally drains from north to south via sheet flow and ultimately contributes to the culvert under the CN rail line south of the site.

- Existing catchment area **EX2** is 1.83ha and includes drainage for the western portion of the site. This area drains via sheet flow from northeast to southwest and ultimately contributes to the existing box culvert under the CN rail line south of the site.

- External catchment area **EXT3** is 2.80ha of external area that includes drainage for areas northeast of the development. The external area includes a portion of Phase 3 rearyard lots, and existing crop area. This area drains from north to south contributing to EX1 and consists of grassed, crop, and impervious area. Flows ultimately contribute to the box culvert under the rai CN rail line lroad south of the site.

- Existing catchment area **EXT4** is 1.17ha of external area that includes drainage for areas directly east of the development. The external area includes a portion of

Phase 3 rearyard lots, and Albine Street. This area drains from east to west contributing to EX1 and consists of grassed, impervious, and gravel areas. Flows ultimately contribute to the box culvert under the CN rail line south of the site.

The hydrologic parameters for the pre-development model are summarized in **Table 1** below. A complete list of the VO input data is included in **Appendix A**.

Table 1 - Pre-Development Hydrological Parameters

Catchment	Area (ha)	TIMP	XIMP	CN*	IA	TP (hr)	VO Command
EX1	12.27	-	-	72	5	0.50	NASHYD
EX2	1.83	-	-	73	5	0.33	NASHYD
EXT3	2.80	-	-	71	5	0.35	NASHYD
EXT4	1.17	24.8	17.1	59	5	-	STANDHYD

Details on the time to peak calculations are included in **Appendix A**.

2.3 Proposed Conditions

Under the proposed condition, the topography will change to include the development of 96 single family homes and 53 townhomes as seen on the **Draft Plan** included as **Figure 2**. There are six (6) proposed drainage catchment areas as well as two (2) external areas as identified on the **Post-Development Drainage Area Plan** included as **Figure 5**. The respective catchment areas can be identified based on the following properties:

- Proposed catchment area **PR1** consists of 11.55ha that includes the entire development area and includes all 96 single family homes, 53 townhomes, the three proposed ROW's, the Albine extension, and the proposed SWM facility. Drainage from this area will flow via overland flow and storm sewers and discharge into the proposed SWM facility. Flows will ultimately be discharged at a controlled rate via a flow spreader to the south and sheet flow to the south, ultimately contributing to the box culvert as in existing conditions.

- Proposed catchment area **PR2** consists of 0.75ha of crop area in the northwest corner of the site. This area will remain unchanged from existing conditions and continue to sheet flow to the southwest and ultimately contribute to the box culvert under the CN rail line south of the site.

- Proposed catchment area **PR3** consists of 1.52ha of crop and grassed are in the northern portion of the site. This area includes the parkland block and a section of crop area which travels via sheet flow towards a conveyance swale which directs flows towards the proposed storm sewer network. Flows contribute to the proposed SWM pond and will ultimately be discharged at a controlled rate via a

flow spreader to the south and sheet flow to the south, ultimately contributing to the box culvert as in existing conditions.

- Proposed catchment area **PR4** consists of 0.27ha of the rear yards in the southern portion of the site. Flows from this area will discharge uncontrolled to the south as in existing conditions and sheet flow towards the box culvert south of the site.

- External catchment area **PXT5** is 2.80ha of external area that includes drainage for areas northeast of the development. The external area includes a portion of Phase 3 rearyard lots, and existing crop area. This area drains towards a lowpoint in the northeast corner of the site where the major storm flows will be captured within the proposed storm sewer network and directed to the SWM pond. This catchment area consists of grassed, crop, and impervious area. Flows ultimately contribute to the box culvert under the railroad south of the site.

- External catchment area **PXT6** is 1.17ha of external area that includes drainage for areas directly east of the development. The external area includes a portion of Phase 3 rearyard lots, and Albine Street. This area drains from east to west contributing to PR1 and consists of grassed, impervious, and gravel areas. Flows will be directed to the SWM pond and will ultimately contribute to the box culvert under the railroad south of the site at a controlled rate.

The characteristics of the proposed drainage areas are summarized in **Table 2** below. A complete list of the VO input data is included in **Appendix A**.

Table 2 - Post - Development Hydrologic Parameters

Catchment	Area (ha)	TIMP	XIMP	CN*	IA	TP (hr)	VO Command
PR1	11.55	52	40	59	5	-	STANDHYD
PR2	0.75	-	-	73	5	0.33	NASHYD
PR3	1.52	-	-	63	5	0.55	NASHYD
PR4	0.27	-	-	59	5	0.49	NASHYD
PXT5	2.80	-	-	71	5	0.36	NASHYD
PXT6	1.17	29	20	59	5	-	STANDHYD

Details on the percent impervious calculations and time to peak calculations are included in **Appendix A**.

2.4 Existing and Proposed Peak Flows

Various storm distributions were analyzed to determine the highest peak flows and ultimately the quantity control storage volumes. The hydrologic model was used to

simulate existing and proposed peak flows for the 100-year storm for the following storm distributions:

- 1, 4, 6 hour Chicago
- 1, 6, 12 Hour AES
- 6, 12, 24 Hour SCS
- Timmins Storm

The results indicated that the 6 Hour SCS distribution produced both the highest peak flows and largest difference in peak flows. This distribution was selected to perform the analysis of the detailed design. The 2 through 100-year storm events were modeled and the results are summarized in **Table 3** and **Table 4** below. A peak flow summary and detailed VO output is included in **Appendix C**.

Table 3 - Pre Development Peak Flows - 6 Hour SCS

Outlet	Catchment ID	Peak Flows (m^3/s)					
		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
EX1	East	0.182	0.334	0.451	0.612	0.741	0.876
EX2	West	0.038	0.069	0.093	0.126	0.153	0.180
EXT3	North	0.052	0.095	0.129	0.175	0.212	0.250
EXT4	Phase 3/Albine	0.048	0.085	0.110	0.144	0.172	0.202
Totals							
Total South	EX1+EXT3+EXT4	0.243	0.441	0.594	0.804	0.974	1.149
Total West	EX2	0.038	0.069	0.093	0.126	0.153	0.180

Table 4 - Post Development Peak Flows - 6 Hour SCS

Outlet	Catchment ID	Peak Flows (m^3/s)					
		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
PR1	To Pond	0.848	1.240	1.624	2.028	2.345	2.670
PR2	Open Space	0.016	0.028	0.038	0.052	0.063	0.074
PR3	Parkland	0.015	0.028	0.039	0.054	0.066	0.078
PR4	Rearyards	0.003	0.005	0.007	0.009	0.011	0.013
PXT5	North	0.051	0.093	0.126	0.171	0.208	0.246
PXT6	Phase 3/Albine	0.054	0.092	0.118	0.154	0.183	0.213
Totals							
Total South	PR1+PR3+PR4+PXT 5+PXT6	0.939	1.405	1.843	2.322	2.699	3.088
Total West	PR2	0.016	0.028	0.038	0.052	0.063	0.074

The results indicate that in the absence of any quantity controls, the peak flows from catchments PR1+PR3+PR4+PXT5+PXT6 to the south will increase under the proposed conditions, when compared with EX1+EXT3+EXT4 and that some form of quantity control is required. The peak flows to the west have not increased in proposed conditions,

therefore no quantity control is required for catchment area PR2. The peak flows from catchment area PR4 will be released from the site uncontrolled, due to grading constraints it was not possible to direct these flows into the pond. The release rate from the pond will be overcontrolled to account for these areas.

Catchment areas PR1, PR3, PXT5, and PXT6 will drain to the south to the proposed stormwater management wet pond. Minor flows (up to 5-year storm event) will be conveyed in the storm sewer and major flows (up to and including 100-year event) will be conveyed via the proposed road and storm sewer. Further details on the stormwater conveyance are included in Section 3.3.

VO model calculations were completed for the SWM facility to determine the storage volumes required to limit post-development flows to pre-development levels. The model outputs are included in **Appendix C**.

3.0 Stormwater Management Controls

3.1 Quantity Control

A wet pond is proposed to provide control of post-development runoff to pre-development levels for drainage areas PR1, PR3, PXT5, and PXT6 as the contributing drainage area is greater than 5 hectares. The pond will be located on the southern border of the site south of Albine Street. Details showing the proposed pond location and associated details are included on the **Preliminary Grading Plan** included as **Figure 8**.

Runoff from minor and major storm events for catchment PR1, PR3, PXT5, and PXT6 will be conveyed to the pond via storm sewer and the road right of way. The pond has a multi-stage outlet; the first stage consists of a 125 mm orifice tube as part of a perforated hickenbottom riser pipe which will provide the desired draw down time for the pond. The second and third stages consist of DICB's complete with 460 mm and 400 mm orifice plates respectively, that will release flows at a controlled rate up to the 100-year storm. The proposed pond will discharge to a proposed level spreader, as per Section 4.5.12 for the MOE SWM Planning & Design Manual (MOESWPDM), and ultimately discharge as sheet flow to the south. Flows will continue to sheet flow and infiltrate across the crop land to the south and ultimately to the existing box culvert under the CP rail line. A 21 m wide emergency overflow weir has been incorporated into the pond at elevation 209.35 m. The overflow weir will allow for 0.25 m of freeboard for the pond. The weir will convey the 100-year peak flows for the flows directed to the pond, in case of emergency or should either of the orifices plug. The emergency overland flow will be captured in the proposed storm network and the proposed ROW's and conveyance swales and ultimately convey to the south as in existing conditions. Weir sizing calculations are included in **Appendix E**.

The proposed stormwater management facility was modeled to determine the functionality and to confirm that it has the capacity to accommodate the flows from the site. A proposed wet pond surface was developed in AutoCAD Civil 3D. This surface was analyzed, and it was determined that the constructed pond has a total capacity of 7,490m^3 up to the invert of the overflow weir. This volume is comprised of 2,278m^3 permanent pool, 1,272m^3 extended

detention and 5,212m^3 of active storage. The surface was used to develop a stage storage relationship in 0.05m increments.

An abbreviated stage storage discharge (SSD) relationship for the pond is shown in **Table 5** below. The complete SSD table and calculations are included in **Appendix D**.

Table 5 - Stage Storage Discharge

Description	Stage (m)	Discharge (m^3/s)	Active Storage Provided (m^3)	Minimum Active Storage Required (from VO) (m^3)	Total Storage Provided (m^3)
Bottom of Pond / Permanent Pool	207.00	-	-	-	0.00
Bottom of Extended Detention/Top of Permanent Pool	208.00	0.000	0.000	0.00	2278
25mm CHI	208.40	0.025	1272	1254	3550
2 - Year Ponding	208.45	0.238	1446	1248	3725
5 - Year Ponding	208.60	0.305	1991	1966	4269
10 - Year Ponding	208.70	0.582	2372	2229	4650
25 - Year Ponding	208.85	0.666	2971	2764	5249
50 - Year Ponding	208.95	0.716	3389	3250	5667
100 - Year Ponding	209.10	0.785	4044	3791	6322
Overflow Weir	209.35	0.888	5212	-	7490
Top of Pond	209.55	-	6217	-	8496

The provided stage storage discharge will limit all storm events to at or below pre-development conditions. **Table 6** below demonstrates that the proposed discharge rates for the SWM facility, including the uncontrolled area to the south, are at or below pre-development release rates.

Table 6 - Allowable vs. Proposed Release Rates

Design Storm (years)	Allowable Discharge Rate (EX1+EXT3+EXT4) (m^3/sec)	Proposed Discharge Rate (PR1+PR3+PXT5+PXT6) (Routed) + PR4 (Uncontrolled) (m^3/sec)
2	0.243	0.240
5	0.441	0.310
10	0.594	0.588
25	0.804	0.675
50	0.974	0.727
100	1.149	0.798

3.2 Quality Control

In accordance with ORCA requirements, quality control is provided in the proposed SWM facility to an "Enhanced" level. Per table 3.2 of the MOE SWM Planning & Design Manual, the quality storage volume requirements for a wet pond facility with 43% site imperviousness was interpolated to be 167 m^3/ha. Of this volume, 40 m^3/ha is extended detention while the remainder represents the permanent pool. For the entire 14.1ha drainage area, a total of 2,355 m^3 of storage is required for enhanced quality control. The permanent pool volume required is 1,791 m^3. The extended detention required is the greater volume generated by the 40 m^3/ha or the 25mm storm event, which is 1254 m^3. The proposed SWM facility provides a permanent pool volume of 2,778 m^3 and an extended detention volume of 1,272 m^3. Therefore, the proposed SWM facility provides adequate quality control volume for the proposed site.

The proposed design includes a sediment forebay at the inlet location to improve pollutant removal and allow for proper maintenance of the SWM facility. The forebay was designed using equations 4.5 - 4.9 of the MOE SWM Planning & Design Manual (MOESWPDM). The forebay will be 21 m in length, with a 4.4 m minimum width, and have a depth of 1.0m. Calculations are included in **Appendix G**. Quality control requirements for the SWM pond are compared to what is being provided in **Table 7** below.

Table 7 - Quality Control Requirements

Description	Requirement	Provided
Quality Control Volume	1,791 m^3	2,778 m^3
Extended Detention	564 m^3	1272 m^3
25mm Chicago Storm	1254 m^3	1272 m^3
Draw Down Time	24 hrs	39 hrs
Settling Length	20.4 m	21 m
Dispersion Length	10.9 m	21 m
Forebay Width	2.6 m	4.4 m

The SWM facility will provide the site with adequate control measures as set out in the MOE SWMPDM; detailed calculations can be found in **Appendix F**.

In addition to the proposed wet pond, low impact development measures will be implemented for the site in order to promote groundwater recharge and provide quality and quantity control for the site. These proposed measures are presented in Section 3.4 and additional details for these features will be provided during the detailed design stage.

3.3 Stormwater Conveyance

Runoff from the site will be conveyed to the SWM facility in one of two methods: via surface drainage systems (including storm sewers and swales) and major overland flow routes.

Minor Storms
Minor storm events, up to and including the 5-year storm, will be conveyed in the storm sewer system and in swales. The storm sewer system will be designed at the detailed design stage in accordance with best practices with all sections of pipe operating below 80% capacity for the 5-year storm. The swales have been designed to convey both the minor and major storm events.

Major Storms
Major flows up to and including 100-year storms, will be conveyed via overland flow routes to the SWM pond. The overland flow routes are shown on the **Preliminary Grading Plan** included in **Figure 8**. The roadway will serve as the major overland flow route for the development as the proposed grading directs the majority of the runoff toward the SWM facility.

Additionally, the infiltration trenches have been designed to convey the 100-year flow in case it becomes inundated in a large storm event. The 100-year flow from the largest contributing area DA1 area was utilized to size the infiltration trenches and can be seen in **Figure 6**. This was conservatively utilized as it is anticipated that this flow will be reduced as a result of the infiltration occurring.

The side yard outlet swale between lots 133 and 134 has been sized to convey the 100-year flow from DA2 to street B and this section will not promote infiltration due to the proximity to the homes on Lots 133 and 134. Calculations demonstrating the sizing and capacity of the swales are included in **Appendix I** and summarized in **Table 8** below.

Table 8 - Swale Capacity

Swale	Characteristics	Cross Sectional Area (m2)	100-Year Flow Rate (m^3/s)	Percent Capacity at 100-Year Flow	Flow Depth (m)
DA1 – Infiltration Trench	Trapezoidal; 3:1 side slope, 0.5m bottom width 1.0% long (average) slope; 0.30m deep	0.420	0.266	61%	0.24
DA2 – Outlet Swale	Triangular; 3:1 side slope, 0.8% long (average) slope; 0.35m deep	0.368	0.199	60%	0.29

3.4 Water Balance

Water balance calculations were completed comparing the pre and post development infiltration volumes for the site using the methodology outlined in the MOE SWPDM.

Pre Development – this scenario considered the site in its current land use and cover, which is entirely grassed area.

Post Development – this scenario considered the site without any LID/infiltration techniques. Only the grassed areas were considered in calculating infiltration. This scenario is meant to convey the change in infiltration if the site were developed using a traditional SWM approach.

Post Development with Enhancements – this scenario included the grassed areas and the proposed infiltration techniques summarized below. This scenario is meant to demonstrate the anticipated improvements in infiltration that can be realized for this site with the implementation of infiltration techniques.

The proposed enhancements for this site include directing rooftop runoff areas to four infiltration trenches.

The calculations for each scenario are included in **Appendix H** and summarized in **Table 9** below.

Table 9 - Annual Infiltration Volumes

Water Balance		
	Annual Infiltration (m^3)	**% Change in Infiltration**
Pre Development	19,359	-
Post Development	12,694	66% of Pre Development
Post with Enhancements	17,811	92% of Pre Development

The results indicate that in the absence of any infiltration techniques, the development of the site would result in a significant reduction in infiltration and disrupt the water balance and baseflows from the site.

The post development infiltration on the site will be improved with the proposed SWM enhancements. The infiltration volume provided in the post development scenario with enhancements is equal to 92% of the predevelopment infiltration volume, which is a significant improvement compared to a traditional SWM approach.

Three infiltration trenches are proposed which will allow rear yard and rooftop drainage that is essentially clean water to re-charge groundwater on the subject site. The locations of the proposed infiltration trenches are included on the **Preliminary Grading Plan** included as **Figure 8**.

3.5 Low Impact Development Measures

As described above, three infiltration trenches have been specified to promote infiltration across the site. The geotechnical report prepared by GHD (June 2021) and the addendum #1 letter (April 13, 2022) were utilized to determine the locations of the LID features. GHD installed three monitoring wells on the site, and groundwater has been encountered at 2.1mgs in two of the locations and the third location is dry. Seasonal monitoring will continue in order to identify any potential groundwater fluctuations. Bed rock was encountered throughout the site and all LID features have been designed with a 1.0 m separation from the bottom of the facility to the top of the bedrock and 1.0m to the highest groundwater elevation. Infiltration testing determined an estimated infiltration rate of 50 – 75 mm/hr, correlating to an average design infiltration rate of 18 mm/hr. A max depth of 2.0 m was calculated based on the soil characteristics and detailed calculations are included in **Appendix I**.

These infiltration measures and further LID measures will be explored further during the detailed design stage.

4.0 Operation and Maintenance

Proper operation and maintenance has an important impact on the long-term performance of stormwater management facilities and features. A detailed Operation and Maintenance Manual will be prepared during the detailed design submission.

5.0 Erosion and Sediment Control

The development of the site will result in a large area of exposed native soils which has the potential to erode and contribute sediment to downstream receivers. To mitigate these effects, an erosion and sediment control strategy will be developed for the site at the detailed design phase. The strategy will incorporate best practices as outlined in the *Erosion and Sediment Control Guidelines for Urban Construction, GGHCA.*

In preparing the plan, consideration will be given to the multi-barrier approach of first reducing erosion where possible and then containing sediment on site. The ESC plan will incorporate several sedimentation control measures including perimeter silt fencing, interceptor swales, straw bale check dams and use of the proposed pond as a temporary sediment pond. The pond will be sized to provide the necessary sediment removal for the entire site; the additional measures including straw bale flow checks will provide a secondary level of control and are part of the treatment train approach for the ESC plan. During the detailed design stage an Erosion and Sediment Control Report and Plan will be developed in accordance with the appropriate guidelines.

6.0 Summary

The development of the proposed Phase 4 of the Norwood Park Subdivision which consists of 96 single family homes, and 52 townhomes, an extension of Albine Street, and the construction of three internal right-of-way's (ROW), will increase runoff rates and has the potential to increase sediment/contaminant loading downstream. To mitigate these effects, a stormwater management strategy is proposed that incorporates a wet pond to provide quantity and quality control. The SWM facility will control the post-development release rates to below the pre-development levels for all storm distributions and durations. Sufficient storage is provided in the pond to allow attenuation of the peak flows for up to the 100-year storms. The wet pond will provide an Enhanced level of quality control. The proposed SWM strategy will ensure that the proposed development does not have a negative impact on downstream receivers. In addition to the pond, low impact development measures will be implemented for the site in order to promote groundwater recharge and aide in quality and quantity control for the site.

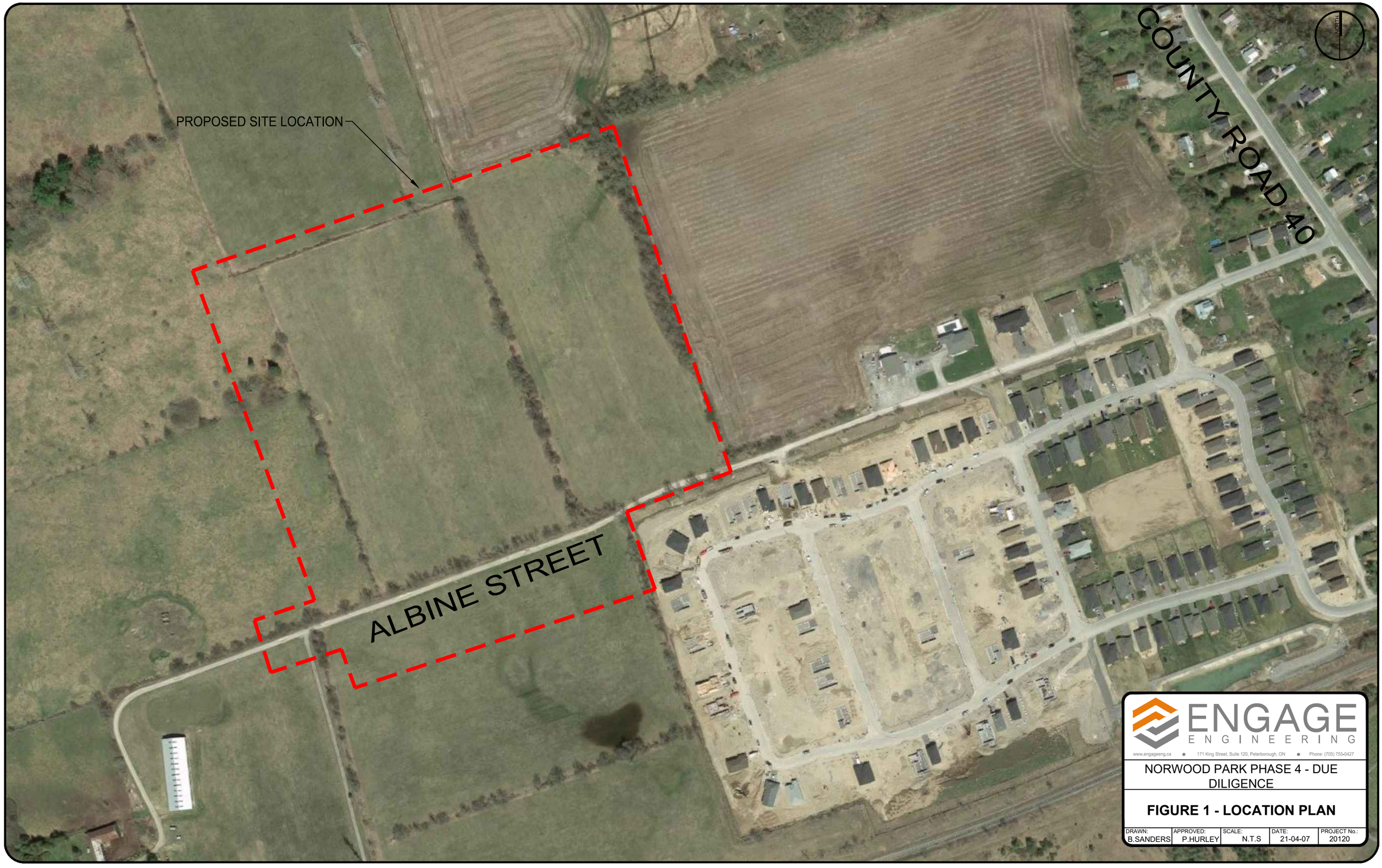
Prepared by:

Mackenzie Crowley, P.Eng
Water Resources Engineer

Reviewed by:

Logan Mattern,
Engineering Intern

Figure 1 - Location Plan



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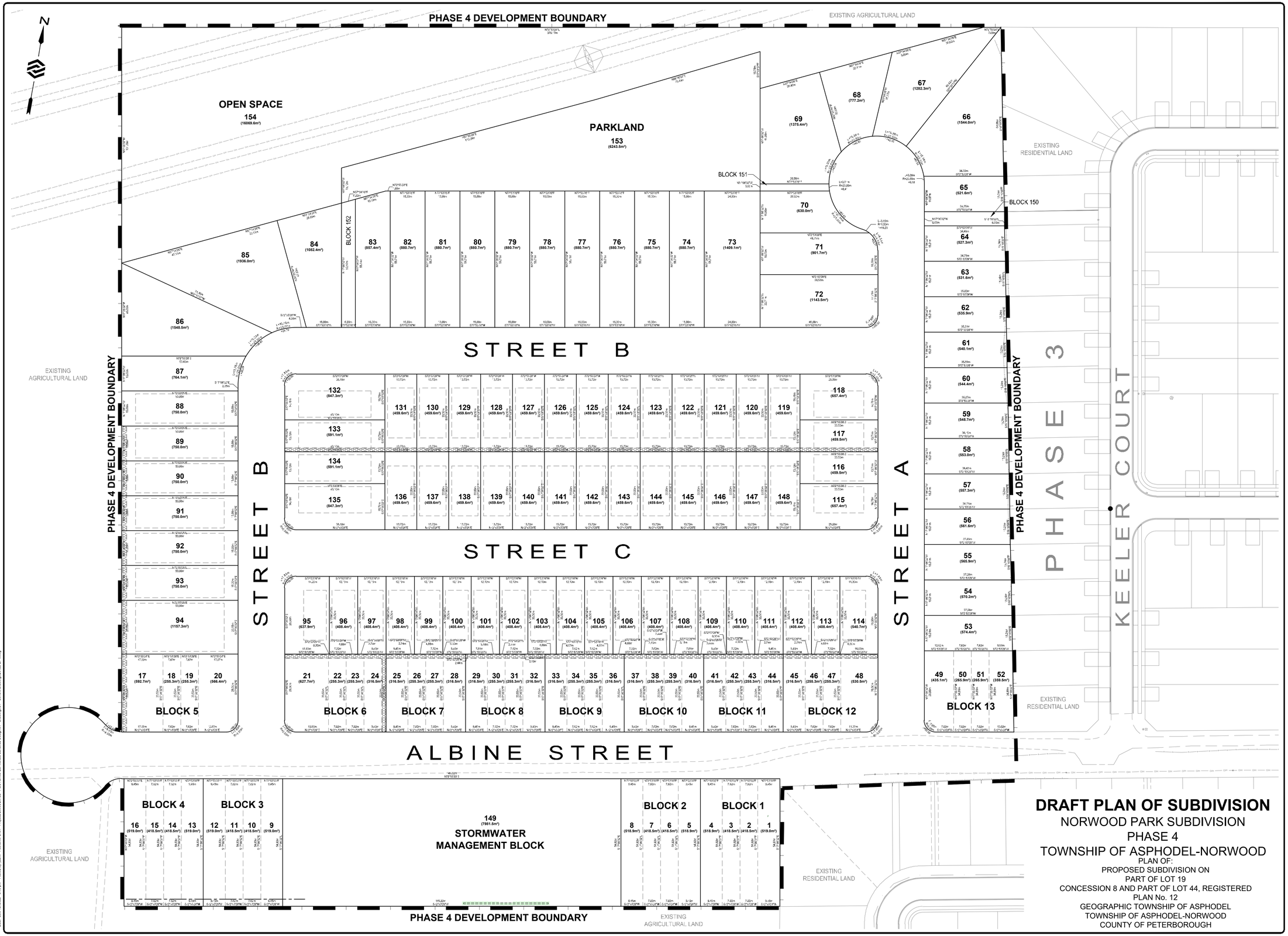
NORWOOD PARK PHASE 4 - DUE DILIGENCE

FIGURE 1 - LOCATION PLAN

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT No.:
B.SANDERS	P.HURLEY	N.T.S	21-04-07	20120

Figure 2 - Draft Plan



BENCHMARK

CUT CROSS IN CONCRETE GUTTER ON KEELER COURT AT THE INTERSECTION OF KEELER COURT AND MARYANN LANE. CUT CROSS IS ON THE WEST SIDE OF THE ROAD APPROXIMATELY 100m NORTH OF THE INTERSECTION OF ALBINE STREET AND KEELER COURT.

ELEV: 213.160m

OWNER'S CERTIFICATE

I AUTHORIZE ECOVUE CONSULTING SERVICES INC. TO SUBMIT THIS DRAFT PLAN OF SUBDIVISION TO THE COUNTY OF PETERBOROUGH.

DATE: 2021-12-10

DPH DEVELOPMENTS INC.

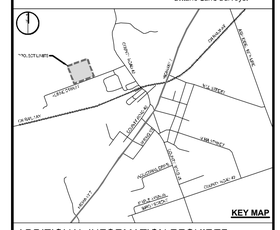
SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND ARE IN ACCORDANCE WITH THE SURVEYS ACT , THE SURVEYORS ACT AND THE LAND TITLES ACT AND THE REGULATIONS MADE UNDER THEM.

DATE: 2021-12-10

SHAWN M. O'CONNOR
Ontario Land Surveyor



ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51-17 (A-L) OF THE PLANNING ACT:

a. AS SHOWN ON THIS DRAFT PLAN
b. AS SHOWN ON THIS DRAFT PLAN
c. AS SHOWN ON THIS DRAFT PLAN
d. RESIDENTIAL DWELLINGS
e. AS SHOWN ON THIS DRAFT PLAN
f. AS SHOWN ON THIS DRAFT PLAN
g. AS SHOWN ON THIS DRAFT PLAN
h. REFER TO FUNCTIONAL SERVICING REPORT BY ENGAGE ENGINEERING
i. REFER TO STORMWATER MANAGEMENT REPORT BY ENGAGE ENGINEERING
j. AS SHOWN ON THIS DRAFT PLAN
k. HYDRO, TELEPHONE, MUNICIPAL SEWAGE SERVICING, MUNICIPAL WATER SERVICING AND STORMWATER MANAGEMENT PONDS
l. N/A

LAND USE SUMMARY

LAND USE	AREA (m^2)	AREA (%)	UNITS
TOWNHOMES BLOCKS 1-13	19,026.30m^2	13.60%	52
SINGLE-FAMILY LOTS 53-148	61,568.10m^2	43.90%	96
SWM BLOCK 149	7981.50m^2	5.70%	-
SERVICING BLOCKS 150-152	621.30m^2	0.40%	-
PARKLAND BLOCK 153	6,243.50m^2	4.50%	-
OPEN SPACE BLOCK 154	16,069.60m^2	11.50%	-
20.0m MUNICIPAL ROAD ALLOWANCE	28,578.30m^2	20.40%	-
TOTAL AREA	140,078.60m^2	100.00%	148

No.	REVISION	BY	DATE
1.	ISSUED FOR DRAFT PLAN SUBMISSION	JD	2021-12-10

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NORWOOD PARK SUBDIVISION PHASE 4

TOWNSHIP OF ASPHODEL NORWOOD

DRAFT PLAN

NORWOOD, ONTARIO

DRAWN BY: J.DUNN	STAMP:
DESIGNED BY: J.DUNN	
APPROVED BY: P.HURLEY	
DATE: 2021-08-30	
SCALE: 1:750	

PROJECT NUMBER:	SHEET NAME:	SHEET:
20120	DP1	1 of 1

DRAFT PLAN OF SUBDIVISION

NORWOOD PARK SUBDIVISION
PHASE 4
TOWNSHIP OF ASPHODEL-NORWOOD
PLAN OF:
PROPOSED SUBDIVISION ON
PART OF LOT 19
CONCESSION 8 AND PART OF LOT 44, REGISTERED
PLAN No. 12
GEOGRAPHIC TOWNSHIP OF ASPHODEL
TOWNSHIP OF ASPHODEL-NORWOOD
COUNTY OF PETERBOROUGH

20120-DP1
Date: Jan. 12, 2022 - 3:43 pm Plotted by: jduns File name: S:\01 - Projects\20000\20120 - Pino Homes Corner\Land\02 Design\01 - Drawings\01 - Current Drawings\20120-DP1.dwg

Figure 3 - Topographic Survey Plan

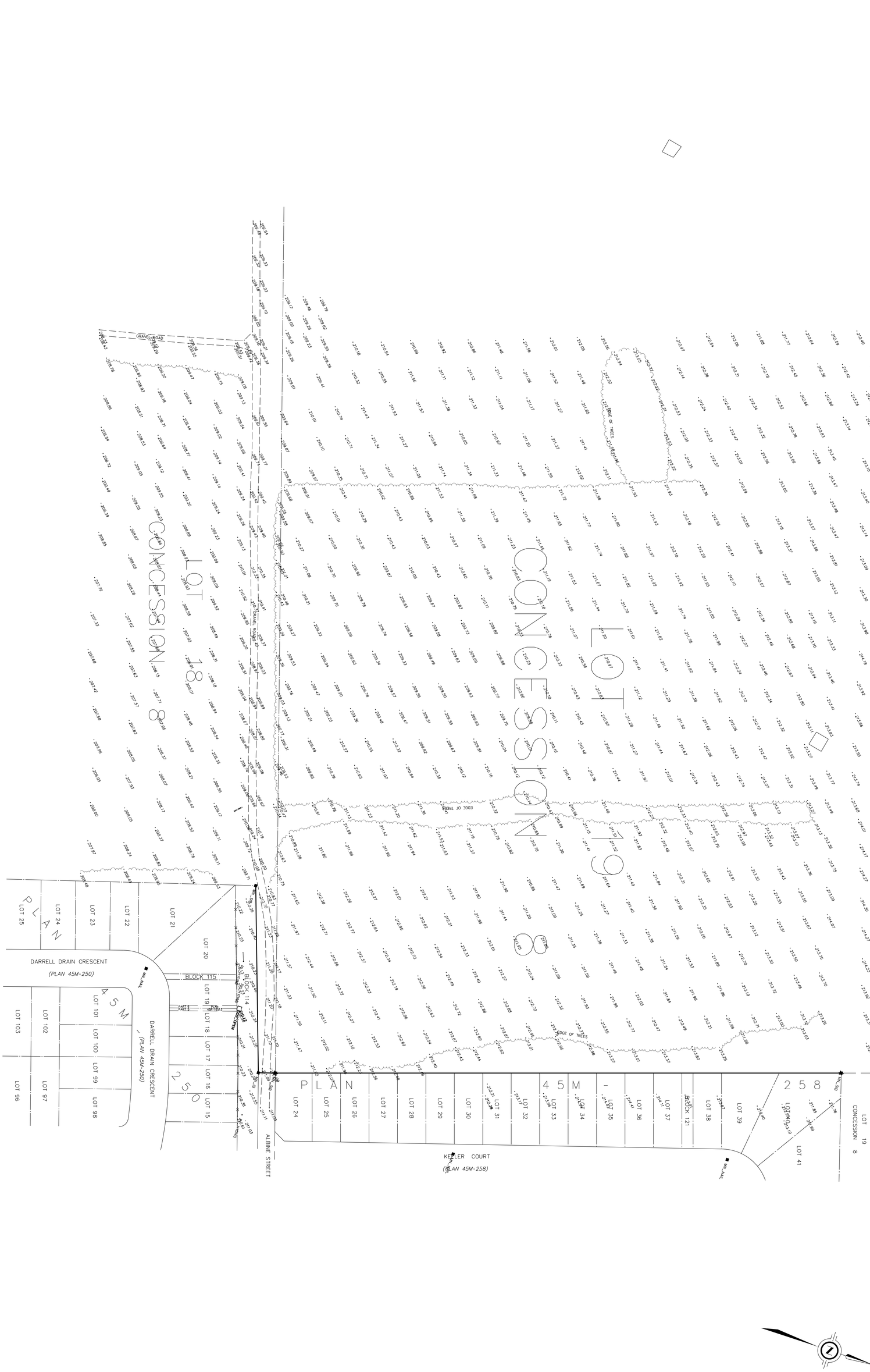
CONCESSION 8
LOT 19
LOT 41
LOT 39
LOT 38
BLOCK 121
KELLER COURT
(PLAN 45M-258)
ALBINE STREET
LOT 24
LOT 25
LOT 26
LOT 27
LOT 28
LOT 29
LOT 30
LOT 31
LOT 32
LOT 33
LOT 34
LOT 35
LOT 36
LOT 37
P L A N
4 5 M - 2 5 0
2 5 8
DARRELL DRAIN CRESCENT
(PLAN 45M-250)
BLOCK 114
BLOCK 115
LOT 20
LOT 21
LOT 22
LOT 23
LOT 24
LOT 25
LOT 15
LOT 16
LOT 17
LOT 18
LOT 19
LOT 96
LOT 97
LOT 98
LOT 99
LOT 100
LOT 101
LOT 102
LOT 103
GRAVEL ROAD
EDGE OF TREES
CONCESSION 8
LOT 18

Figure 4 - Pre-Development Drainage Area Plan

HYDRO CORRIDOR

EXT3
0.33 | 2.80

EX1
0.35 | 12.27

EX2
0.35 | 1.83

EXT4
0.35 | 1.17

NORWOOD PARK PHASE 3

ALBINE STREET

NORWOOD PARK PHASE 2

NORTH

LEGEND

OVERLAND FLOW ROUTE

CATCHMENT BOUNDARY

EX1 — CATCHMENT NAME
RUNOFF COEFFICIENT 0.26 | 0.45 AREA (ha)

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NORWOOD PARK PHASE 4

FIGURE 4 - PRE-DEVELOPMENT DRAINAGE AREA PLAN

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT No.:
B.SANDERS	B.PARSONS	1:2000	21-12-10	20120

Figure 5 - Post-Development Drainage Area Plan

HYDRO CORRIDOR

PXT5
0.33 | 2.80

PR2
0.35 | 0.75

PR3
0.10 | 1.52

PR1
0.52 | 11.55

PR4
0.10 | 0.27

PXT6
0.33 | 1.17

MONITOR WELL

MONITOR WELL

NORWOOD PARK PHASE 3

NORWOOD PARK PHASE 2

ALBINE STREET

NORTH

LEGEND

OVERLAND FLOW ROUTE

CATCHMENT BOUNDARY

PR1 — CATCHMENT NAME
RUNOFF COEFFICIENT — 0.26 | 0.45 — AREA (ha)

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NORWOOD PARK PHASE 4

FIGURE 5 - POST-DEVELOPMENT DRAINAGE AREA PLAN

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT No.:
B.SANDERS	B.PARSONS	1:500	21-10-01	20120

Figure 6 - Infiltration Trench Drainage Area Plan

HYDRO CORRIDOR

NORTH

MONITOR WELL

NORWOOD PARK PHASE 3

MONITOR WELL

DA2
0.58 | 0.77

DA3
0.28 | 0.32

DA1
0.52 | 1.15

LEGEND

OVERLAND FLOW ROUTE

CATCHMENT BOUNDARY

PR1 — CATCHMENT NAME
RUNOFF COEFFICIENT — 0.26 | 0.45 — AREA (ha)

ALBINE STREET

NORWOOD PARK PHASE 2

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NORWOOD PARK PHASE 4

FIGURE 6 - INFILTRATION TRENCH DRAINAGE AREA PLAN

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT No.:
JM	MC	1:2000	2022-06-15	20120

Figure 7 - Overall Stormwater Plan

DEVELOPMENT BOUNDARY

OPEN SPACE
154 (16069.6m²)

PARKLAND
153 (6243.5m²)

BLOCK 151

BLOCK 150

BLOCK 152

STREET 'B'

STREET 'A'

STREET 'C'

KEELER COURT

DEVELOPMENT BOUNDARY

DEVELOPMENT BOUNDARY

ALBINE STREET

DARRELL DRAIN CRES

PHASE 3

PHASE 2

BLOCK 5

BLOCK 6

BLOCK 7

BLOCK 8

BLOCK 9

BLOCK 10

BLOCK 11

BLOCK 12

BLOCK 13

BLOCK 4

BLOCK 3

BLOCK 2

BLOCK 1

STORMWATER MANAGEMENT BLOCK
149 (7981.5m²)

REFER TO SHEET X FOR FUTURE SERVCING ON ALBINE STREET

BENCHMARK
CUT CROSS IN CONCRETE GUTTER ON KEELER COURT AT THE INTERSECTION OF KEELER COURT AND MARYANN LANE. CUT CROSS IS ON THE WEST SIDE OF THE ROAD APPROXIMATELY 10m NORTH OF THE INTERSECTION OF ALBINE STREET AND KEELER COURT.
ELEV: 213.160m

NOTES:

OVERLAND FLOW DIRECTION
STORM SEWER
CATCH BASIN
DOUBLE CATCH BASIN
CATCH BASIN MANHOLE
DOUBLE CB MANHOLE
STORM MANHOLE

No.	REVISION	BY	DATE
2.	ISSUED TO ORCA	JD	2022-06-29
1.	ISSUED FOR REVIEW	JD	2021-12-01

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NORWOOD PARK SUBDIVISION PHASE 4

TOWNSHIP OF ASPHODEL-NORWOOD

FUNCTIONAL STORM SEWER DESIGN

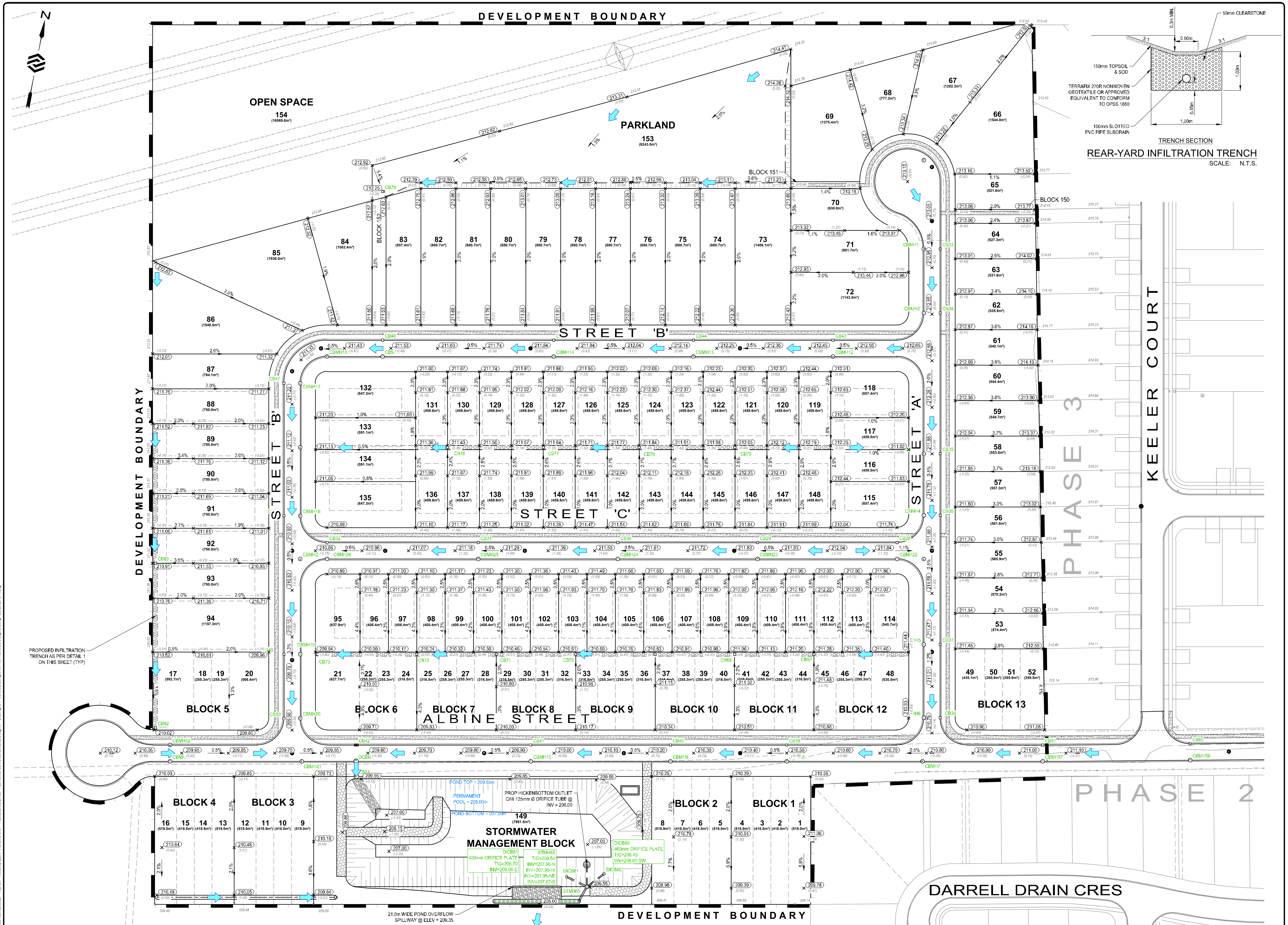
NORWOOD, ONTARIO

DRAWN BY: J.DUNN	STAMP:
DESIGNED BY: J.DUNN	
APPROVED BY: J.ARMSTRONG	
DATE: 2021-11-17	
SCALE:	

PROJECT NUMBER:	SHEET NAME:	SHEET:
20120	ST1	2 of 2

20120-ST1
Date: Jul. 26, 2022 - 11:31 am Plotted by: jdunn File name: S:\01-Projects\2020\20120 - Pino Homes Carmichael Lands\02 Design\01 - Drawing\01 - Current Drawing\20120-ST1.dwg

Figure 8 - Preliminary Grading Plan



BENCHMARK

CUT CROSS IN CONCRETE GUTTER ON KEELER COURT AT THE INTERSECTION OF KEELER COURT AND MARYANN LANE. CUT CROSS IS ON THE WEST SIDE OF THE ROAD APPROXIMATELY 100m NORTH OF THE INTERSECTION OF ALBINE STREET AND KEELER COURT.

ELEV: 213.160m

NOTES:

No.	REVISION	BY	DATE
2.	ISSUED TO ORCA	JD	2022-06-29
1.	ISSUED FOR REVIEW	JD	2021-12-01

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NORWOOD PARK SUBDIVISION PHASE 4

TOWNSHIP OF ASPHODEL-NORWOOD

FUNCTIONAL GRADING PLAN

NORWOOD, ONTARIO

DRAWN BY: J.DUNN

DESIGNED BY: J.DUNN

APPROVED BY: J.ARMSTRONG

DATE: 2021-11-17

STAMP:

SCALE:

PROJECT NUMBER: 20120

SHEET NAME: GP1

SHEET: 1 of 2

20120-GP1

Appendix A: Hydrologic Parameters

Visual OTTHYMO Input Parameters
STANDHYD Command

Project Name: Norwood Park Phase 4
Project No: 20120
Designed By: MC
Date: 2022-06-06

Parameter	Description	EXT4	PR1	PXT6
AREA	Catchment Area (ha)	1.17	11.55	1.17
DT	Time Step Increment (min)	5		
TIMP	Total Impervious Area (%)	24.76	52.4	28.94
XIMP	Directly Connected Impervious Area (%)	17.1	40	20.09
DWF	Dry Weather Flow (m^3/s)	0		
LOSS[1]	Modified CN*	59	59	59
SLPP	Average Slope Pervious Area (%)	5	3	5.1
LGP	Overland Flow Length Pervioius Area (m)	26	22	26
MNP	Manning's Roughness Coefficient (Pervious)	0.25		
SCP	Storage Coefficient Pervious Area	0		
DPSI	Depression Storage Impervious Area (mm/hr)	1		
SLPI	Average Slope Impervious Area (%)	2	1	2
LGI	Impervious Overland Flow Length (m)	88.3	277.5	88.3
MNI	Manning's Roughness Coefficient (Impervious)	0.013		
SCI	Storage Coefficient Impervious Area	0		
RAIN	Optional Rainfall Intensity (mm/hr)	0		

Notes:

1. CN values based on Design Chart 1.09 in MTO Drainage Manual based on Soil Type BC.
2. CN* derived using the Modify CN function in VO5. The modification was completed in accordance with the procedure decribed in the VO5 reference Manual.
3. Initial abstraction values derived from UNESCO Manual on Drainage in Urban Areas, 1987.

Visual OTTHYMO Input Parameters
NASHYD Command

Project Name: Norwood Park Phase 4
Project No: 20120
Designed By: MC
Date: 2022-06-06

Parameter	Description	EX1	EX2	EXT3	PR2	PR3	PR4	PXT5
Area	Watershed Area (m)	12.27	1.83	2.80	0.75	1.52	0.27	2.80
DT	Time Step Increment (min)	5						
DWF	Dry Weather Flow (Base Flow)	0						
CN[1,2]	Modified SCS Number	72	73	71	73	63	59	71
IA[3]	Initial Abstraction	5						
TP [4,5]	Unit Hydrograph Time to Peak	0.50	0.33	0.35	0.33	0.55	0.49	0.36
N	Number of Linear Reservior	3						
Rain	Optional Rainfall Intensity (mm/hr)	0 - None						

Notes:

1. CN values based on Design Chart 1.09 in MTO Drainage Manual based on Soil Type BC.
2. CN derived using the Modify CN function in VO5. The modification was completed in accordance with the procedure decribed in the VO5 reference Manual.
3. Initial abstraction values derived from UNESCO Manual on Drainage in Urban Areas, 1987.
4. Time of Concentration calculated using Airport Equation for C<0.4 and Bransby Williams for C>0.4.
5. Time to Peak estimated at 0.67Tc.

Rational Method Calculations

Project Name: Norwood Park Phase 4
Project No: 20120
Rain Gauge: Peterborough

Designed By: MC
Date: 2022-06-06

Catchment Name and Description		Land Use and Areas (Ha)								Catchment Characteristics									
Name	Description	CN = 50 Wetland	CN = 61 Grass	CN = 85 Gravel	CN = 74 Crop & other improved land	CN = 65 Pasture & other unimproved land	CN = 58 Woodlots and forests	CN = 98 Impervious	**Total**	CN Weighted	% Impervious	Soils Group	Length (m)	Average Slope (%)	Calculated Time of Concentration (min)	Minimum Time of Concentration (min)	Time to Peak (min)	Time to Peak (hr)	Composite Runnoff Coefficient
EX1	East	0.000	0.000	0.300	11.290	0.000	0.680	0.000	**12.27**	73.38	0.00%	B	450.0	1.5	45.3	10.0	30.2	0.50	0.35
EX2	West	0.000	0.000	0.030	1.730	0.000	0.070	0.000	**1.83**	73.57	0.00%	B	145.0	1.0	29.4	10.0	19.6	0.33	0.35
EXT3	North External	0.000	0.583	0.000	2.061	0.000	0.000	0.156	**2.80**	72.63	5.57%	B	132.0	0.8	31.1	10.0	20.7	0.35	0.33
EXT4	Phase 3/Albine	0.000	0.851	0.030	0.000	0.000	0.000	0.290	**1.17**	70.78	24.76%	B	240.0	2.0	30.2	10.0	20.2	0.34	0.35
Total Site	EX1 + EX2	0.000	0.000	0.330	13.020	0.000	0.750	0.000	**14.10**										
PR1	Internal West	0.000	5.500	0.000	0.000	0.000	0.000	6.051	**11.55**	80.38	52.39%	B	523.0	0.5	26.8	10.0	17.9	0.30	0.52
PR2	West	0.000	0.000	0.000	0.750	0.000	0.000	0.000	**0.75**	74.00	0.00%	B	145.0	1.0	29.4	10.0	19.6	0.33	0.35
PR3	Parkland	0.000	1.523	0.000	0.000	0.000	0.000	0.000	**1.52**	61.00	0.00%	B	200.0	0.8	49.6	10.0	33.1	0.55	0.10
PR4	Rearyards	0.000	0.272	0.000	0.000	0.000	0.000	0.000	**0.27**	61.00	0.00%	B	184.0	1.0	44.2	10.0	29.5	0.49	0.10
PXT5	North External	0.000	0.583	0.000	2.061	0.000	0.000	0.156	**2.80**	72.63	5.57%	B	141.0	0.8	32.1	10.0	21.4	0.36	0.33
PXT6	Phase 3/Albine	0.000	0.832	0.000	0.000	0.000	0.000	0.339	**1.17**	71.71	28.94%	B	240.0	1.0	38.8	10.0	25.9	0.43	0.33
Total Site	PR1+PR2+PR3+PR4	0.000	7.295	0.000	0.750	0.000	0.000	6.051	**14.10**										

Notes:

1. Runoff coefficients for Land Uses taken from MTO Drainage Manual Design Chart 1.07.
2. Runoff coefficients have been adjusted for storms exceeding the 10-year return period as follows: 25 Year - 1.10; 50-Year: 1.20; 100-Year: 1.25

Time of Concentration

1.Tc calculcated using Airport equation for C<0.4 and Bransby Willisams for C>0.4
2. Tp calculated as 0.67Tc.

Appendix B: Percent Impervious Calculations

PERCENT IMPERVIOUS AREA CALCUATIONS

PROPOSED DRAINAGE AREA PR1

Project Name: Norwood Park Phase 4

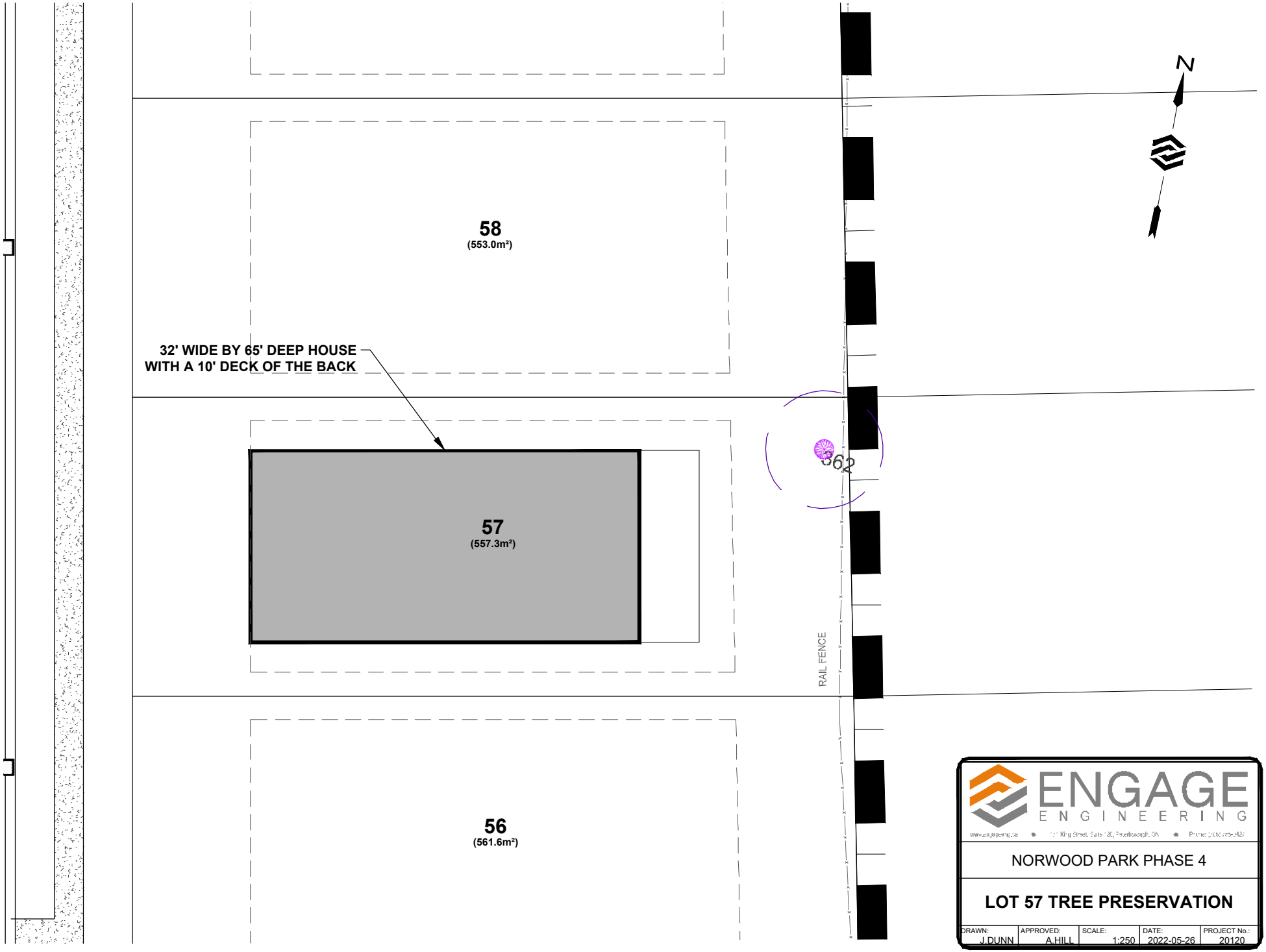
Project No.: 20120

Surface Type	Number	Length (m)	Width (m)	Unit Area (m2)	Total Area (m2)
Homes (50' lots)[1]	44			195	8580
Homes (45' lots)	32			225	7200
Homes (40' lots)[1]	20			195	3900
Townhomes	52			153	7956
Road		1281	10		12810
Cul de sac	2			1332	2664
Sidewalk (one side)		1540	1.5		2310
Driveways	148	8	6		7104
SWM Facility/SPS				7981	7981
Directly Connected Impervious					46687
Subtotal Impervious					60505
Pervious					54995
Drainage Area Total					115500

% Impervious	52%
% Directly Connected	40%

1 - Building areas taken from Peterborough Homes building plans, using largest unit type for given lot type.

2 - Directly connected impervious area includes: road, sidewalk, driveways, 0.5*homes, SWM Bloc



ENGAGE ENGINEERING

NORWOOD PARK PHASE 4

LOT 57 TREE PRESERVATION

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT No.:
J.DUNN	A.HILL	1:250	2022-05-26	20120

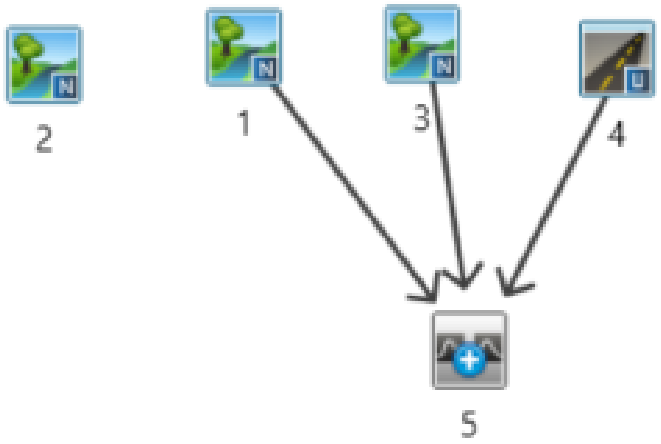
S:\01 - Projects\20000\20120 - Ptbo Homes Carmichael Lands\02 Design\01 - Drawings\01 - Current Drawings\20120-F1.dwg PRINTED: May 26, 2022

Appendix C: Visual OTTHYMO Results

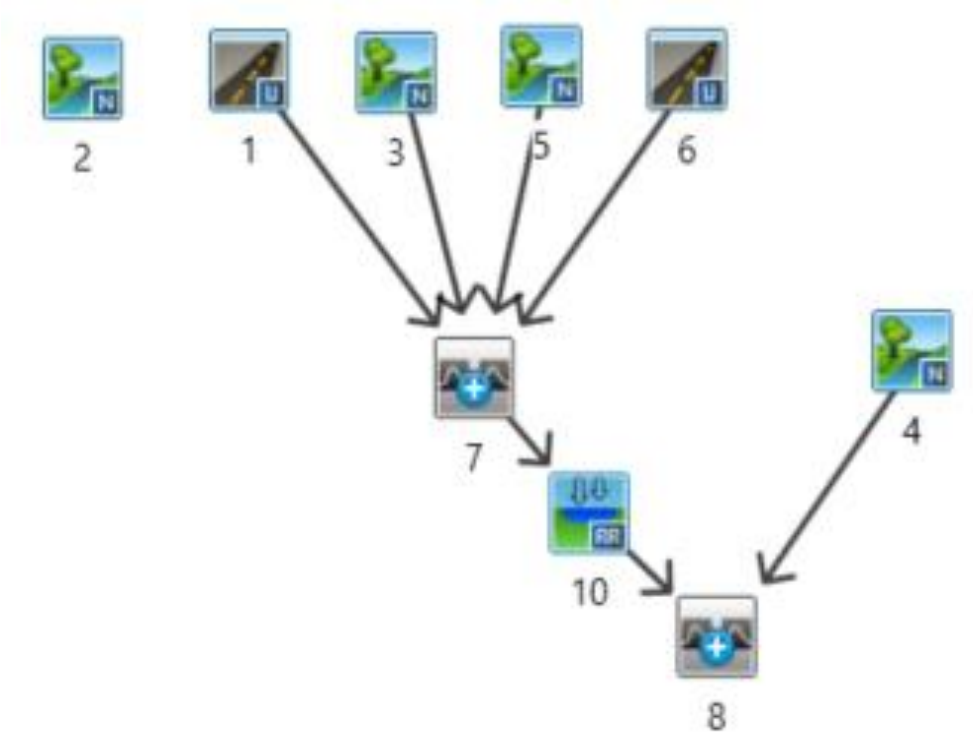
Visual OTTHYMO 6 - Hydrologic Model

Project Name:	Norwood Park Phase 4	**Designed By:**	MC
Project No:	20120	**Date:**	2022-06-27

Pre-Development Model



Post-Development Model



Visual OTTHYMO
Peak Flow Summary

Project Name: Norwood Park Phase 4 **Designed By:** MC

Project No: 20120 **Date:** Jun-22

Catchment ID	Direction	Peak Flows (m^3/s) (Ptbo - 6 Hour SCS)					
		2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
EX1	East	0.182	0.334	0.451	0.612	0.741	0.876
EX2	West	0.038	0.069	0.093	0.126	0.153	0.180
EXT3	North External	0.052	0.095	0.129	0.175	0.212	0.250
EXT4	Phase 3/Albine	0.048	0.085	0.110	0.144	0.172	0.202
Total South	EX1+EXT3+EXT4	0.243	0.441	0.594	0.804	0.974	1.149
Total Pre Development	EX1+EX2+EXT3+EXT4						
PR1	Internal West	0.848	1.240	1.624	2.028	2.345	2.67
PR2	Open Space	0.016	0.028	0.038	0.052	0.063	0.074
PR3	Parklands	0.015	0.028	0.039	0.054	0.066	0.078
PR4	Rearyards	0.003	0.005	0.007	0.009	0.011	0.013
PXT5	North External	0.051	0.093	0.126	0.171	0.208	0.246
PXT6	Phase 3/Albine	0.054	0.092	0.118	0.154	0.183	0.213
Total To Pond	PR1+PR3+PXT5+PXT6	0.936	1.400	1.836	2.313	2.688	3.075
Total South	PR1+PR3+PR4+PXT5+PXT6	0.939	1.405	1.843	2.322	2.699	3.088
Allowable Discharge	Total South - PR4	0.240	0.436	0.587	0.795	0.963	1.136

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

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       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         V V    I      SS   U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

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

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DATE: 06-27-2022                          TIME: 03:09:18

USER:


COMMENTS: _____________________________________________________

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  ************************************************


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| Ptotal= 38.75 mm |    Comments: Ptbo_SCS_6hr_2yr
--------------------
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.25     1.60 |  1.75     3.90 |  3.25     8.50 |  4.75     2.30
               0.50     1.60 |  2.00     3.90 |  3.50     8.50 |  5.00     2.30
               0.75     2.30 |  2.25     4.60 |  3.75     3.90 |  5.25     1.60
               1.00     2.30 |  2.50     4.60 |  4.00     3.90 |  5.50     1.60
               1.25     2.30 |  2.75    23.20 |  4.25     3.10 |  5.75     1.60
               1.50     2.30 |  3.00    60.40 |  4.50     3.10 |  6.00     1.60

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

--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   1.83   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

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

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

     Unit Hyd Qpeak  (cms)=   0.212

     PEAK FLOW       (cms)=   0.038 (i)
     TIME TO PEAK    (hrs)=   3.250
     RUNOFF VOLUME    (mm)=   8.917
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.230

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  12.27   Curve Number   (CN)= 72.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.50

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

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

     Unit Hyd Qpeak  (cms)=   0.937

     PEAK FLOW       (cms)=   0.182 (i)
     TIME TO PEAK    (hrs)=   3.500
     RUNOFF VOLUME    (mm)=   8.594
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.222

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   2.80   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.35

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

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

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              1.333    2.30 | 2.833   60.40 | 4.333    3.10 |  5.83    1.60
              1.417    2.30 | 2.917   60.40 | 4.417    3.10 |  5.92    1.60
              1.500    2.30 | 3.000   60.40 | 4.500    3.10 |  6.00    1.60

     Unit Hyd Qpeak  (cms)=   0.306

     PEAK FLOW       (cms)=   0.052 (i)
     TIME TO PEAK    (hrs)=   3.250
     RUNOFF VOLUME    (mm)=   8.282
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.214

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

--------------------------------------------------------------------------------
-------------------
| CALIB           |
| STANDHYD (  0004)|   Area    (ha)=   1.17
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.00   Dir. Conn.(%)=  17.10
-------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.29         0.88
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      88.32        26.00
     Mannings n           =      0.013        0.250

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

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

     Max.Eff.Inten.(mm/hr)=      60.40        13.22
               over (min)         5.00        15.00
     Storage Coeff.  (min)=       2.36 (ii)   11.66 (ii)
     Unit Hyd. Tpeak (min)=       5.00        15.00
     Unit Hyd. peak  (cms)=       0.30         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.02          0.048 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.08           3.00
     RUNOFF VOLUME    (mm)=      37.75         6.04          11.46
     TOTAL RAINFALL   (mm)=      38.75        38.75          38.75
     RUNOFF COEFFICIENT   =       0.97         0.16           0.30

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (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  (  0005)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    12.27   0.182     3.50     8.59
     + ID2= 2 (  0003):     2.80   0.052     3.25     8.28
       ====================================================
       ID = 3 (  0005):    15.07   0.229     3.42     8.54

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

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    15.07   0.229     3.42     8.54
     + ID2= 2 (  0004):     1.17   0.048     3.00    11.46
       ====================================================
       ID = 1 (  0005):    16.24   0.243     3.42     8.75

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
  Output  filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\a1d88c8e-443
  Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\a1d88c8e-443

DATE: 06-27-2022                          TIME: 03:09:19

USER:


COMMENTS: _____________________________________________________

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  ************************************************
  ** SIMULATION : 2-Ptbo_SCS_6hr_5yr            **
  ************************************************

--------------------
|    READ STORM    |    Filename: C:\Users\mcraig\AppD
|                  |              ata\Local\Temp\
|                  |              407a7141-c2f7-4ab7-bd69-d68b3c031235\6361997a
| Ptotal= 52.44 mm |    Comments: Ptbo_SCS_6hr_5yr
--------------------
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.25    2.10 |  1.75    5.20 |  3.25   11.50 |  4.75    3.20
              0.50    2.10 |  2.00    5.20 |  3.50   11.50 |  5.00    3.20
              0.75    3.20 |  2.25    6.30 |  3.75    5.20 |  5.25    2.10
              1.00    3.20 |  2.50    6.30 |  4.00    5.20 |  5.50    2.10
              1.25    3.20 |  2.75   31.40 |  4.25    4.20 |  5.75    2.10
              1.50    3.20 |  3.00   81.78 |  4.50    4.20 |  6.00    2.10

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| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   1.83   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

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

                          ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
```

0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.212

PEAK FLOW (cms)= 0.069 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 15.916
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.303

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

CALIB
NASHYD (0001) | Area (ha)= 12.27 Curve Number (CN)= 72.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.50

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	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.937

PEAK FLOW (cms)= 0.334 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 15.394
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.294

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

CALIB
NASHYD (0003) | Area (ha)= 2.80 Curve Number (CN)= 71.0
ID= 1 DT= 5.0 min | Ia (mm)= 5.00 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.35

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr

0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.306

PEAK FLOW (cms)= 0.095 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 14.885
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.284

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

CALIB
STANDHYD (0004) | Area (ha)= 1.17
ID= 1 DT= 5.0 min | Total Imp(%)= 25.00 Dir. Conn.(%)= 17.10

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.29	0.88
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	5.00
Length	(m)=	88.32	26.00
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	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Max.Eff.Inten.(mm/hr)=		81.78	24.14	
over (min)		5.00	10.00	
Storage Coeff. (min)=		2.09 (ii)	9.40 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.31	0.12	
				TOTALS
PEAK FLOW	(cms)=	0.05	0.04	0.085 (iii)
TIME TO PEAK	(hrs)=	3.00	3.08	3.00
RUNOFF VOLUME	(mm)=	51.44	11.06	17.96
TOTAL RAINFALL	(mm)=	52.45	52.45	52.45
RUNOFF COEFFICIENT	=	0.98	0.21	0.34

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(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 (0005)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):		12.27	0.334	3.42	15.39
+ ID2= 2 (0003):		2.80	0.095	3.25	14.89
ID = 3 (0005):		15.07	0.419	3.42	15.30

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0005)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0005):		15.07	0.419	3.42	15.30
+ ID2= 2 (0004):		1.17	0.085	3.00	17.96
ID = 1 (0005):		16.24	0.441	3.33	15.49

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
       V    V   I    SSSSS  U   U    A    L              (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I       SS  U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

        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 6.0\VO2\voin.dat
Output filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\6e37793d-9d5
Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\6e37793d-9d5

DATE: 06-27-2022 TIME: 03:09:19

USER:

COMMENTS: _____

** SIMULATION : 3-Ptbo_SCS_6hr_10yr **

READ STORM	Filename: C:\Users\mcraig\AppD ata\Local\Temp\ 407a7141-c2f7-4ab7-bd69-d68b3c031235\3a85cc49
Ptotal= 61.60 mm	Comments: Ptbo_SCS_6hr_10yr

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

CALIB		
NASHYD (0002)|	Area (ha)=	1.83 Curve Number (CN)= 73.0
ID= 1 DT= 5.0 min |	Ia (mm)=	5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.33

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

Unit Hyd Qpeak (cms)= 0.212

PEAK FLOW (cms)= 0.093 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 21.274
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.345

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

CALIB		
NASHYD (0001)|	Area (ha)=	12.27 Curve Number (CN)= 72.0
ID= 1 DT= 5.0 min |	Ia (mm)=	5.00 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.50

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

Unit Hyd Qpeak (cms)= 0.937

PEAK FLOW (cms)= 0.451 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 20.617
TOTAL RAINFALL (mm)= 61.600
RUNOFF COEFFICIENT = 0.335

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

CALIB					
NASHYD (0003)	Area (ha)=	2.80	Curve Number (CN)=	71.0	
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.35			

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

---- TRANSFORMED HYETOGRAPH ----

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

Unit Hyd Qpeak (cms)= 0.306

PEAK FLOW	(cms)=	0.129 (i)
TIME TO PEAK	(hrs)=	3.250
RUNOFF VOLUME	(mm)=	19.975
TOTAL RAINFALL	(mm)=	61.600
RUNOFF COEFFICIENT	=	0.324

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

CALIB					
STANDHYD (0004)	Area (ha)=	1.17			
ID= 1 DT= 5.0 min	Total Imp(%)=	25.00	Dir. Conn.(%)=	17.10	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.29	0.88
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	5.00
Length	(m)=	88.32	26.00
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	2.50	1.583	6.20	3.083	13.50	4.58	3.70
0.167	2.50	1.667	6.20	3.167	13.50	4.67	3.70
0.250	2.50	1.750	6.20	3.250	13.50	4.75	3.70
0.333	2.50	1.833	6.20	3.333	13.50	4.83	3.70
0.417	2.50	1.917	6.20	3.417	13.50	4.92	3.70
0.500	2.50	2.000	6.20	3.500	13.50	5.00	3.70
0.583	3.70	2.083	7.40	3.583	6.20	5.08	2.50
0.667	3.70	2.167	7.40	3.667	6.20	5.17	2.50
0.750	3.70	2.250	7.40	3.750	6.20	5.25	2.50
0.833	3.70	2.333	7.40	3.833	6.20	5.33	2.50
0.917	3.70	2.417	7.40	3.917	6.20	5.42	2.50
1.000	3.70	2.500	7.40	4.000	6.20	5.50	2.50
1.083	3.70	2.583	36.90	4.083	4.90	5.58	2.50
1.167	3.70	2.667	36.90	4.167	4.90	5.67	2.50
1.250	3.70	2.750	36.90	4.250	4.90	5.75	2.50
1.333	3.70	2.833	95.90	4.333	4.90	5.83	2.50
1.417	3.70	2.917	95.90	4.417	4.90	5.92	2.50
1.500	3.70	3.000	95.90	4.500	4.90	6.00	2.50

Max.Eff.Inten.(mm/hr)=	95.90	32.64	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.96 (ii)	8.44 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.31	0.12	

				TOTALS
PEAK FLOW	(cms)=	0.05	0.06	0.110 (iii)
TIME TO PEAK	(hrs)=	3.00	3.08	3.00
RUNOFF VOLUME	(mm)=	60.60	15.03	22.82
TOTAL RAINFALL	(mm)=	61.60	61.60	61.60
RUNOFF COEFFICIENT	=	0.98	0.24	0.37

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(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 (0005)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	12.27	0.451	3.42	20.62
+ ID2= 2 (0003):	2.80	0.129	3.25	19.97
ID = 3 (0005):	15.07	0.566	3.42	20.50

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0005)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0005):	15.07	0.566	3.42	20.50
+ ID2= 2 (0004):	1.17	0.110	3.00	22.82
ID = 1 (0005):	16.24	0.594	3.33	20.66

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
V    V   I    SSSSS  U   U    A    L              (v 6.0.2006)
V    V   I    SS     U   U   A A   L
 V  V    I     SS    U   U  AAAAA  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 6.0\VO2\voin.dat
Output filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\3a4ed4b0-33d
Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\3a4ed4b0-33d

DATE: 06-27-2022 TIME: 03:09:18

USER:

COMMENTS: _____

```
**********************************************
** SIMULATION : 4-Ptbo_SCS_6hr_25yr          **
**********************************************
```

```
--------------------
|    READ STORM     |    Filename: C:\Users\mcraig\AppD
|                   |              ata\Local\Temp\
|                   |              407a7141-c2f7-4ab7-bd69-d68b3c031235\a25664cf
| Ptotal= 72.90 mm  |    Comments: Ptbo_SCS_6hr_25yr
--------------------
```

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

```
--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0002)| Area    (ha)=   1.83   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min | Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------  U.H. Tp(hrs)=   0.33

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

```
    Unit Hyd Qpeak  (cms)=   0.212

    PEAK FLOW       (cms)=   0.126 (i)
    TIME TO PEAK    (hrs)=   3.167
    RUNOFF VOLUME    (mm)=  28.479
    TOTAL RAINFALL   (mm)=  72.900
    RUNOFF COEFFICIENT   =   0.391

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0001)| Area    (ha)=  12.27   Curve Number   (CN)= 72.0
|ID= 1 DT= 5.0 min | Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------  U.H. Tp(hrs)=   0.50

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

```
    Unit Hyd Qpeak  (cms)=   0.937

    PEAK FLOW       (cms)=   0.612 (i)
    TIME TO PEAK    (hrs)=   3.417
    RUNOFF VOLUME    (mm)=  27.659
    TOTAL RAINFALL   (mm)=  72.900
    RUNOFF COEFFICIENT   =   0.379

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| NASHYD   (  0003)| Area    (ha)=   2.80   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min | Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------  U.H. Tp(hrs)=   0.35

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

---- TRANSFORMED HYETOGRAPH ----

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

```
    Unit Hyd Qpeak  (cms)=   0.306

    PEAK FLOW       (cms)=   0.175 (i)
    TIME TO PEAK    (hrs)=   3.250
    RUNOFF VOLUME    (mm)=  26.854
    TOTAL RAINFALL   (mm)=  72.900
    RUNOFF COEFFICIENT   =   0.368

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

--------------------------------------------------------------------------------
--------------------
| CALIB              |
| STANDHYD (  0004)| Area    (ha)=   1.17
|ID= 1 DT= 5.0 min | Total Imp(%)=  25.00   Dir. Conn.(%)=  17.10
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.29          0.88
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       2.00          5.00
     Length            (m)=      88.32         26.00
     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	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40

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

```
     Max.Eff.Inten.(mm/hr)=     113.70        44.52
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.83 (ii)    7.55 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.13
                                                    *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.08          0.144 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.00          3.00
     RUNOFF VOLUME    (mm)=      71.90        20.50         29.29
     TOTAL RAINFALL   (mm)=      72.90        72.90         72.90
     RUNOFF COEFFICIENT   =       0.99         0.28          0.40

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (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  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0001):    12.27   0.612     3.42    27.66
      + ID2= 2 (  0003):     2.80   0.175     3.25    26.85
        ================================================
        ID = 3 (  0005):    15.07   0.768     3.33    27.51

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

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 3 (  0005):    15.07   0.768     3.33    27.51
      + ID2= 2 (  0004):     1.17   0.144     3.00    29.29
        ================================================
        ID = 1 (  0005):    16.24   0.804     3.33    27.64

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
  Output  filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\3abb3022-043
  Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\3abb3022-043

DATE: 06-27-2022                          TIME: 03:09:19

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 5-Ptbo_SCS_6hr_50yr           **
  ************************************************

--------------------
|    READ STORM    |    Filename: C:\Users\mcraig\AppD
|                  |              ata\Local\Temp\
|                  |              407a7141-c2f7-4ab7-bd69-d68b3c031235\ed30a070
| Ptotal= 81.47 mm |    Comments: Ptbo_SCS_6hr_50yr
--------------------
```

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

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

--------------------
| CALIB            |
| NASHYD   (  0002)|   Area     (ha)=   1.83   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

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

```
     Unit Hyd Qpeak  (cms)=   0.212

     PEAK FLOW       (cms)=   0.153 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  34.308
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.421

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0001)|   Area     (ha)=  12.27   Curve Number   (CN)= 72.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.50

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

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

     Unit Hyd Qpeak  (cms)=   0.937

     PEAK FLOW       (cms)=   0.741 (i)
     TIME TO PEAK    (hrs)=   3.417
     RUNOFF VOLUME    (mm)=  33.370
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.410

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area     (ha)=   2.80   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.35

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

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

     Unit Hyd Qpeak  (cms)=   0.306

     PEAK FLOW       (cms)=   0.212 (i)
     TIME TO PEAK    (hrs)=   3.250
     RUNOFF VOLUME    (mm)=  32.444
     TOTAL RAINFALL   (mm)=  81.475
     RUNOFF COEFFICIENT   =   0.398

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0004)|   Area     (ha)=   1.17
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.00   Dir. Conn.(%)=  17.10
--------------------

                        IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.29          0.88
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       2.00          5.00
     Length           (m)=      88.32         26.00
     Mannings n            =      0.013         0.250

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

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

     Max.Eff.Inten.(mm/hr)=     127.00        54.18
               over (min)          5.00        10.00
     Storage Coeff.  (min)=        1.75 (ii)    7.04 (ii)
     Unit Hyd. Tpeak (min)=        5.00        10.00
     Unit Hyd. peak  (cms)=        0.32         0.14
                                                      *TOTALS*
     PEAK FLOW       (cms)=        0.07         0.10          0.172 (iii)
     TIME TO PEAK    (hrs)=        3.00         3.00           3.00
     RUNOFF VOLUME    (mm)=       80.48        25.02          34.50
     TOTAL RAINFALL   (mm)=       81.48        81.48          81.48
     RUNOFF COEFFICIENT   =        0.99         0.31           0.42

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (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  (  0005)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    12.27    0.741     3.42    33.37
     + ID2= 2 (  0003):     2.80    0.212     3.25    32.44
       ==========================================================
       ID = 3 (  0005):    15.07    0.932     3.33    33.20

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

--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    15.07    0.932     3.33    33.20
     + ID2= 2 (  0004):     1.17    0.172     3.00    34.50
       ==========================================================
       ID = 1 (  0005):    16.24    0.974     3.33    33.29

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

       V    V   I    SSSSS  U   U    A    L                 (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

       OOO   TTTTT  TTTTT  H   H  Y   Y  M   M   OOO    TM
```

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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
  Output  filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\d89b32a9-003
  Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\d89b32a9-003

DATE: 06-27-2022                          TIME: 03:09:19

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 6-Ptbo_SCS_6hr_100yr          **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\mcraig\AppD
|                  |              ata\Local\Temp\
|                  |              407a7141-c2f7-4ab7-bd69-d68b3c031235\bd87fd49
| Ptotal= 89.93 mm |    Comments: Ptbo_SCS_6hr_100yr
--------------------
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
                0.25     3.60 |  1.75     9.00 |  3.25    19.80 |  4.75     5.40
                0.50     3.60 |  2.00     9.00 |  3.50    19.80 |  5.00     5.40
                0.75     5.40 |  2.25    10.80 |  3.75     9.00 |  5.25     3.60
                1.00     5.40 |  2.50    10.80 |  4.00     9.00 |  5.50     3.60
                1.25     5.40 |  2.75    53.90 |  4.25     7.20 |  5.75     3.60
                1.50     5.40 |  3.00   140.20 |  4.50     7.20 |  6.00     3.60

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--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   1.83   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

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


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

    Unit Hyd Qpeak  (cms)=   0.212

    PEAK FLOW       (cms)=   0.180 (i)
    TIME TO PEAK    (hrs)=   3.167
    RUNOFF VOLUME    (mm)=  40.310
    TOTAL RAINFALL   (mm)=  89.925
    RUNOFF COEFFICIENT   =   0.448

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

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--------------------
| CALIB            |
| NASHYD   (  0001)|   Area    (ha)=  12.27   Curve Number   (CN)= 72.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.50

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


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

    Unit Hyd Qpeak  (cms)=   0.937

    PEAK FLOW       (cms)=   0.876 (i)
    TIME TO PEAK    (hrs)=   3.417
    RUNOFF VOLUME    (mm)=  39.258
    TOTAL RAINFALL   (mm)=  89.925
    RUNOFF COEFFICIENT   =   0.437

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

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--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   2.80   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.35

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


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

    Unit Hyd Qpeak  (cms)=   0.306

    PEAK FLOW       (cms)=   0.250 (i)
    TIME TO PEAK    (hrs)=   3.250
    RUNOFF VOLUME    (mm)=  38.218
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     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT    =   0.425

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
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| CALIB              |
| STANDHYD (  0004)|   Area    (ha)=   1.17
|ID= 1 DT= 5.0 min |   Total Imp(%)=  25.00   Dir. Conn.(%)=  17.10
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.29         0.88
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      2.00         5.00
     Length            (m)=     88.32        26.00
     Mannings n           =     0.013        0.250

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


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

     Max.Eff.Inten.(mm/hr)=     140.20        64.31
               over (min)         5.00        10.00
     Storage Coeff.  (min)=       1.68 (ii)    6.62 (ii)
     Unit Hyd. Tpeak (min)=       5.00        10.00
     Unit Hyd. peak  (cms)=       0.32         0.14
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.08         0.12          0.202 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.00           3.00
     RUNOFF VOLUME    (mm)=      88.92        29.76          39.87
     TOTAL RAINFALL   (mm)=      89.93        89.93          89.93
     RUNOFF COEFFICIENT   =       0.99         0.33           0.44

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (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  (  0005)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    12.27   0.876     3.42    39.26
     + ID2= 2 (  0003):     2.80   0.250     3.25    38.22
       ==========================================
       ID = 3 (  0005):    15.07   1.102     3.33    39.07

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

```
--------------------
| ADD HYD  (  0005)|
|   3 +  2 =  1    |         AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 3 (  0005):    15.07   1.102     3.33    39.07
     + ID2= 2 (  0004):     1.17   0.202     3.00    39.87
       ==========================================
       ID = 1 (  0005):    16.24   1.149     3.33    39.12

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

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 FINISH
================================================================================================================
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================================================================================================================

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         V V    I      SS   U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

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

  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
  Output  filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\8dd54930-5d9
  Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\8dd54930-5d9

DATE: 06-27-2022                          TIME: 02:06:56

USER:


COMMENTS: _____________________________________________________________

----------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 1-Ptbo_SCS_6hr_2yr            **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\mcraig\AppD
|                  |              ata\Local\Temp\
|                  |              2c21b110-a15d-4b69-bdfd-344eeaa15e95\77c4994c
| Ptotal= 38.75 mm |    Comments: Ptbo_SCS_6hr_2yr
--------------------
                TIME     RAIN |  TIME     RAIN |'  TIME     RAIN |  TIME     RAIN
                 hrs    mm/hr |   hrs    mm/hr |'   hrs    mm/hr |   hrs    mm/hr
               0.25     1.60 |  1.75     3.90 |  3.25     8.50 |  4.75     2.30
               0.50     1.60 |  2.00     3.90 |  3.50     8.50 |  5.00     2.30
               0.75     2.30 |  2.25     4.60 |  3.75     3.90 |  5.25     1.60
               1.00     2.30 |  2.50     4.60 |  4.00     3.90 |  5.50     1.60
               1.25     2.30 |  2.75    23.20 |  4.25     3.10 |  5.75     1.60
               1.50     2.30 |  3.00    60.40 |  4.50     3.10 |  6.00     1.60

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--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   0.75   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

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

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

     Unit Hyd Qpeak  (cms)=   0.087

     PEAK FLOW       (cms)=   0.016 (i)
     TIME TO PEAK    (hrs)=   3.250
     RUNOFF VOLUME    (mm)=   8.917
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.230

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

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--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   1.52   Curve Number   (CN)= 63.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.55

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

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

     Unit Hyd Qpeak  (cms)=   0.106

     PEAK FLOW       (cms)=   0.015 (i)
     TIME TO PEAK    (hrs)=   3.500
     RUNOFF VOLUME    (mm)=   6.226
     TOTAL RAINFALL   (mm)=  38.750
     RUNOFF COEFFICIENT   =   0.161

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   2.80   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

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

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

1.333	2.30	2.833	60.40	4.333	3.10	5.83	1.60
1.417	2.30	2.917	60.40	4.417	3.10	5.92	1.60
1.500	2.30	3.000	60.40	4.500	3.10	6.00	1.60

Unit Hyd Qpeak (cms)= 0.297

PEAK FLOW (cms)= 0.051 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 8.283
TOTAL RAINFALL (mm)= 38.750
RUNOFF COEFFICIENT = 0.214

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

CALIB
STANDHYD (0006)
ID= 1 DT= 5.0 min

Area (ha)= 1.17
Total Imp(%)= 29.00 Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.34	0.83
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	5.00
Length	(m)=	88.32	26.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

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

				TOTALS
Max.Eff.Inten.(mm/hr)=		60.40	13.75	
over (min)		5.00	15.00	
Storage Coeff. (min)=		2.36 (ii)	11.51 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.30	0.09	
PEAK FLOW	(cms)=	0.04	0.02	0.054 (iii)
TIME TO PEAK	(hrs)=	3.00	3.08	3.00
RUNOFF VOLUME	(mm)=	37.75	6.17	12.48
TOTAL RAINFALL	(mm)=	38.75	38.75	38.75
RUNOFF COEFFICIENT	=	0.97	0.16	0.32

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(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 (0001)
ID= 1 DT= 5.0 min

Area (ha)= 11.55
Total Imp(%)= 52.00 Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.01	5.54
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	3.00
Length	(m)=	277.49	22.00
Mannings n	=	0.013	0.250

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

---- TRANSFORMED HYETOGRAPH ----

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

				TOTALS
Max.Eff.Inten.(mm/hr)=		60.40	16.95	
over (min)		5.00	15.00	
Storage Coeff. (min)=		5.77 (ii)	14.65 (ii)	
Unit Hyd. Tpeak (min)=		5.00	15.00	
Unit Hyd. peak (cms)=		0.20	0.08	
PEAK FLOW	(cms)=	0.74	0.14	0.848 (iii)
TIME TO PEAK	(hrs)=	3.00	3.17	3.00
RUNOFF VOLUME	(mm)=	37.75	6.86	19.22
TOTAL RAINFALL	(mm)=	38.75	38.75	38.75
RUNOFF COEFFICIENT	=	0.97	0.18	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.

ADD HYD (0007)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):		11.55	0.848	3.00	19.22
+ ID2= 2 (0003):		1.52	0.015	3.50	6.23
ID = 3 (0007):		13.07	0.853	3.00	17.71

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0007)
3 + 2 = 1

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0007):		13.07	0.853	3.00	17.71
+ ID2= 2 (0005):		2.80	0.051	3.25	8.28
ID = 1 (0007):		15.87	0.882	3.00	16.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0007)
1 + 2 = 3

		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0007):		15.87	0.882	3.00	16.04
+ ID2= 2 (0006):		1.17	0.054	3.00	12.48
ID = 3 (0007):		17.04	0.936	3.00	15.80

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| RESERVOIR(  0010)|     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   |   0.6660     0.2762
                          0.2380     0.1248   |   0.7160     0.3247
                          0.3050     0.1965   |   0.7850     0.3788
                          0.5820     0.2224   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     17.040     0.936      3.00      15.80
   OUTFLOW: ID= 1 (  0010)     17.040     0.238      3.50      15.79

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.38
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1248

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   0.27   Curve Number   (CN)= 59.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.49

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


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

    Unit Hyd Qpeak  (cms)=   0.021

    PEAK FLOW       (cms)=   0.003 (i)
    TIME TO PEAK    (hrs)=   3.500
    RUNOFF VOLUME    (mm)=   5.413
    TOTAL RAINFALL   (mm)=  38.750
    RUNOFF COEFFICIENT   =   0.140

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

--------------------------------------------------------------------------------
--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):    17.04   0.238     3.50    15.79
     + ID2= 2 (  0004):     0.27   0.003     3.50     5.41
       ==========================================
       ID = 3 (  0008):    17.31   0.240     3.50    15.63

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

```
      O   O    T     T    H   H    Y    M   M  O   O
       OOO     T     T    H   H    Y    M   M   OOO
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                  *****  D E T A I L E D   O U T P U T *****


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
  Output  filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\e4cc15b8-393
  Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\e4cc15b8-393

DATE: 06-27-2022                          TIME: 02:06:56

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 2-Ptbo_SCS_6hr_5yr            **
  ************************************************

--------------------
|    READ STORM    |    Filename: C:\Users\mcraig\AppD
|                  |              ata\Local\Temp\
|                  |              2c21b110-a15d-4b69-bdfd-344eeaa15e95\6361997a
| Ptotal= 52.44 mm |    Comments: Ptbo_SCS_6hr_5yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    2.10 |  1.75    5.20 |  3.25   11.50 |  4.75    3.20
                0.50    2.10 |  2.00    5.20 |  3.50   11.50 |  5.00    3.20
                0.75    3.20 |  2.25    6.30 |  3.75    5.20 |  5.25    2.10
                1.00    3.20 |  2.50    6.30 |  4.00    5.20 |  5.50    2.10
                1.25    3.20 |  2.75   31.40 |  4.25    4.20 |  5.75    2.10
                1.50    3.20 |  3.00   81.78 |  4.50    4.20 |  6.00    2.10

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   0.75   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

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

                        ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    2.10 | 1.583    5.20 | 3.083   11.50 |  4.58    3.20
 0.167    2.10 | 1.667    5.20 | 3.167   11.50 |  4.67    3.20
 0.250    2.10 | 1.750    5.20 | 3.250   11.50 |  4.75    3.20
 0.333    2.10 | 1.833    5.20 | 3.333   11.50 |  4.83    3.20
 0.417    2.10 | 1.917    5.20 | 3.417   11.50 |  4.92    3.20
 0.500    2.10 | 2.000    5.20 | 3.500   11.50 |  5.00    3.20
 0.583    3.20 | 2.083    6.30 | 3.583    5.20 |  5.08    2.10
 0.667    3.20 | 2.167    6.30 | 3.667    5.20 |  5.17    2.10
 0.750    3.20 | 2.250    6.30 | 3.750    5.20 |  5.25    2.10
 0.833    3.20 | 2.333    6.30 | 3.833    5.20 |  5.33    2.10
 0.917    3.20 | 2.417    6.30 | 3.917    5.20 |  5.42    2.10
 1.000    3.20 | 2.500    6.30 | 4.000    5.20 |  5.50    2.10
 1.083    3.20 | 2.583   31.40 | 4.083    4.20 |  5.58    2.10
 1.167    3.20 | 2.667   31.40 | 4.167    4.20 |  5.67    2.10
 1.250    3.20 | 2.750   31.40 | 4.250    4.20 |  5.75    2.10
 1.333    3.20 | 2.833   81.78 | 4.333    4.20 |  5.83    2.10
 1.417    3.20 | 2.917   81.78 | 4.417    4.20 |  5.92    2.10
 1.500    3.20 | 3.000   81.78 | 4.500    4.20 |  6.00    2.10

    Unit Hyd Qpeak  (cms)=   0.087

    PEAK FLOW       (cms)=   0.028 (i)
    TIME TO PEAK    (hrs)=   3.250
    RUNOFF VOLUME    (mm)=  15.916
    TOTAL RAINFALL   (mm)=  52.445
```

RUNOFF COEFFICIENT = 0.303

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

CALIB					
NASHYD (0003)	Area (ha)= 1.52	Curve Number (CN)= 63.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.55				

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	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.106

PEAK FLOW (cms)= 0.028 (i)
TIME TO PEAK (hrs)= 3.500
RUNOFF VOLUME (mm)= 11.447
TOTAL RAINFALL (mm)= 52.445
RUNOFF COEFFICIENT = 0.218

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

CALIB					
NASHYD (0005)	Area (ha)= 2.80	Curve Number (CN)= 71.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.36				

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

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Unit Hyd Qpeak (cms)= 0.297

PEAK FLOW (cms)= 0.093 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 14.886
TOTAL RAINFALL (mm)= 52.445

RUNOFF COEFFICIENT = 0.284

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

CALIB					
STANDHYD (0006)	Area (ha)= 1.17				
ID= 1 DT= 5.0 min	Total Imp(%)= 29.00	Dir. Conn.(%)= 20.00			

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.34	0.83
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	5.00
Length	(m)=	88.32	26.00
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	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

Max.Eff.Inten.(mm/hr)=		81.78	25.04	
over (min)		5.00	10.00	
Storage Coeff. (min)=		2.09 (ii)	9.29 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.31	0.12	
				TOTALS
PEAK FLOW	(cms)=	0.05	0.04	0.092 (iii)
TIME TO PEAK	(hrs)=	3.00	3.08	3.00
RUNOFF VOLUME	(mm)=	51.45	11.26	19.29
TOTAL RAINFALL	(mm)=	52.45	52.45	52.45
RUNOFF COEFFICIENT	=	0.98	0.21	0.37

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(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 (0001)	Area (ha)= 11.55				
ID= 1 DT= 5.0 min	Total Imp(%)= 52.00	Dir. Conn.(%)= 40.00			

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.01	5.54
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	3.00
Length	(m)=	277.49	22.00
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	2.10	1.583	5.20	3.083	11.50	4.58	3.20

0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

```
    Max.Eff.Inten.(mm/hr)=      81.78         30.48
              over (min)         5.00         15.00
    Storage Coeff.  (min)=       5.11 (ii)    12.13 (ii)
    Unit Hyd. Tpeak (min)=       5.00         15.00
    Unit Hyd. peak  (cms)=       0.21          0.09
                                                      *TOTALS*
    PEAK FLOW       (cms)=       1.01          0.27          1.240 (iii)
    TIME TO PEAK    (hrs)=       3.00          3.08           3.00
    RUNOFF VOLUME    (mm)=      51.44         12.37          28.00
    TOTAL RAINFALL   (mm)=      52.45         52.45          52.45
    RUNOFF COEFFICIENT   =       0.98          0.24           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.
```

```
--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0001):     11.55    1.240      3.00     28.00
     + ID2= 2 (  0003):      1.52    0.028      3.50     11.45
       ====================================================
       ID = 3 (  0007):     13.07    1.251      3.00     26.08

    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):     13.07    1.251      3.00     26.08
     + ID2= 2 (  0005):      2.80    0.093      3.25     14.89
       ====================================================
       ID = 1 (  0007):     15.87    1.308      3.00     24.10

    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):     15.87    1.308      3.00     24.10
     + ID2= 2 (  0006):      1.17    0.092      3.00     19.29
       ====================================================
       ID = 3 (  0007):     17.04    1.400      3.00     23.77

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

```
--------------------
| RESERVOIR(  0010)|     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    |   0.6660     0.2762
                         0.2380     0.1248    |   0.7160     0.3247
                         0.3050     0.1965    |   0.7850     0.3788
                         0.5820     0.2224    |   0.0000     0.0000
```

```
                                AREA     QPEAK     TPEAK      R.V.
                                (ha)     (cms)     (hrs)      (mm)
   INFLOW : ID= 2 (  0007)     17.040     1.400      3.00     23.77
   OUTFLOW: ID= 1 (  0010)     17.040     0.305      3.58     23.76

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.78
                  TIME SHIFT OF PEAK FLOW         (min)= 35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.1966
```

```
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area     (ha)=   0.27   Curve Number   (CN)= 59.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.49

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

TIME	RAIN	TIME	RAIN	TIME	RAIN	TIME	RAIN
hrs	mm/hr	hrs	mm/hr	hrs	mm/hr	hrs	mm/hr
0.083	2.10	1.583	5.20	3.083	11.50	4.58	3.20
0.167	2.10	1.667	5.20	3.167	11.50	4.67	3.20
0.250	2.10	1.750	5.20	3.250	11.50	4.75	3.20
0.333	2.10	1.833	5.20	3.333	11.50	4.83	3.20
0.417	2.10	1.917	5.20	3.417	11.50	4.92	3.20
0.500	2.10	2.000	5.20	3.500	11.50	5.00	3.20
0.583	3.20	2.083	6.30	3.583	5.20	5.08	2.10
0.667	3.20	2.167	6.30	3.667	5.20	5.17	2.10
0.750	3.20	2.250	6.30	3.750	5.20	5.25	2.10
0.833	3.20	2.333	6.30	3.833	5.20	5.33	2.10
0.917	3.20	2.417	6.30	3.917	5.20	5.42	2.10
1.000	3.20	2.500	6.30	4.000	5.20	5.50	2.10
1.083	3.20	2.583	31.40	4.083	4.20	5.58	2.10
1.167	3.20	2.667	31.40	4.167	4.20	5.67	2.10
1.250	3.20	2.750	31.40	4.250	4.20	5.75	2.10
1.333	3.20	2.833	81.78	4.333	4.20	5.83	2.10
1.417	3.20	2.917	81.78	4.417	4.20	5.92	2.10
1.500	3.20	3.000	81.78	4.500	4.20	6.00	2.10

```
    Unit Hyd Qpeak  (cms)=   0.021

    PEAK FLOW       (cms)=   0.005 (i)
    TIME TO PEAK    (hrs)=   3.417
    RUNOFF VOLUME    (mm)=  10.047
    TOTAL RAINFALL   (mm)=  52.445
    RUNOFF COEFFICIENT   =   0.192

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

```
--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA     QPEAK     TPEAK      R.V.
--------------------          (ha)     (cms)     (hrs)      (mm)
       ID1= 1 (  0010):     17.04    0.305      3.58     23.76
     + ID2= 2 (  0004):      0.27    0.005      3.42     10.05
       ====================================================
       ID = 3 (  0008):     17.31    0.310      3.58     23.55

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

```
       V    V   I    SSSSS  U   U    A    L              (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

```
  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
  Output  filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\b801d531-2fe
  Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\b801d531-2fe

DATE: 06-27-2022                          TIME: 02:06:57

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 3-Ptbo_SCS_6hr_10yr           **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\mcraig\AppD
|                  |              ata\Local\Temp\
|                  |              2c21b110-a15d-4b69-bdfd-344eeaa15e95\3a85cc49
| Ptotal= 61.60 mm |    Comments: Ptbo_SCS_6hr_10yr
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.25    2.50 |  1.75    6.20 |   3.25   13.50 |  4.75    3.70
                0.50    2.50 |  2.00    6.20 |   3.50   13.50 |  5.00    3.70
                0.75    3.70 |  2.25    7.40 |   3.75    6.20 |  5.25    2.50
                1.00    3.70 |  2.50    7.40 |   4.00    6.20 |  5.50    2.50
                1.25    3.70 |  2.75   36.90 |   4.25    4.90 |  5.75    2.50
                1.50    3.70 |  3.00   95.90 |   4.50    4.90 |  6.00    2.50

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

--------------------
| CALIB            |
| NASHYD  (  0002) |   Area    (ha)=   0.75   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

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


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

    Unit Hyd Qpeak  (cms)=   0.087

    PEAK FLOW       (cms)=   0.038 (i)
    TIME TO PEAK    (hrs)=   3.250
    RUNOFF VOLUME    (mm)=  21.273
    TOTAL RAINFALL   (mm)=  61.600
    RUNOFF COEFFICIENT   =   0.345

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

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

--------------------
| CALIB            |
| NASHYD  (  0003) |   Area    (ha)=   1.52   Curve Number   (CN)= 63.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.55

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


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

    Unit Hyd Qpeak  (cms)=   0.106

    PEAK FLOW       (cms)=   0.039 (i)
    TIME TO PEAK    (hrs)=   3.500
    RUNOFF VOLUME    (mm)=  15.567
    TOTAL RAINFALL   (mm)=  61.600
    RUNOFF COEFFICIENT   =   0.253

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

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

--------------------
| CALIB            |
| NASHYD  (  0005) |   Area    (ha)=   2.80   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

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


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

    Unit Hyd Qpeak  (cms)=   0.297

    PEAK FLOW       (cms)=   0.126 (i)
    TIME TO PEAK    (hrs)=   3.250
    RUNOFF VOLUME    (mm)=  19.975
    TOTAL RAINFALL   (mm)=  61.600
    RUNOFF COEFFICIENT   =   0.324

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

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

--------------------
| CALIB            |
| STANDHYD (  0006) |   Area    (ha)=   1.17
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  20.00
--------------------
```

```
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34          0.83
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       2.00          5.00
     Length            (m)=      88.32         26.00
     Mannings n           =      0.013         0.250

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


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

     Max.Eff.Inten.(mm/hr)=      95.90         33.83
               over (min)         5.00         10.00
     Storage Coeff.  (min)=       1.96 (ii)    8.35 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.31          0.12
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.06          0.06          0.118 (iii)
     TIME TO PEAK    (hrs)=       3.00          3.08           3.00
     RUNOFF VOLUME    (mm)=      60.60         15.28          24.34
     TOTAL RAINFALL   (mm)=      61.60         61.60          61.60
     RUNOFF COEFFICIENT   =       0.98          0.25           0.40

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (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 (  0001)|   Area    (ha)=  11.55
|ID= 1 DT= 5.0 min |   Total Imp(%)=  52.00   Dir. Conn.(%)=  40.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.01          5.54
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          3.00
     Length            (m)=     277.49         22.00
     Mannings n           =      0.013         0.250

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


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

     Max.Eff.Inten.(mm/hr)=      95.90         40.91
               over (min)         5.00         10.00
     Storage Coeff.  (min)=       4.79 (ii)    9.57 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.22          0.11
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.20          0.43          1.624 (iii)
     TIME TO PEAK    (hrs)=       3.00          3.08           3.00
     RUNOFF VOLUME    (mm)=      60.60         16.69          34.25
     TOTAL RAINFALL   (mm)=      61.60         61.60          61.60
     RUNOFF COEFFICIENT   =       0.98          0.27           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  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    11.55    1.624     3.00    34.25
     + ID2= 2 (  0003):     1.52    0.039     3.50    15.57
       ================================================
       ID = 3 (  0007):    13.07    1.639     3.00    32.08

     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):    13.07    1.639     3.00    32.08
     + ID2= 2 (  0005):     2.80    0.126     3.25    19.98
       ================================================
       ID = 1 (  0007):    15.87    1.718     3.00    29.94

     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):    15.87    1.718     3.00    29.94
     + ID2= 2 (  0006):     1.17    0.118     3.00    24.34
       ================================================
       ID = 3 (  0007):    17.04    1.836     3.00    29.56

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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     |   0.6660     0.2762
                         0.2380     0.1248     |   0.7160     0.3247
                         0.3050     0.1965     |   0.7850     0.3788
                         0.5820     0.2224     |   0.0000     0.0000

                                    AREA     QPEAK     TPEAK      R.V.
                                    (ha)     (cms)     (hrs)      (mm)
     INFLOW : ID= 2 (  0007)      17.040     1.836      3.00      29.56
     OUTFLOW: ID= 1 (  0010)      17.040     0.582      3.33      29.55

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)= 31.70
                    TIME SHIFT OF PEAK FLOW          (min)= 20.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  0.2229
```

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--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   0.27   Curve Number   (CN)= 59.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.49

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


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

     Unit Hyd Qpeak  (cms)=   0.021

     PEAK FLOW       (cms)=   0.007 (i)
     TIME TO PEAK    (hrs)=   3.417
     RUNOFF VOLUME    (mm)=  13.738
     TOTAL RAINFALL   (mm)=  61.600
     RUNOFF COEFFICIENT   =   0.223

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

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):    17.04   0.582     3.33    29.55
     + ID2= 2 (  0004):     0.27   0.007     3.42    13.74
       ================================================
       ID = 3 (  0008):    17.31   0.588     3.33    29.31

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
  Output  filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\2e03b05e-fd9
  Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\2e03b05e-fd9


DATE: 06-27-2022                          TIME: 02:06:57

USER:
```

```
COMMENTS: _____________________________________________________

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  ************************************************
  ** SIMULATION : 4-Ptbo_SCS_6hr_25yr           **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\mcraig\AppD
|                  |              ata\Local\Temp\
|                  |              2c21b110-a15d-4b69-bdfd-344eeaa15e95\a25664cf
| Ptotal= 72.90 mm |    Comments: Ptbo_SCS_6hr_25yr
--------------------
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.25    2.90 |  1.75    7.30 |  3.25   16.00 |  4.75    4.40
 0.50    2.90 |  2.00    7.30 |  3.50   16.00 |  5.00    4.40
 0.75    4.40 |  2.25    8.80 |  3.75    7.30 |  5.25    2.90
 1.00    4.40 |  2.50    8.80 |  4.00    7.30 |  5.50    2.90
 1.25    4.40 |  2.75   43.70 |  4.25    5.80 |  5.75    2.90
 1.50    4.40 |  3.00  113.70 |  4.50    5.80 |  6.00    2.90

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--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   0.75   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

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


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

     Unit Hyd Qpeak  (cms)=   0.087

     PEAK FLOW       (cms)=   0.052 (i)
     TIME TO PEAK    (hrs)=   3.167
     RUNOFF VOLUME    (mm)=  28.478
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.391

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

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

--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   1.52   Curve Number   (CN)= 63.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.55

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


                          ---- TRANSFORMED HYETOGRAPH ----
  TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
   hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
 0.083    2.90 | 1.583    7.30 | 3.083   16.00 |  4.58    4.40
 0.167    2.90 | 1.667    7.30 | 3.167   16.00 |  4.67    4.40
```

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

Unit Hyd Qpeak (cms)= 0.106

PEAK FLOW (cms)= 0.054 (i)
TIME TO PEAK (hrs)= 3.500
RUNOFF VOLUME (mm)= 21.237
TOTAL RAINFALL (mm)= 72.900
RUNOFF COEFFICIENT = 0.291

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

CALIB			
NASHYD (0005)	Area (ha)=	2.80	Curve Number (CN)= 71.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.36	

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

---- TRANSFORMED HYETOGRAPH ----

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

Unit Hyd Qpeak (cms)= 0.297

PEAK FLOW (cms)= 0.171 (i)
TIME TO PEAK (hrs)= 3.250
RUNOFF VOLUME (mm)= 26.855
TOTAL RAINFALL (mm)= 72.900
RUNOFF COEFFICIENT = 0.368

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

CALIB			
STANDHYD (0006)	Area (ha)=	1.17	
ID= 1 DT= 5.0 min	Total Imp(%)=	29.00	Dir. Conn.(%)= 20.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.34	0.83
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	5.00
Length	(m)=	88.32	26.00
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	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Max.Eff.Inten.(mm/hr)=	113.70	46.07	
over (min)	5.00	10.00	
Storage Coeff. (min)=	1.83 (ii)	7.47 (ii)	
Unit Hyd. Tpeak (min)=	5.00	10.00	
Unit Hyd. peak (cms)=	0.32	0.13	
			TOTALS
PEAK FLOW (cms)=	0.07	0.08	0.154 (iii)
TIME TO PEAK (hrs)=	3.00	3.00	3.00
RUNOFF VOLUME (mm)=	71.90	20.82	31.03
TOTAL RAINFALL (mm)=	72.90	72.90	72.90
RUNOFF COEFFICIENT =	0.99	0.29	0.43

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(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 (0001)	Area (ha)=	11.55	
ID= 1 DT= 5.0 min	Total Imp(%)=	52.00	Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.01	5.54
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	3.00
Length	(m)=	277.49	22.00
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	2.90	1.583	7.30	3.083	16.00	4.58	4.40
0.167	2.90	1.667	7.30	3.167	16.00	4.67	4.40
0.250	2.90	1.750	7.30	3.250	16.00	4.75	4.40
0.333	2.90	1.833	7.30	3.333	16.00	4.83	4.40
0.417	2.90	1.917	7.30	3.417	16.00	4.92	4.40
0.500	2.90	2.000	7.30	3.500	16.00	5.00	4.40
0.583	4.40	2.083	8.80	3.583	7.30	5.08	2.90
0.667	4.40	2.167	8.80	3.667	7.30	5.17	2.90
0.750	4.40	2.250	8.80	3.750	7.30	5.25	2.90
0.833	4.40	2.333	8.80	3.833	7.30	5.33	2.90
0.917	4.40	2.417	8.80	3.917	7.30	5.42	2.90
1.000	4.40	2.500	8.80	4.000	7.30	5.50	2.90
1.083	4.40	2.583	43.70	4.083	5.80	5.58	2.90
1.167	4.40	2.667	43.70	4.167	5.80	5.67	2.90
1.250	4.40	2.750	43.70	4.250	5.80	5.75	2.90
1.333	4.40	2.833	113.70	4.333	5.80	5.83	2.90
1.417	4.40	2.917	113.70	4.417	5.80	5.92	2.90
1.500	4.40	3.000	113.70	4.500	5.80	6.00	2.90

Max.Eff.Inten.(mm/hr)= 113.70 55.37

```
              over (min)        5.00         10.00
     Storage Coeff.  (min)=     4.48 (ii)     8.94 (ii)
     Unit Hyd. Tpeak (min)=     5.00         10.00
     Unit Hyd. peak  (cms)=     0.23          0.12
                                                        *TOTALS*
     PEAK FLOW       (cms)=     1.43          0.60          2.028 (iii)
     TIME TO PEAK    (hrs)=     3.00          3.00           3.00
     RUNOFF VOLUME    (mm)=    71.90         22.59          42.32
     TOTAL RAINFALL   (mm)=    72.90         72.90          72.90
     RUNOFF COEFFICIENT   =     0.99          0.31           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  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    11.55   2.028     3.00    42.32
     + ID2= 2 (  0003):     1.52   0.054     3.50    21.24
       ================================================
       ID = 3 (  0007):    13.07   2.050     3.00    39.86

     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):    13.07   2.050     3.00    39.86
     + ID2= 2 (  0005):     2.80   0.171     3.25    26.85
       ================================================
       ID = 1 (  0007):    15.87   2.159     3.00    37.57

     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):    15.87   2.159     3.00    37.57
     + ID2= 2 (  0006):     1.17   0.154     3.00    31.03
       ================================================
       ID = 3 (  0007):    17.04   2.313     3.00    37.12

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.6660     0.2762
                          0.2380     0.1248   |   0.7160     0.3247
                          0.3050     0.1965   |   0.7850     0.3788
                          0.5820     0.2224   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     17.040      2.313      3.00       37.12
   OUTFLOW: ID= 1 (  0010)     17.040      0.666      3.42       37.11

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 28.79
                  TIME SHIFT OF PEAK FLOW        (min)= 25.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.2764

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   0.27   Curve Number   (CN)= 59.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.49

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

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

     Unit Hyd Qpeak  (cms)=   0.021

     PEAK FLOW       (cms)=   0.009 (i)
     TIME TO PEAK    (hrs)=   3.417
     RUNOFF VOLUME    (mm)=  18.858
     TOTAL RAINFALL   (mm)=  72.900
     RUNOFF COEFFICIENT   =   0.259

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

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):    17.04   0.666     3.42    37.11
     + ID2= 2 (  0004):     0.27   0.009     3.42    18.86
       ================================================
       ID = 3 (  0008):    17.31   0.675     3.42    36.83

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

       V    V   I    SSSSS  U   U    A    L              (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         V  V   I      SS   U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
  Output  filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\f8dd0ea7-263
  Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\f8dd0ea7-263


DATE: 06-27-2022                          TIME: 02:06:57

USER:


COMMENTS: _____________________________________________________

--------------------------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 5-Ptbo_SCS_6hr_50yr           **
  ************************************************
```

```
--------------------
|    READ STORM    |    Filename: C:\Users\mcraig\AppD
|                  |              ata\Local\Temp\
|                  |              2c21b110-a15d-4b69-bdfd-344eeaa15e95\ed30a070
| Ptotal= 81.47 mm |    Comments: Ptbo_SCS_6hr_50yr
--------------------
```

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

```
--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   0.75   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

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

```
    Unit Hyd Qpeak  (cms)=   0.087

    PEAK FLOW       (cms)=   0.063 (i)
    TIME TO PEAK    (hrs)=   3.167
    RUNOFF VOLUME    (mm)=  34.307
    TOTAL RAINFALL   (mm)=  81.475
    RUNOFF COEFFICIENT   =   0.421

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

```
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   1.52   Curve Number   (CN)= 63.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.55

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

```
    Unit Hyd Qpeak  (cms)=   0.106

    PEAK FLOW       (cms)=   0.066 (i)
    TIME TO PEAK    (hrs)=   3.500
    RUNOFF VOLUME    (mm)=  25.916
    TOTAL RAINFALL   (mm)=  81.475
    RUNOFF COEFFICIENT   =   0.318

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

```
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   2.80   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

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

---- TRANSFORMED HYETOGRAPH ----

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

```
    Unit Hyd Qpeak  (cms)=   0.297

    PEAK FLOW       (cms)=   0.208 (i)
    TIME TO PEAK    (hrs)=   3.250
    RUNOFF VOLUME    (mm)=  32.445
    TOTAL RAINFALL   (mm)=  81.475
    RUNOFF COEFFICIENT   =   0.398

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

```
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   1.17
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  20.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.34	0.83
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	2.00	5.00
Length	(m)=	88.32	26.00
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	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90

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

Max.Eff.Inten.(mm/hr)=		127.00	56.03	
over (min)		5.00	10.00	
Storage Coeff. (min)=		1.75 (ii)	6.97 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.32	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.08	0.10	0.183 (iii)
TIME TO PEAK	(hrs)=	3.00	3.00	3.00
RUNOFF VOLUME	(mm)=	80.47	25.40	36.41
TOTAL RAINFALL	(mm)=	81.48	81.48	81.48
RUNOFF COEFFICIENT	=	0.99	0.31	0.45

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(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 (0001)	Area	(ha)= 11.55	
ID= 1 DT= 5.0 min	Total Imp(%)=	52.00	Dir. Conn.(%)= 40.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	6.01	5.54
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	3.00
Length	(m)=	277.49	22.00
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	3.30	1.583	8.10	3.083	17.90	4.58	4.90
0.167	3.30	1.667	8.10	3.167	17.90	4.67	4.90
0.250	3.30	1.750	8.10	3.250	17.90	4.75	4.90
0.333	3.30	1.833	8.10	3.333	17.90	4.83	4.90
0.417	3.30	1.917	8.10	3.417	17.90	4.92	4.90
0.500	3.30	2.000	8.10	3.500	17.90	5.00	4.90
0.583	4.90	2.083	9.80	3.583	8.10	5.08	3.30
0.667	4.90	2.167	9.80	3.667	8.10	5.17	3.30
0.750	4.90	2.250	9.80	3.750	8.10	5.25	3.30
0.833	4.90	2.333	9.80	3.833	8.10	5.33	3.30
0.917	4.90	2.417	9.80	3.917	8.10	5.42	3.30
1.000	4.90	2.500	9.80	4.000	8.10	5.50	3.30
1.083	4.90	2.583	48.90	4.083	6.50	5.58	3.30
1.167	4.90	2.667	48.90	4.167	6.50	5.67	3.30
1.250	4.90	2.750	48.90	4.250	6.50	5.75	3.30
1.333	4.90	2.833	127.00	4.333	6.50	5.83	3.30
1.417	4.90	2.917	127.00	4.417	6.50	5.92	3.30
1.500	4.90	3.000	127.00	4.500	6.50	6.00	3.30

Max.Eff.Inten.(mm/hr)=		127.00	67.05	
over (min)		5.00	10.00	
Storage Coeff. (min)=		4.28 (ii)	8.55 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.23	0.12	
				TOTALS
PEAK FLOW	(cms)=	1.60	0.75	2.345 (iii)
TIME TO PEAK	(hrs)=	3.00	3.00	3.00
RUNOFF VOLUME	(mm)=	80.48	27.45	48.66
TOTAL RAINFALL	(mm)=	81.48	81.48	81.48

RUNOFF COEFFICIENT	=	0.99	0.34	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 (0007)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0001):	11.55	2.345	3.00	48.66
	+ ID2= 2 (0003):	1.52	0.066	3.50	25.92
	ID = 3 (0007):	13.07	2.372	3.00	46.01

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0007)					
3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 3 (0007):	13.07	2.372	3.00	46.01
	+ ID2= 2 (0005):	2.80	0.208	3.25	32.45
	ID = 1 (0007):	15.87	2.506	3.00	43.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0007)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0007):	15.87	2.506	3.00	43.62
	+ ID2= 2 (0006):	1.17	0.183	3.00	36.41
	ID = 3 (0007):	17.04	2.688	3.00	43.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0010)	OVERFLOW IS OFF			
IN= 2---> OUT= 1				
DT= 5.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.6660	0.2762
	0.2380	0.1248	0.7160	0.3247
	0.3050	0.1965	0.7850	0.3788
	0.5820	0.2224	0.0000	0.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0007)	17.040	2.688	3.00	43.12
OUTFLOW: ID= 1 (0010)	17.040	0.716	3.50	43.12

PEAK FLOW REDUCTION [Qout/Qin](%)= 26.64
TIME SHIFT OF PEAK FLOW (min)= 30.00
MAXIMUM STORAGE USED (ha.m.)= 0.3250

CALIB			
NASHYD (0004)	Area (ha)=	0.27	Curve Number (CN)= 59.0
ID= 1 DT= 5.0 min	Ia (mm)=	5.00	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)=	0.49	

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

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

Unit Hyd Qpeak (cms)= 0.021

PEAK FLOW (cms)= 0.011 (i)
TIME TO PEAK (hrs)= 3.417
RUNOFF VOLUME (mm)= 23.113
TOTAL RAINFALL (mm)= 81.475
RUNOFF COEFFICIENT = 0.284

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

ADD HYD (0008)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0010):	17.04	0.716	3.50	43.12
	+ ID2= 2 (0004):	0.27	0.011	3.42	23.11
	ID = 3 (0008):	17.31	0.727	3.50	42.81

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
       V    V   I    SSSSS  U   U    A    L              (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
        V  V    I      SS   U   U  A   A  L
         VV     I    SSSSS  UUUUU  A   A  LLLLL

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

Input filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
Output filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\9611fb2f-b1c
Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\9611fb2f-b1c

DATE: 06-27-2022 TIME: 02:06:58

USER:

COMMENTS: _____

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  ************************************************
  ** SIMULATION : 6-Ptbo_SCS_6hr_100yr          **
  ************************************************
```

READ STORM	Filename: C:\Users\mcraig\AppData\Local\Temp\2c21b110-a15d-4b69-bdfd-344eeaa15e95\bd87fd49
Ptotal= 89.93 mm	Comments: Ptbo_SCS_6hr_100yr

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	3.60	1.75	9.00	3.25	19.80	4.75	5.40
0.50	3.60	2.00	9.00	3.50	19.80	5.00	5.40
0.75	5.40	2.25	10.80	3.75	9.00	5.25	3.60
1.00	5.40	2.50	10.80	4.00	9.00	5.50	3.60
1.25	5.40	2.75	53.90	4.25	7.20	5.75	3.60
1.50	5.40	3.00	140.20	4.50	7.20	6.00	3.60

CALIB					
NASHYD (0002)	Area (ha)= 0.75	Curve Number (CN)= 73.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.33				

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

Unit Hyd Qpeak (cms)= 0.087

PEAK FLOW (cms)= 0.074 (i)
TIME TO PEAK (hrs)= 3.167
RUNOFF VOLUME (mm)= 40.310
TOTAL RAINFALL (mm)= 89.925
RUNOFF COEFFICIENT = 0.448

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

CALIB					
NASHYD (0003)	Area (ha)= 1.52	Curve Number (CN)= 63.0			
ID= 1 DT= 5.0 min	Ia (mm)= 5.00	# of Linear Res.(N)= 3.00			
	U.H. Tp(hrs)= 0.55				

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

Unit Hyd Qpeak (cms)= 0.106

```
     PEAK FLOW       (cms)=   0.078 (i)
     TIME TO PEAK    (hrs)=   3.500
     RUNOFF VOLUME    (mm)=  30.807
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.343

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

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--------------------
| CALIB             |
| NASHYD   (  0005)|   Area     (ha)=   2.80   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

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

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

     Unit Hyd Qpeak  (cms)=   0.297

     PEAK FLOW       (cms)=   0.246 (i)
     TIME TO PEAK    (hrs)=   3.250
     RUNOFF VOLUME    (mm)=  38.219
     TOTAL RAINFALL   (mm)=  89.925
     RUNOFF COEFFICIENT   =   0.425

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

--------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0006)|   Area     (ha)=   1.17
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  20.00
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                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      0.34          0.83
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      2.00          5.00
     Length            (m)=     88.32         26.00
     Mannings n            =     0.013         0.250

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

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

     Max.Eff.Inten.(mm/hr)=     140.20         66.46
               over (min)         5.00         10.00
     Storage Coeff.  (min)=       1.68 (ii)    6.56 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.32          0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.09          0.12          0.213 (iii)
     TIME TO PEAK    (hrs)=       3.00          3.00           3.00
     RUNOFF VOLUME    (mm)=      88.93         30.18          41.93
     TOTAL RAINFALL   (mm)=      89.93         89.93          89.93
     RUNOFF COEFFICIENT   =       0.99          0.34           0.47

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (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 (  0001)|   Area     (ha)=  11.55
|ID= 1 DT= 5.0 min |   Total Imp(%)=  52.00   Dir. Conn.(%)=  40.00
--------------------

                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      6.01          5.54
     Dep. Storage     (mm)=      1.00          5.00
     Average Slope     (%)=      1.00          3.00
     Length            (m)=    277.49         22.00
     Mannings n            =     0.013         0.250

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

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

     Max.Eff.Inten.(mm/hr)=     140.20         79.25
               over (min)         5.00         10.00
     Storage Coeff.  (min)=       4.12 (ii)    8.22 (ii)
     Unit Hyd. Tpeak (min)=       5.00         10.00
     Unit Hyd. peak  (cms)=       0.24          0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.77          0.90          2.670 (iii)
     TIME TO PEAK    (hrs)=       3.00          3.00           3.00
     RUNOFF VOLUME    (mm)=      88.93         32.51          55.07
     TOTAL RAINFALL   (mm)=      89.93         89.93          89.93
     RUNOFF COEFFICIENT   =       0.99          0.36           0.61

***** 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.
```

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--------------------
| ADD HYD  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):     11.55   2.670     3.00    55.07
     + ID2= 2 (  0003):      1.52   0.078     3.50    30.81
       ================================================
       ID = 3 (  0007):     13.07   2.702     3.00    52.25

    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):     13.07   2.702     3.00    52.25
     + ID2= 2 (  0005):      2.80   0.246     3.25    38.22
       ================================================
       ID = 1 (  0007):     15.87   2.862     3.00    49.78

    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):     15.87   2.862     3.00    49.78
     + ID2= 2 (  0006):      1.17   0.213     3.00    41.93
       ================================================
       ID = 3 (  0007):     17.04   3.075     3.00    49.24

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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   |   0.6660     0.2762
                          0.2380     0.1248   |   0.7160     0.3247
                          0.3050     0.1965   |   0.7850     0.3788
                          0.5820     0.2224   |   0.0000     0.0000

                               AREA     QPEAK     TPEAK       R.V.
                               (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     17.040     3.075      3.00      49.24
   OUTFLOW: ID= 1 (  0010)     17.040     0.785      3.50      49.23

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 25.52
                  TIME SHIFT OF PEAK FLOW         (min)= 30.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.3791

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area    (ha)=   0.27   Curve Number   (CN)= 59.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.49

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


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

    Unit Hyd Qpeak  (cms)=   0.021

    PEAK FLOW       (cms)=   0.013 (i)
    TIME TO PEAK    (hrs)=   3.417
    RUNOFF VOLUME    (mm)=  27.581
    TOTAL RAINFALL   (mm)=  89.925
    RUNOFF COEFFICIENT   =   0.307

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

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--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0010):     17.04   0.785     3.50    49.23
     + ID2= 2 (  0004):      0.27   0.013     3.42    27.58
       ================================================
       ID = 3 (  0008):     17.31   0.798     3.50    48.89

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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 FINISH
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       V    V   I    SSSSS  U   U    A    L             (v 6.0.2006)
       V    V   I    SS     U   U   A A   L
        V  V    I     SS    U   U  AAAAA  L
         V  V   I      SS   U   U  A   A  L
          VV    I    SSSSS  UUUUU  A   A  LLLLL

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


  Input   filename: C:\Program Files (x86)\Visual OTTHYMO 6.0\VO2\voin.dat
  Output  filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\e1df9d24-71d
  Summary filename: C:\Users\mcraig\AppData\Local\Civica\VH5\8997b08e-7671-45f2-a98a-df5ea147461e\e1df9d24-71d


DATE: 06-27-2022                          TIME: 01:56:07

USER:


COMMENTS: _____________________________________________________


----------------------------------------------------------------------------------------------------------------
  ************************************************
  ** SIMULATION : 7-25mm CHI                    **
  ************************************************


--------------------
|    READ STORM    |    Filename: C:\Users\mcraig\AppD
|                  |              ata\Local\Temp\
|                  |              cc0891a8-dcf9-4cc9-b4fd-8d3656af8706\5898056a
| Ptotal= 24.91 mm |    Comments: 25mm CHI
--------------------
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.17    1.76 |  1.17   11.75 |   2.17    3.88 |  3.17    2.07
               0.33    2.00 |  1.33   57.66 |   2.33    3.35 |  3.33    1.93
               0.50    2.32 |  1.50   15.20 |   2.50    2.96 |  3.50    1.81
               0.67    2.81 |  1.67    8.31 |   2.67    2.66 |  3.67    1.71
               0.83    3.61 |  1.83    5.91 |   2.83    2.42 |  3.83    1.62
               1.00    5.28 |  2.00    4.66 |   3.00    2.23 |  4.00    1.54

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

--------------------
| CALIB            |
| NASHYD   (  0002)|   Area    (ha)=   0.75   Curve Number   (CN)= 73.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.33

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

                           ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    1.76 | 1.083   11.75 | 2.083    3.88 |  3.08    2.07
               0.167    1.76 | 1.167   11.75 | 2.167    3.88 |  3.17    2.07
               0.250    2.00 | 1.250   57.66 | 2.250    3.35 |  3.25    1.93
               0.333    2.00 | 1.333   57.66 | 2.333    3.35 |  3.33    1.93
               0.417    2.32 | 1.417   15.20 | 2.417    2.96 |  3.42    1.81
               0.500    2.32 | 1.500   15.20 | 2.500    2.96 |  3.50    1.81
               0.583    2.81 | 1.583    8.31 | 2.583    2.66 |  3.58    1.71
               0.667    2.81 | 1.667    8.31 | 2.667    2.66 |  3.67    1.71
               0.750    3.61 | 1.750    5.91 | 2.750    2.42 |  3.75    1.62
               0.833    3.61 | 1.833    5.90 | 2.833    2.42 |  3.83    1.62
               0.917    5.27 | 1.917    4.66 | 2.917    2.23 |  3.92    1.54
               1.000    5.28 | 2.000    4.66 | 3.000    2.23 |  4.00    1.54

    Unit Hyd Qpeak  (cms)=   0.087

    PEAK FLOW       (cms)=   0.005 (i)
    TIME TO PEAK    (hrs)=   1.750
    RUNOFF VOLUME    (mm)=   3.479
    TOTAL RAINFALL   (mm)=  24.906
    RUNOFF COEFFICIENT   =   0.140

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0003)|   Area    (ha)=   1.52   Curve Number   (CN)= 63.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.55

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

                           ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    1.76 | 1.083   11.75 | 2.083    3.88 |  3.08    2.07
               0.167    1.76 | 1.167   11.75 | 2.167    3.88 |  3.17    2.07
               0.250    2.00 | 1.250   57.66 | 2.250    3.35 |  3.25    1.93
               0.333    2.00 | 1.333   57.66 | 2.333    3.35 |  3.33    1.93
               0.417    2.32 | 1.417   15.20 | 2.417    2.96 |  3.42    1.81
               0.500    2.32 | 1.500   15.20 | 2.500    2.96 |  3.50    1.81
               0.583    2.81 | 1.583    8.31 | 2.583    2.66 |  3.58    1.71
               0.667    2.81 | 1.667    8.31 | 2.667    2.66 |  3.67    1.71
               0.750    3.61 | 1.750    5.91 | 2.750    2.42 |  3.75    1.62
               0.833    3.61 | 1.833    5.90 | 2.833    2.42 |  3.83    1.62
               0.917    5.27 | 1.917    4.66 | 2.917    2.23 |  3.92    1.54
               1.000    5.28 | 2.000    4.66 | 3.000    2.23 |  4.00    1.54

    Unit Hyd Qpeak  (cms)=   0.106

    PEAK FLOW       (cms)=   0.005 (i)
    TIME TO PEAK    (hrs)=   2.083
    RUNOFF VOLUME    (mm)=   2.343
    TOTAL RAINFALL   (mm)=  24.906
    RUNOFF COEFFICIENT   =   0.094

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0005)|   Area    (ha)=   2.80   Curve Number   (CN)= 71.0
|ID= 1 DT= 5.0 min |   Ia      (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.36

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

                           ---- TRANSFORMED HYETOGRAPH ----
                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
               0.083    1.76 | 1.083   11.75 | 2.083    3.88 |  3.08    2.07
               0.167    1.76 | 1.167   11.75 | 2.167    3.88 |  3.17    2.07
               0.250    2.00 | 1.250   57.66 | 2.250    3.35 |  3.25    1.93
               0.333    2.00 | 1.333   57.66 | 2.333    3.35 |  3.33    1.93
               0.417    2.32 | 1.417   15.20 | 2.417    2.96 |  3.42    1.81
               0.500    2.32 | 1.500   15.20 | 2.500    2.96 |  3.50    1.81
               0.583    2.81 | 1.583    8.31 | 2.583    2.66 |  3.58    1.71
               0.667    2.81 | 1.667    8.31 | 2.667    2.66 |  3.67    1.71
               0.750    3.61 | 1.750    5.91 | 2.750    2.42 |  3.75    1.62
               0.833    3.61 | 1.833    5.90 | 2.833    2.42 |  3.83    1.62
               0.917    5.27 | 1.917    4.66 | 2.917    2.23 |  3.92    1.54
               1.000    5.28 | 2.000    4.66 | 3.000    2.23 |  4.00    1.54

    Unit Hyd Qpeak  (cms)=   0.297

    PEAK FLOW       (cms)=   0.016 (i)
    TIME TO PEAK    (hrs)=   1.750
    RUNOFF VOLUME    (mm)=   3.204
    TOTAL RAINFALL   (mm)=  24.906
    RUNOFF COEFFICIENT   =   0.129

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0006)|   Area    (ha)=   1.17
```

```
|ID= 1 DT= 5.0 min |   Total Imp(%)=  29.00   Dir. Conn.(%)=  20.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.34         0.83
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      88.32        26.00
     Mannings n             =     0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    1.76 | 1.083   11.75 | 2.083    3.88 |  3.08    2.07
              0.167    1.76 | 1.167   11.75 | 2.167    3.88 |  3.17    2.07
              0.250    2.00 | 1.250   57.66 | 2.250    3.35 |  3.25    1.93
              0.333    2.00 | 1.333   57.66 | 2.333    3.35 |  3.33    1.93
              0.417    2.32 | 1.417   15.20 | 2.417    2.96 |  3.42    1.81
              0.500    2.32 | 1.500   15.20 | 2.500    2.96 |  3.50    1.81
              0.583    2.81 | 1.583    8.31 | 2.583    2.66 |  3.58    1.71
              0.667    2.81 | 1.667    8.31 | 2.667    2.66 |  3.67    1.71
              0.750    3.61 | 1.750    5.91 | 2.750    2.42 |  3.75    1.62
              0.833    3.61 | 1.833    5.90 | 2.833    2.42 |  3.83    1.62
              0.917    5.27 | 1.917    4.66 | 2.917    2.23 |  3.92    1.54
              1.000    5.28 | 2.000    4.66 | 3.000    2.23 |  4.00    1.54

     Max.Eff.Inten.(mm/hr)=      57.66         3.18
               over (min)        5.00        20.00
     Storage Coeff.  (min)=      2.40 (ii)   18.85 (ii)
     Unit Hyd. Tpeak (min)=      5.00        20.00
     Unit Hyd. peak  (cms)=      0.30         0.06
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.04         0.00        0.038 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.67         1.33
     RUNOFF VOLUME    (mm)=     23.91         2.37         6.66
     TOTAL RAINFALL   (mm)=     24.91        24.91        24.91
     RUNOFF COEFFICIENT   =      0.96         0.09         0.27

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
             YOU SHOULD CONSIDER SPLITTING THE AREA.

       (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 (  0001)|   Area    (ha)=  11.55
|ID= 1 DT= 5.0 min |   Total Imp(%)=  52.00   Dir. Conn.(%)=  40.00
--------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       6.01         5.54
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         3.00
     Length            (m)=     277.49        22.00
     Mannings n             =     0.013        0.250

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    1.76 | 1.083   11.75 | 2.083    3.88 |  3.08    2.07
              0.167    1.76 | 1.167   11.75 | 2.167    3.88 |  3.17    2.07
              0.250    2.00 | 1.250   57.66 | 2.250    3.35 |  3.25    1.93
              0.333    2.00 | 1.333   57.66 | 2.333    3.35 |  3.33    1.93
              0.417    2.32 | 1.417   15.20 | 2.417    2.96 |  3.42    1.81
              0.500    2.32 | 1.500   15.20 | 2.500    2.96 |  3.50    1.81
              0.583    2.81 | 1.583    8.31 | 2.583    2.66 |  3.58    1.71
              0.667    2.81 | 1.667    8.31 | 2.667    2.66 |  3.67    1.71
              0.750    3.61 | 1.750    5.91 | 2.750    2.42 |  3.75    1.62
              0.833    3.61 | 1.833    5.90 | 2.833    2.42 |  3.83    1.62
              0.917    5.27 | 1.917    4.66 | 2.917    2.23 |  3.92    1.54
              1.000    5.28 | 2.000    4.66 | 3.000    2.23 |  4.00    1.54

     Max.Eff.Inten.(mm/hr)=      57.66         4.13
               over (min)        5.00        25.00
     Storage Coeff.  (min)=      5.87 (ii)   21.50 (ii)
     Unit Hyd. Tpeak (min)=      5.00        25.00
     Unit Hyd. peak  (cms)=      0.19         0.05
                                                      *TOTALS*
     PEAK FLOW       (cms)=      0.63         0.03        0.636 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.67         1.33
     RUNOFF VOLUME    (mm)=     23.91         2.70        11.18
     TOTAL RAINFALL   (mm)=     24.91        24.91        24.91
     RUNOFF COEFFICIENT   =      0.96         0.11         0.45

       (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  (  0007)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
       ID1= 1 (  0001):    11.55    0.636     1.33    11.18
     + ID2= 2 (  0003):     1.52    0.005     2.08     2.34
       ================================================
       ID = 3 (  0007):    13.07    0.637     1.33    10.15

     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):    13.07    0.637     1.33    10.15
     + ID2= 2 (  0005):     2.80    0.016     1.75     3.20
       ================================================
       ID = 1 (  0007):    15.87    0.640     1.33     8.93

     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):    15.87    0.640     1.33     8.93
     + ID2= 2 (  0006):     1.17    0.038     1.33     6.66
       ================================================
       ID = 3 (  0007):    17.04    0.678     1.33     8.77

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0010)|     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    |  0.0250      0.1272

                                 AREA     QPEAK     TPEAK       R.V.
                                 (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0007)     17.040     0.678      1.33       8.77
   OUTFLOW: ID= 1 (  0010)     17.040     0.025      4.08       8.69

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  3.63
                TIME SHIFT OF PEAK FLOW          (min)=165.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.1254

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0004)|   Area     (ha)=   0.27   Curve Number   (CN)= 59.0
|ID= 1 DT= 5.0 min |   Ia       (mm)=   5.00   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=   0.49

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


                              ---- TRANSFORMED HYETOGRAPH ----
               TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
              0.083    1.76 | 1.083   11.75 | 2.083    3.88 |  3.08    2.07
```

```
               0.167    1.76 | 1.167   11.75 | 2.167    3.88 |  3.17    2.07
               0.250    2.00 | 1.250   57.66 | 2.250    3.35 |  3.25    1.93
               0.333    2.00 | 1.333   57.66 | 2.333    3.35 |  3.33    1.93
               0.417    2.32 | 1.417   15.20 | 2.417    2.96 |  3.42    1.81
               0.500    2.32 | 1.500   15.20 | 2.500    2.96 |  3.50    1.81
               0.583    2.81 | 1.583    8.31 | 2.583    2.66 |  3.58    1.71
               0.667    2.81 | 1.667    8.31 | 2.667    2.66 |  3.67    1.71
               0.750    3.61 | 1.750    5.91 | 2.750    2.42 |  3.75    1.62
               0.833    3.61 | 1.833    5.90 | 2.833    2.42 |  3.83    1.62
               0.917    5.27 | 1.917    4.66 | 2.917    2.23 |  3.92    1.54
               1.000    5.28 | 2.000    4.66 | 3.000    2.23 |  4.00    1.54

     Unit Hyd Qpeak  (cms)=   0.021

     PEAK FLOW       (cms)=   0.001 (i)
     TIME TO PEAK    (hrs)=   2.000
     RUNOFF VOLUME    (mm)=   2.013
     TOTAL RAINFALL   (mm)=  24.906
     RUNOFF COEFFICIENT   =   0.081

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

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

--------------------
| ADD HYD  (  0008)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0010):    17.04   0.025     4.08     8.69
      + ID2= 2 (  0004):     0.27   0.001     2.00     2.01
        ================================================
        ID = 3 (  0008):    17.31   0.025     4.08     8.59

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

 FINISH
================================================================================================================
```

Appendix D: Stage Storage Discharge Calculations

Stormwater Management Facility
Outlet Sizing

Project Name: Norwood Park - Phase 4 **Designed By:** MC

Project No: 20120 **Date:** 2022-06-27

Pond Outlet Configuration

Description	Stage 1	Stage 2	Stage 3	Stage 4
Control Type	Orifice Tube	Orifice Plate	Orifice Plate	Orifice Plate
Orifice Diameter/Weir Height	0.125	0.460	0.400	
Invert Elevations	208.00	208.00	208.00	

Stage Storage Discharge

Description	Elevation (m)	Storage (m^3)	Controlled Discharge Rate (m^3/s) Orifice[1]	Orifice[2]	Orifice[2]	Orifice[2]	Total
Bottom of Storage	208.00	0	0.000	0.000	0.000	0.000	0.000
	208.05	147	0.000	0.000	0.000	0.000	0.000
	208.10	298	0.008	0.000	0.000	0.000	0.008
	208.15	451	0.013	0.000	0.000	0.000	0.013
	208.20	609	0.016	0.000	0.000	0.000	0.016
	208.25	769	0.019	0.000	0.000	0.000	0.019
	208.30	933	0.021	0.000	0.000	0.000	0.021
	208.35	1101	0.023	0.000	0.000	0.000	0.023
25mm Ponding	208.40	1272	0.025	0.000	0.000	0.000	0.025
2 Year Ponding	208.45	1446	0.027	0.211	0.000	0.000	0.238
	208.50	1624	0.029	0.233	0.000	0.000	0.262
	208.55	1806	0.030	0.254	0.000	0.000	0.284
5 Year Ponding	208.60	1991	0.032	0.273	0.000	0.000	0.305
	208.65	2180	0.033	0.291	0.000	0.000	0.324
10 Year Ponding	208.70	2372	0.035	0.308	0.240	0.000	0.582
	208.75	2568	0.036	0.324	0.252	0.000	0.611
	208.80	2767	0.037	0.339	0.263	0.000	0.639
25 Year Ponding	208.85	2971	0.039	0.353	0.274	0.000	0.666
	208.90	3178	0.040	0.367	0.284	0.000	0.691
50 Year Ponding	208.95	3389	0.041	0.381	0.294	0.000	0.716
	209.00	3603	0.042	0.394	0.304	0.000	0.739
	209.05	3822	0.043	0.406	0.313	0.000	0.762
100 Year Ponding	209.10	4044	0.044	0.419	0.322	0.000	0.785
	209.15	4270	0.045	0.430	0.331	0.000	0.807
	209.20	4499	0.046	0.442	0.339	0.000	0.828
	209.25	4733	0.047	0.453	0.348	0.000	0.848
	209.30	4971	0.048	0.464	0.356	0.000	0.869
Emergency Weir	209.35	5212	0.049	0.475	0.364	0.000	0.888
	209.40	5458	0.050	0.485	0.372	0.000	0.907
	209.45	5707	0.051	0.496	0.379	0.000	0.926
	209.50	5960	0.052	0.506	0.387	0.000	0.945
Top of Pond	209.55	6217	0.053	0.516	0.394	0.000	0.963

Notes:

1. Orifice tube discharge calculated according to Q=0.8A(2gh)1/2
2. Orifice plate discharge calculated according to Q=0.6A(2gh)1/2
3. Emergency weir calculations included on separate sheet.

Appendix E: Weir Sizing Calculations

Weir Sizing

Project Name: Norwood Park Phase 4
Project No: 20120

Designed By: MC
Date: 2022-06-27

Weir Parameters					
Type:[1,2]	Broad Crested Trapezoidal		Weir Invert:	209.35	m
Peak Flow:	3.075	m^3/s	Weir Height:	0.20	m
Included Angle:	45	Degrees	Width:	21.0	m

Stage Discharge

Elevation (m)	Weir Flow (m^3/s)
209.35	0.000
209.37	0.101
209.39	0.287
209.41	0.527
209.43	0.811
209.45	1.134
209.47	1.491
209.49	1.879
209.51	2.297
209.53	2.742
209.55	3.212
-	-
-	-

Weir Overflow Results

Pond Elevation at Peak Flow:	209.545	m
Freeboard:	0.005	m
Velocity:	0.752	m/s

Notes:

1. Flows over rectangular broad crested weir calculated based on weir equations in MTO Drainage Manual Chapter 8, Section Flow Over Weirs and Notches.

2 Flows over trapezoidal broad crested weir calculated based on weir equations in Nottawasaga Valley Conservation Authority Section 9.9, Trapezoidal Broad Crested Weir (Emergency Spillways)

Appendix F: Water Quality Calculations

Water Quality Sizing Criteria

Project Name: Norwood Park Phase 4
Project No: 20120
Designed By: MC
Date: 2022-06-27

Site Data			
Protection Level:		Enhanced	
Facility Type:		Wet Pond	
Area	=	14.1	ha
% Impervious Calculated	=	43.00	%
Impervious Area	=	6.06	ha
Required Extended Detention Volume (Ved)			
Ved	=	40	m^3/ha
	=	564	m^3
Ved_{25mm}	=	1254	m^3
Required Storage Volume (Vs)			
Vs	=	167	m^3/ha
	=	2355	m^3
Required Permanent Pool Volume (Vpp)			
Vpp	=	127	m^3/ha
	=	1791	m^3
Pernanent Pool Volume Provided	=	2778	m^3
Final Volumes			
Quantity Control Volume Required	=	3791.0	m^3
Quantity Control Volume Provided	=	4044.0	m^3
Total Pond Volume Required	=	5582	m^3
Total Pond Volume Provided	=	6822	m^3

Notes:

Table 3.2: Water Quality Storage Requirements based on Receiving Waters (MOE SWMPD Manual)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level				
		0%	35%	55%	70%	85%
Enhanced 80% long-term S.S. removal	Infiltration	16.25	25	30	35	40
	Wetlands	36.25	80	105	120	140
	Hybrid Wet Pond/Wetland	40	110	150	175	195
	Wet Pond	52.5	140	190	225	250
Normal 70% long-term S.S. removal	Infiltration	20	20	20	25	30
	Wetlands	42.5	60	70	80	90
	Hybrid Wet Pond/Wetland	48.75	75	90	105	120
	Wet Pond	55	90	110	130	150
Basic 60% long-term S.S. removal	Infiltration	20	20	20	20	20
	Wetlands	60	60	60	60	60
	Hybrid Wet Pond/Wetland	42.5	60	70	75	80
	Wet Pond	33.75	60	75	85	95
	Dry Pond (Continuous Flow)	0	90	150	200	240

Appendix G: Drawdown Time & Forebay Calculations

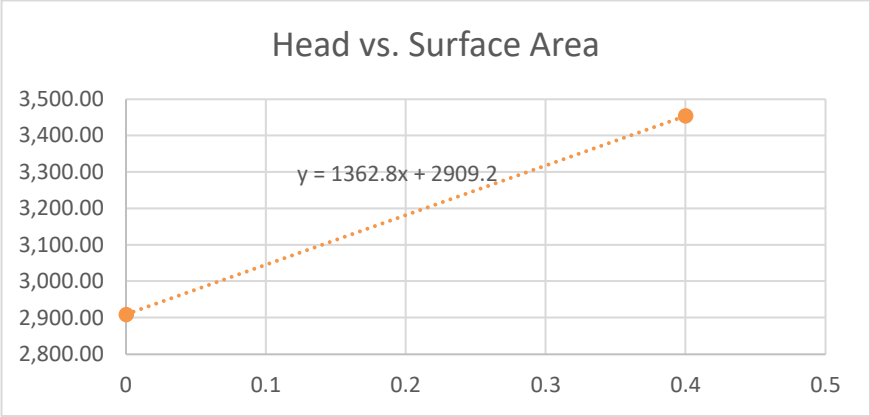
Drawdown Time Calculations Design Sheet

Project Name: Norwood Park Phase 4
Project No: 21020
Designed By: MC
Date: 2022-06-27

Design Criteria			Design Storms	
Quality Volume:[1]	40	m^3/ha	Volume:	Chicago 25
Disturbed Area:	14.1	ha	Conveyance:	100-Year
Volume Required:	564	m^3		

Storage Volume					
Req'd Quality Volume:	564	m^3	Pond Bottom:	208.00	m
Req'd Volume (Chicago 25 mm):	1254	m^3	Top of Storage:	208.40	m
Volume Provided:	1272	m^3	Top of Pond:	209.55	m

Drawdown Time Calculation



Outlet Configuration		
Outlet Type:	Orifice	
Diameter:	125.00	mm
Invert:	208.00	mm
Peak Dischage:[3]	0.025	m^3/s

Drawdown Time[2]

$t = (0.66C_1h^{1.5} + 2C_2h^{0.5})/2.75A$

where

C_1 =	1363	slope coefficient (from regression)
C_2 =	2909	intercept (from regression)
h =	0.400	maximum water elevation (m)
A =	0.012	cross sect. area orifice (m^2)

t = 115783.9 seconds

= 32 hours

Notes:

1. From ESC Design Guidelines for Urban Construction, GGHCA
2. From MOE SWMPDM Section 4.6.
3. Orifice plate discharge calculated according to Q=0.61A(2gh)1/2

Forebay Calculations

Project Name:	Norwood Park Phase 4	**Designed By:**	MC
Project No:	20120	**Date:**	2022-06-27

Settling Length[1] (D_s)			
Length To Width Ratio:	r =	5.0:1	
Peak Outflow:	Q =	0.025	m^3/s
Desired Velocity In Forebay:	V =	0.0003	m/s
Required Settling Length:	D_s =	$(rQ/V)^{0.5}$	
	=	20.41	m
Dispersion Length[2] (D)			
Peak Inflow:	Q =	0.678	m^3/s
Permanent Pool Depth:	d =	1.0	m
Desired Velocity in Forebay:	V =	0.5	m/s
Required Dispersion Length:	D =	8Q/dV	
	=	10.85	m
Forebay Dimensions			
Min Forebay Length:	L_{min} =	20.41	m
Min Forebay Width:	W_{min} =	$D_s/8$	
		2.55	m

Notes:

1. From MOE SWMPDM Section 4.5.
2. From MOE SWMPDM Section 4.6.

Appendix H: Water Balance Calculations

Pre-Development
Water Balance Equations

Project Name: Norwood Park Phase 4
Project No: 20120
Location: Peterborough
Rainfall Data: Peterborough STP

Designed By: MC
Date: 2022-06-15

Catchment Designation	Site - Pre-Development			
	Crop Areas	Gravel Areas	Woodlot Areas	Totals
Area (m^2)	130200	3300	7500	141000
Pervious Area (m^2)	130200	0	7500	137700
Impervious Area (m^2)	0	3300	0	3300
Infiltration Factors				
Topography Infiltration Factor	0.2	0.2	0.2	
Soil Infiltration Factor	0.2	0.2	0.2	
Land Cover Infiltration Factor	0.1	0.1	0.2	
MOE Infiltration Factor	0.5	0.5	0	
Actual Infiltration Factor	0.5	0.5	0	
Run-off Coefficient	0.35	0.6	0.25	
Runoff from Impervious Surfaces *	0	0.8	0.8	
Inputs (per Unit Area)				
Precipitation (mm/yr)	855	855	855	855
Run-On (mm/yr)	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0
Total Inputs (mm/yr)	855	855	855	855
Outputs (per Unit Area)				
Precipitation Surplus (mm/yr)	290	290	684	311
Net Surplus (mm/yr)	290	290	684	311
Evapotranspiration (mm/yr) *	565	565	171	544
Infiltration (mm/yr)	145	145	0	137
LID Infiltration (mm/yr)	0	0	0	0
Total Infiltration (mm/yr)	145	145	0	137
Runoff Pervious Areas (mm/yr)	145	145	0	137
Runoff Impervious Areas (mm/yr)	0	0	684	36
Total Runoff (mm/yr)	145	145	684	174
Total Outputs (mm/yr)	855	855	855	855
Difference (Inputs- Outputs)	0	0	0	0
Inputs (Volumes)				
Precipitation (m^3/yr)	111373	2823	6416	120611
Run-On (m^3/yr)	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0
Total Inputs (m^3/yr)	111373	2823	6416	120611
Outputs (Volumes)				
Precipitation Surplus (m^3/yr)	37761	957	5132	43850
Net Surplus (m^3/yr)	37761	957	5132	43850
Evapotranspiration (m^3/yr) *	73612	1866	1283	76761
Infiltration (m^3/yr)	18880	479	0	19359
Soakaway Infiltration (m^3/yr)	0	0	0	0
Total Infiltration (m^3/yr)	18880	479	0	19359
Runoff Pervious Areas (m^3/yr)	18880	479	0	19359
Runoff Impervious Areas (m^3/yr)	0	0	5132	5132
Total Runoff (m^3/yr)	18880	479	5132	24491
Total Outputs (m^3/yr)	111373	2823	6416	120611
Difference (Inputs- Outputs)	0	0	0	0

Notes:

Infiltration Factors

1.	**Topography**	Flat Land, average slope < 0.6 m/km	0.3
		Rolling Land, average slope 2.8 m to 3.8 m/km	0.2
		Hilly Land, average slope 28 m to 47 m/km	0.1
2.	**Soils**	Tight impervious clay	0.1
		Medium combinations of clay and loam	0.2
		Open Sandy loam	0.4
3.	**Cover**	Cultivated Land	0.1
		Woodland	0.2

4. Evapotranspiration from impervious surfaces assumed to be 20% of precipitation.

Post-Development
Water Balance Calculations

Project Name: Norwood Park Phase 4
Project No: 20120
Location: Peterborough
Rainfall Data: Peterborough STP

Designed By: MC
Date: 2022-06-15

Catchment Designation	Site - Post-Development			
	Grassed Area	Crop Area	Impervious Area	Totals
Area (m^2)	72950	7500	60510	140960
Pervious Area (m^2)	72950	7500	0	80450
Impervious Area (m^2)	0	0	60510	60510
Infiltration Factors				
Topography Infiltration Factor	0.3	0.2	0.3	
Soil Infiltration Factor	0.2	0.2	0.2	
Land Cover Infiltration Factor	0.1	0.1	0.2	
MOE Infiltration Factor	0.6	0.5	0	
Actual Infiltration Factor	0.6	0.5	0	
Run-off Coefficient	0.1	0.35	0.9	
Runoff from Impervious Surfaces *	0	0	0.8	
Inputs (per Unit Area)				
Precipitation (mm/yr)	855	855	855	855
Run-On (mm/yr)	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0
Total Inputs (mm/yr)	855	855	855	855
Outputs (per Unit Area)				
Precipitation Surplus (mm/yr)	290	0	684	444
Net Surplus (mm/yr)	290	0	684	444
Evapotranspiration (mm/yr) *	565	565	171	396
Infiltration (mm/yr)	174	0	0	90
LID Infiltration (mm/yr)	0	0	0	0
Total Infiltration (mm/yr)	174	0	0	90
Runoff Pervious Areas (mm/yr)	116	290	0	75
Runoff Impervious Areas (mm/yr)	0	0	684	294
Total Runoff (mm/yr)	116	290	684	369
Total Outputs (mm/yr)	855	855	855	855
Difference (Inputs- Outputs)	0	0	0	0
Inputs (Volumes)				
Precipitation (m^3/yr)	62401	6416	51760	120577
Run-On (m^3/yr)	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0
Total Inputs (m^3/yr)	62401	6416	51760	120577
Outputs (Volumes)				
Precipitation Surplus (m^3/yr)	21157	0	41408	62565
Net Surplus (m^3/yr)	21157	0	41408	62565
Evapotranspiration (m^3/yr) *	41244	4240	10352	55837
Infiltration (m^3/yr)	12694	0	0	12694
Soakaway Infiltration (m^3/yr)	0	0	0	0
Total Infiltration (m^3/yr)	12694	0	0	12694
Runoff Pervious Areas (m^3/yr)	8463	2175	0	10638
Runoff Impervious Areas (m^3/yr)	0	0	41408	41408
Total Runoff (m^3/yr)	8463	2175	41408	52046
Total Outputs (m^3/yr)	62401	6416	51760	120577
Difference (Inputs- Outputs)	0	0	0	0

Pre-Development Total Infil.:
19359 m3/yr

Notes:

Infiltration Factors

1.	**Topography**	Flat Land, average slope < 0.6 m/km	0.3
		Rolling Land, average slope 2.8 m to 3.8 m/km	0.2
		Hilly Land, average slope 28 m to 47 m/km	0.1
2.	**Soils**	Tight impervious clay	0.1
		Medium combinations of clay and loam	0.2
		Open Sandy loam	0.4
3.	**Cover**	Cultivated Land	0.1
		Woodland	0.2

4. Evapotranspiration from impervious surfaces assumed to be 20% of precipitation.

Project Name: Norwood Park Phase 4
Project No: 20120
Location: Peterborough
Rainfall Data: Peterborough STP

Designed By: MC
Date: 2022-06-15

Catchment Designation	Site - Post-Development				
	Grassed Area	Crop Areas	Impervious Area	Impervious Area Directed to Infiltration Facility	Totals
Area (m^2)	72950	7500	49140	11370	140960
Pervious Area (m^2)	72950	7500	0	0	80450
Impervious Area (m^2)	0	0	49140	11370	60510
Infiltration Factors					
Topography Infiltration Factor	0.3	0.2	0	0.3	
Soil Infiltration Factor	0.2	0.2	0	0.2	
Land Cover Infiltration Factor	0.1	0.1	0	0.2	
MOE Infiltration Factor	0.6	0.5	0	0	
Actual Infiltration Factor	0.6	0.5	0	0	
Run-off Coefficient	0.1	0.35	0.9	0.9	
Runoff from Impervious Surfaces *	0	0	0.8	0.8	
Inputs (per Unit Area)					
Precipitation (mm/yr)	855	855	855	855	855
Run-On (mm/yr)	0	0	0	0	0
Other Inputs (mm/yr)	0	0	0	0	0
Total Inputs (mm/yr)	855	855	855	855	855
Outputs (per Unit Area)					
Precipitation Surplus (mm/yr)	290	0	684	684	444
Net Surplus (mm/yr)	290	0	684	684	444
Evapotranspiration (mm/yr) *	565	565	171	171	366
Infiltration (mm/yr)	174	0	0	0	90
LID Infiltration (mm/yr)	0	0	0	450	36
Total Infiltration (mm/yr)	174	0	0	450	126
Runoff Pervious Areas (mm/yr)	116	290	0	0	60
Runoff Impervious Areas (mm/yr)	0	0	684	234	257
Total Runoff (mm/yr)	116	290	684	234	317
Total Outputs (mm/yr)	855	855	855	855	810
Difference (Inputs- Outputs)	0	0	0	0	0
Inputs (Volumes)					
Precipitation (m^3/yr)	62401	6416	42034	9726	120577
Run-On (m^3/yr)	0	0	0	0	0
Other Inputs (m^3/yr)	0	0	0	0	0
Total Inputs (m^3/yr)	62401	6416	42034	9726	120577
Outputs (Volumes)					
Precipitation Surplus (m^3/yr)	21157	0	33627	7781	62565
Net Surplus (m^3/yr)	21157	0	33627	7781	62565
Evapotranspiration (m^3/yr) *	41244	4240	8407	1945	55837
Infiltration (m^3/yr)	12694	0	0	0	12694
Soakaway Infiltration (m^3/yr)	0	0	0	5117	5117
Total Infiltration (m^3/yr)	12694	0	0	5117	17811
Runoff Pervious Areas (m^3/yr)	8463	2175	0	0	10638
Runoff Impervious Areas (m^3/yr)	0	0	33627	2664	36292
Total Runoff (m^3/yr)	8463	2175	33627	2664	46930
Total Outputs (m^3/yr)	62401	6416	42034	9726	120577
Difference (Inputs- Outputs)	0	0	0	0	0

Proposed Infiltration via Mitig

Pre-Development Total Infiltration:
137 mm/yr

Note:
539.8 mm
Precipitation available between Apr-Oct (non-winter months). Therefore available for infiltration into non-frozen soil

Pre-Development Total Infiltration:
19359 m3/yr

Notes:

Infiltration Factors

1.	**Topography**	Flat Land, average slope < 0.6 m/km	0.3
		Rolling Land, average slope 2.8 m to 3.8 m/km	0.2
		Hilly Land, average slope 28 m to 47 m/km	0.1
2.	**Soils**	Tight impervious clay	0.1
		Medium combinations of clay and loam	0.2
		Open Sandy loam	0.4
3.	**Cover**	Cultivated Land	0.1
		Woodland	0.2

4. Evapotranspiration from impervious surfaces assumed to be 20% of precipitation.

Water Budget Summary

Project Name: Norwood Park Phase 4
Project No: 20120
Location: Peterborough
Rainfall Data: Peterborough STP

Designed By: MC
Date: 2022-06-27

Characteristic	Site				
	Pre-Development	Post-Development	Post-Development *with Mitigation*	Change (Pre to Post)	Change (Pre to Post) *with Mititgation*
Inputs (Volumes)					
Precipitation (m^3/yr)	120611	120577	120577	0%	0%
Run-On (m^3/yr)	0	0	0	0%	0%
Other inputs (m^3/yr)	0	0	0	0%	0%
Total Inputs (m^3/yr)	120611	120577	120577	-34	-34
Outputs (Volumes)					
Precipitation Surplus (m^3/yr)	43850	62565	62565	143%	143%
Net Surplus (m^3/yr)	43850	62565	62565	143%	143%
Evapotranspiration (m^3/yr)	76761	55837	55837	73%	73%
Infiltration (m^3/yr)	19359	12694	12694	66%	66%
LID Infiltration (m^3/yr)	0	0	5117	-	5117 m3/yr
Total Infiltration (m^3/yr)	**19359**	**12694**	**17811**	**66%**	**92%**
Runoff Pervious Areas (m^3/yr)	19359	10638	10638	55%	55%
Runoff Impervious Areas (m^3/yr	5132	41408	36292	-	-
Total Runoff (m^3/yr)	24491	52046	46930	213%	192%
Total Outputs (m^3/yr)	120611	120577	120577	0%	0%

Appendix I: LID Facility Sizing & Swale Sizing

Rational Method Calculations

Project Name: Norwood Park Phase 4
Project No: 20120
Rain Gauge: Peterborough

Designed By: MC
Date: 2022-06-15

Catchment Name and Description		Land Use and Areas (Ha)								Catchment Characteristics								Runoff Coefficient								Peak Flows (m^3/s)					
Name	Description	CN = 50 Wetland	CN = 61 Grass	CN = 85 Gravel	CN = 74 Crop & other improved land	CN = 65 Pasture & other unimproved land	CN = 58 Woodlots and forests	CN = 98 Impervious	Total	CN Weighted	% Impervious	Soils Group	Length (m)	Average Slope (%)	Calculated Time of Concentration (min)	Minimum Time of Concentration (min)	Time to Peak (min)	Time to Peak (hr)	Wetland	Grass	Gravel	Crop & other improved land	Pasture & other unimproved land	Woodlots and forests	Impervious	Composite Runnoff Coefficient	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Infiltration Trench Sizing												B																			
DA1	South IT	0.000	0.550	0.000	0.000	0.000	0.000	0.604	**1.15**	80.38	52.37%	B	227.0	0.5	14.7	10.0	9.8	0.16	0.05	0.10	0.60	0.35	0.28	0.25	0.90	0.52	0.52	0.52	0.52	0.57	0.62	0.65	0.095	0.127	0.149	0.192	0.233	0.266
DA2	North IT	0.000	0.310	0.000	0.000	0.000	0.000	0.461	**0.77**	83.14	59.85%	B	221.0	0.6	14.4	10.0	9.6	0.16	0.05	0.10	0.60	0.35	0.28	0.25	0.90	0.58	0.58	0.58	0.58	0.64	0.69	0.72	0.072	0.096	0.112	0.144	0.175	0.199
DA3	West IT	0.000	0.245	0.000	0.000	0.000	0.000	0.071	**0.32**	69.32	22.48%	B	140.0	1.5	27.7	10.0	18.5	0.31	0.05	0.10	0.60	0.35	0.28	0.25	0.90	0.28	0.28	0.28	0.28	0.31	0.34	0.35	0.010	0.013	0.016	0.020	0.025	0.028
								1.137																														

Notes:

1. Runoff coefficients for Land Uses taken from MTO Drainage Manual Design Chart 1.07.
2. Runoff coefficients have been adjusted for storms exceeding the 10-year return period as follows: 25 Year - 1.10; 50-Year: 1.20; 100-Year: 1.25

Time of Concentration

1.Tc calculcated using Airport equation for C<0.4 and Bransby Willisams for C>0.4
2. Tp calculated as 0.67Tc.

Channel Design Sheet

Project Name: Norwood Park Phase 4
Project No: 20120

Designed By: MC
Date: 2022-06-13

Location	Contributing Area and Flow		Channel Properties						Hydraulics					
Channel Description	Description	Flow (m^3/s)	Bed Slope	Side Slope (X:1)	Bottom Width (m)	Depth (m)	Lining Material	Manning's n	Channel Capacity (m^3)	% Capacity	Cross Sectional Area (m^2)	Wetted Perimter (m)	Flow Depth (m)	Velocity (m/s)
DA1 - Infiltration Trench	100 year	0.266	0.0100	3.000	0.5	0.30	Grass	0.03	0.44	61%	0.420	2.40	0.24	0.92
DA2 - Outlet Swale	100 year	0.199	0.0080	3.000	0.0	0.35	Grass	0.03	0.33	60%	0.368	2.21	0.29	0.79
DA2 - Infiltration Trench	100 year	0.199	0.0080	3.000	0.5	0.30	Grass	0.03	0.39	51%	0.420	2.40	0.22	0.78
DA3 - Infiltration Trench	100 year	0.028	0.0070	3.000	0.5	0.30	Grass	0.03	0.37	8%	0.420	2.40	0.08	0.44

Soakaway/Infiltration Cell Sizing

Project Name: Norwood Park Phase 4
Project No: 20120

Designed By: BS
Date: 2021-12-10

Soil Information			
Geotechnical Report prepared by GHD. dated October 8, 2021 (Job No: 11231077)			
Borehole	Soil Characteristics	Hydraulic Conductivity (cm/sec)	Design Infiltration Rate (mm/hr)
MW1-21	0m to 1.4m - sand fill	10^{-3} to 10^{-4}	18

Reservoir Depth - dr max = i*ts/Vr		
i = native soil infiltration rate	18	mm/hr
V_r = void space ratio (40% =0.4)	0.4	
t_s = time to drain	48	hr
$d_{r\ max}$ = max. stone reservoir depth	**2000**	**mm**

Appendix J: Geotechnical Report

347 Pido Road
Peterborough, Ontario K9J 6X7
Canada
www.ghd.com

Our ref: 11231077

13 April 2022

Mackenzie Crowley
DPH Developments Inc.
c/o Engage Engineering Ltd.
171 King Street Suite 120
Peterborough, Ontario K9J 2R8

Re: Addendum #1 – Geotechnical Investigation
Norwood Park Subdivision (Phase 4)
Albine Street, Norwood, County of Peterborough, Ontario

This letter presents a summary of groundwater measurements collected at the above captioned site and should be considered Addendum No. 1 to the GHD report entitled "Geotechnical Investigation Report: Proposed Norwood Park Subdivision – Phase 4, Albine Street, Norwood, Ontario" (the Report) dated October 8, 2021, under GHD's project no. 11231077.

The geotechnical investigation included the advancement of four (4) boreholes to depths ranging from 2.7 to 4.0 metres below ground surface (mbgs) and included the installation of three (3) monitoring wells within the advanced boreholes. Additionally, eleven (11) test pits were excavated to depths ranging from 1.4 to 3.7 mbgs. Details of the monitoring wells and test pits are presented in the Report. A summary of the groundwater measurements that have been completed to date are provided in the following table:

Summary of Groundwater Readings

Location	Ground Elevation* (m)	Borehole Depth (mbgs)	Seepage Depth (mbgs) / Seepage Elevation (m)	Water Levels (mbgs) / Groundwater Elevations (m)		
				Aug. 18, 2021 (Open Borehole)	Aug. 27, 2021 (Monitoring Well)	Apr. 12, 2022 (Monitoring Well)
MW1-21	211.9	3.1	Not observed	Dry	Dry	2.1 / 209.8
MW2-21	210.3	3.7	Not observed	Dry	Dry	2.1 / 208.2
MW3-21	211.7	4.0	Not observed	Dry	Dry	Dry
BH4-21	208.3	2.7	Not observed	Dry	Monitoring well not installed	
TP1-21	212.3	1.7	Not observed	Dry	Monitoring well not installed	
TP2-21	212.2	1.8	Not observed	Dry	Monitoring well not installed	
TP3-21	212.9	3.2	Not observed	Dry	Monitoring well not installed	
TP4-21	211.9	3.7	Not observed	Dry	Monitoring well not installed	
TP5-21	209.7	1.6	Not observed	Dry	Monitoring well not installed	
TP6-21	209.9	1.4	Not observed	Dry	Monitoring well not installed	
TP7-21	212.0	2.0	Not observed	Dry	Monitoring well not installed	
TP8-21	212.2	1.8	Not observed	Dry	Monitoring well not installed	
TP9-21	210.1	1.6	Not observed	Dry	Monitoring well not installed	
TP10-21	212.2	1.7	Not observed	Dry	Monitoring well not installed	

Location	Ground Elevation* (m)	Borehole Depth (mbgs)	Seepage Depth (mbgs) / Seepage Elevation (m)	Water Levels (mbgs) / Groundwater Elevations (m)		
				Aug. 18, 2021 (Open Borehole)	Aug. 27, 2021 (Monitoring Well)	Apr. 12, 2022 (Monitoring Well)
TP11-21	212.2	1.1	Not observed	Dry	Monitoring well not installed	

Notes:
m = metres; mbgs = metres below ground surface
(*) Ground elevations surveyed by GHD for the purposes of evaluating groundwater elevations and should not be relied upon as a legal survey or topographic elevation survey.

Based upon the field work completed on April 12, 2022, the water levels were measured to be 2.1 mbgs in MW1-21 and MW21-2 corresponding to groundwater elevation of 209.8 to 208.2 m, respectively. The monitoring well MW21-3 was dry to a depth of 4.0 mbgs (207.7 m).

The conclusions and recommendations presented in our Report have not changed. We trust that this brief report meets with your immediate requirements. Should you have any questions, please contact our office.

Sincerely,

GHD Limited

Leandro Ramos, P.Eng.
Geotechnical Engineer

Robert Neck, P.Geo. (Limited)
Associate, Project Director

Geotechnical Investigation Report

Proposed Norwood Park Subdivision - Phase 4, Albine Street, Norwood, Ontario

DPH Developments Inc.

8 October 2021

→ The Power of Commitment

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Appendices

1. Introduction

GHD Limited (GHD) has been retained by DPH Developments Inc. (the Client), being represented by Engage Engineering Ltd. (EEL) to conduct a geotechnical investigation for the design and construction of phase 4 of the proposed Norwood Park subdivision along Albine Street and west of Keeler Court (phase 3), in Norwood, Ontario (the Site). The Site location map is presented as **Figure 1** in the attachment section of this report.

It is GHD's expectation that the proposed development will consist of typical 1- and 2-storey residences, with or without basements, with associated asphalt-paved roadways, and in-ground servicing. A preliminary conceptual plan provided by the Client illustrated the site location and proposed road network and lot layout. Further details of the proposed development, such as site grading plans and servicing plans, were not available at the time of preparation of this report.

The purpose of the geotechnical investigation was to assess the subsurface soil and groundwater conditions within the proposed development area, and to provide geotechnical engineering recommendations relevant to earthwork construction, reuse of existing soils as backfill material, service installation, infiltration rates for potential Low Impact Development (LID) features, storm water management (SWM) pond design, foundations, slabs, and pavement structure for roadway construction. The geotechnical investigation was completed in general accordance with our proposal PG-5227 dated July 6, 2021.

The factual data, interpretations and preliminary recommendations contained in this report pertain to a specific project as described in the report and are not applicable to any other project or site location. This report should be read in conjunction with the Statement of Limitations appended to this report. The reader's attention is specifically drawn to this information, as it is essential for the proper use and interpretation of this report.

2. GHD's Scope of Work

GHD's scope of work was carried out from July to October 2021 and involved the following tasks:

– Pre-Planning activities:
  - Preparation of a Site-specific health and safety plan (HASP).
  - Completion of underground utility locate clearances (public and private).
– Field activities:
  - Advancement of four (4) boreholes identified as MW1-21, MW2-21, MW3-21 and BH4-21 as shown on **Figure 2** to depths ranging between 2.7 to 4.0 metres below ground surface (mbgs). Monitoring wells were installed in three (3) of the borehole locations (MW1-21, MW2-21, and MW3-21) to facilitate groundwater monitoring and testing.
  - Advancement of eleven (11) test pits identified as TP1-21 through TP11-21 on **Figure 2** to depths ranging between 1.0 to 3.7 mbgs.
  - Standard Penetration Test (SPT) and associated split spoon soil sampling in accordance with ASTM D1586.
  - Hydraulic testing (i.e. single well response slug testing) was completed at the three (3) monitoring wells and permeameter testing was completed at three test pit locations, to evaluate hydraulic conductivity for potential dewatering and infiltration rates for potential Low Impact Development (LID) design.
– Completion of geotechnical laboratory testing on the selected soil samples.
– Preparation of geotechnical investigations report (factual data, analysis and recommendations).

3. Methodology

3.1 Safety Planning

Upon project initiation, a Site-specific Health and Safety Plan (HASP) was prepared for implementation during the field investigation program. The HASP presents the visually observed Site conditions to identify potential physical hazards to field personnel. Required personal protective equipment was also listed in the HASP. It is mandatory for all GHD personnel involved in the field program, to read the HASP and have a copy of the HASP available at the Site during the investigative work. Health and Safety requirements in the HASP were implemented during the field investigation program.

In addition to the abovementioned safety measures, GHD's safety protocol related to COVID-19 issues was implemented and all preventive measures were reinforced. GHD and sub-contractor maintained the required social distancing throughout the field investigations.

3.2 Utility Clearance

GHD completed a pre-drilling Site visit to review the Site conditions and access restrictions. Based on the limits of approach, the test holes were positioned appropriately to avoid potential obstructions. The test holes were placed in the field based on the preliminary conceptual plan.

Prior to initiating the subsurface investigation activities, all applicable utility companies (gas, hydro, network cables, water, waste water, etc.) were contacted, to demarcate the location of their respective underground utilities to ensure that service lines would not be damaged during the investigative works.

GHD also retained a specialist private services locator (Utility Marx) to locate any underground private utilities that could potentially be present at the Site. The proposed boreholes and test pits were positioned at appropriate locations to avoid existing service lines.

3.3 Field Investigation

The test hole program associated with the geotechnical investigation was conducted on August 18th and August 27th, 2021. The subsurface investigation consisted of advancing a total of four (4) exploratory boreholes and eleven (11) test pits. Monitoring wells were installed in three (3) of borehole locations. The test hole locations are presented on **Figure 2**.

GHD's safety protocol related to COVID-19 issues was implemented and all preventive measures were applied for the bringing of samples into the lab. The sample bags were decontaminated before carrying out the sample review and laboratory testing.

3.3.1 Test Hole Advancement and Sample Collection

The boreholes were located as shown in **Figure 2**. The drilling work was carried out by a track mounted drilling rig, supplied, and operated by Landshark Drilling under the full-time supervision of a GHD experienced technical representative. The boreholes were advanced to depths ranging between approximately 2.7 to 4.0 mbgs.

The boreholes were advanced using continuous solid stem augers and soil samples were collected using a 50 millimetre (mm) outside diameter split spoon sampler in general accordance with the specifications of the Standard Penetration Test Method (ASTM D1586). The relative density or consistency of the subsurface soil layers were measured using the Standard Penetration Test (SPT) method, by counting the number of blows ('N') required to drive a conventional split barrel soil sampler 300 mm depth.

Monitoring wells were installed in three (3) borehole locations (MW1-21, MW2-21 and MW3-21). The monitoring wells consist of a 50 mm diameter polyvinyl chloride (PVC) slotted well screen and completed to the ground surface using a riser pipe. A silica sand pack was placed in the annular space between the PVC screen and riser pipe to approximately 0.3 m above the top of the screen. A bentonite seal was installed in the remaining borehole annulus above the sand pack.

The test pits were located as shown in **Figure 2**. The test pitting was carried out by a track mounted excavator, supplied, and operated by Drain Brothers Excavating Ltd under the full-time supervision of a GHD experienced technical representative. The test pits were advanced to bedrock at depths ranging between approximately 1.1 to 3.7 mbgs.

Groundwater level observations and measurements were made in the test holes as drilling and test pits proceeded and upon completion of the test holes. The observed conditions and measured groundwater levels are provided in the logs of the drilled boreholes and excavated test pits. The boreholes in which a monitoring well was not installed were backfilled upon completion and sealed in accordance with Ontario Regulation 903.

The GHD technical representative logged the soil samples and bedrock encountered in the test holes and examined the samples as they were obtained. The recovered samples were transferred to the GHD Peterborough laboratory, where they were reviewed by a senior geotechnical engineer. The detailed results of the examination are recorded on the test hole logs presented in Appendix A.

3.4 Test Hole Locations and Ground Surface Elevations

UTM coordinates and ground surface elevations for each test hole location was surveyed using a Leica RX1250X GPS system connected to the Real-Time Kinematic (RTK) network. The location of each test hole is referenced to UTM (Zone 17). The following table presents a summary of investigated depths, surface elevations, and UTM coordinates for the test hole locations:

Table 3.1 Summary of Test Holes

Borehole and Test Pit ID	Location – UTM Coordinates System		Test Hole Depth (mbgs)	Ground Elevation (m)
	Northing	Easting		
MW1-21	4919307	261628	3.1	211.9
MW2-21	4919275	261660	3.7	210.3
MW3-21	4919153	261503	4.0	211.7
BH4-21	4919103	261664	2.7	208.3
TP1-21	4919431	261740	1.7	212.3
TP2-21	4919371	261770	1.8	212.2
TP3-21	4919287	261795	3.2	212.9
TP4-21	4919218	261816	3.7	211.9
TP5-21	4919166	261690	1.6	209.7
TP6-21	4919126	261566	1.4	209.9
TP7-21	4919161	261501	2.0	212.0
TP8-21	4919211	261535	1.8	212.2
TP9-21	4949243	261669	1.6	210.1
TP10-21	4919299	261520	1.7	212.2
TP11-21	4919320	261644	1.1	212.2

It should be noted that the provided coordinates and elevations are approximate, and should not be used for construction purposes. The locations of the test holes are shown on the Test Hole Location Plan presented as **Figure 2**. Details of the subsurface conditions encountered are discussed in Section 5 of this report and are presented on the individual logs attached to this report in Appendix A.

3.5 Geotechnical Laboratory Testing

Geotechnical laboratory testing was completed in accordance with the latest editions of the ASTM standards. Geotechnical laboratory testing consisted of moisture content tests on recovered soil samples, as well as grain size distribution analysis (hydrometers) on five (5) selected soil samples.

The collected soil samples were classified / described in general accordance with the ASTM D2487 - Standard Practice for Classification of Soils for engineering purposes (Unified Soil Classification System-USCS).

The results of the moisture content and grain size distribution analysis are recorded at their corresponding depths on the individual test hole logs provided in Appendix A. The gradation curves are provided in Appendix B.

3.6 Hydraulic Conductivity and Infiltration Testing

In-situ constant head permeameter testing was conducted at test pits TP3-21 (2 tests), TP7-21 and TP11-21 at depths from about 0.3 to 1.4 mbgs. Infiltration testing was completed using an ETC Pask (constant head well) permeameter. The infiltration testing results are provided in Appendix C.

In-situ hydraulic response testing was completed in the monitoring wells installed in boreholes MW1-21, MW2-21 and MW3-21. The testing consisted of falling head testing and was completed by introducing a known quantity of potable water in the piezometers, and then measuring the water levels using a data logger programmed to record readings at three (3) second intervals. The data was analyzed using AQTESOLV and the Bouwer-Rice solution for each test. The results of the hydraulic response testing are presented graphically in Appendix C.

4. Site Location and Description

The proposed development area is located along Albine Street to the west of Keeler Court with the bulk of the property on the north side of Albine Street, and a smaller portion on the south side of Albine Street, in Norwood, Ontario. The Site currently consists of vacant agricultural fields. The ground surface within the proposed development area generally comprised of recently harvested hay crops (cut grassed areas) delineated by older fence lines. Power transmission lines border the property at the northern extent. The Site topography is consists of rolling terrain with elevations generally dropping the south.

5. Regional Geology and Subsurface Conditions

5.1 Regional Geology

According to the Quaternary Geology of Ontario Map 2556 (“Quaternary Geology of Ontario-Southern Sheet”, prepared by the Ministry of Northern Development and Mines (MNDM), published in 1997), the quaternary deposits in the area of the subject Site consist of till deposits comprised of predominantly sandy silt to silt matrix, commonly rich in clasts, often high in total matrix carbonate content.

According to the Paleozoic Geology of Southern Ontario map, the bedrock in the area consists of limestone and shale of the Verulam Formation, Simcoe Group of the Middle Ordovician era. The bedrock in this area is expected to be encountered near the surface.

5.2 Subsurface Conditions

Subsurface conditions at the test hole locations were generally found to be consistent with the regional geology. Details of the subsurface conditions encountered in the four (4) boreholes and eleven (11) test pits advanced at Site during the GHD investigation are summarized in the following sections of the report. Detailed stratigraphy is shown on the detailed test hole logs presented in Appendix A. It should be noted that the subsurface conditions are only confirmed at the test hole locations and may vary between and beyond the test hole locations. The boundaries between the various strata, as shown on the test hole logs are based on non-continuous sampling and drilling resistance noted and observed at the time of drilling. These boundaries represent an inferred transition between the various strata, rather than precise planes of geological change.

5.2.1 Topsoil

A layer of topsoil was encountered at the surface in the boreholes and test pits. This topsoil layer ranged from 125 to 325 mm in thickness. This soil was observed to be in a damp, loose state, with a silty, highly organic content. As such, it is expected to be devoid of any structural engineering properties.

5.2.2 Sandy Silt / Silty Sand

The surficial layer of topsoil was underlain by native soils generally consisting of sandy silt or silty sand extending to depths ranging from 0.6 mbgs to 3.4 mbgs in the investigated test hole locations. These soils were generally brown in colour and were observed to contain increasing amounts of gravel, cobbles and boulders with depth. SPT N values obtained from within the sandy silt and silty sand layer varied from 4 blows/300mm to over 76 blows/150mm, indicating a loose to very dense in-situ state of relative density.

Samples of this material were visually described to be in a generally moist condition. Measured moisture contents ranged from 1 percent to 16 percent by weight.

5.2.3 Bedrock

Each test hole encountered practical refusal to further advancement due inferred/confirmed bedrock. Practical refusal occurred at depths ranging from 1.7 to 4.0 mbgs.

The depth at which practical refusal was encountered was interpreted by GHD as being the depth of competent bedrock for the purpose of logging the test holes. It is noted that bedrock typically exhibits a certain degree of weathering and fracturing in its upper zone. This weathering effect can increase significantly in shale/limestone bedrock. A number of the test pits penetrated partly into the bedrock, (i.e., through this upper zone of more fractured /

weathered bedrock) before encountering refusal on bedrock interpreted to be of more sound composition. This layer of weathered bedrock appears in the test holes with the exception of test pit TP2-21. Refer to Appendix A for additional details.

The estimated depths of the top of bedrock surface are provided on the test hole logs (Appendix A) and are summarized in Table 5.1.

Table 5.1 Depth to Bedrock

Borehole ID	Depth / Elevation to Inferred / Confirmed Weathered Bedrock (mbgs / m)	Depth / Elevation to Inferred / Confirmed Sound Bedrock (mbgs / m)
MW1-21	1.8 / 210.1	3.1 / 208.8
MW2-21	2.3 / 208.0	3.7 / 206.7
MW3-21	3.4 / 208.4	4.0 / 207.8
BH4-21	2.1 / 206.2	2.7 / 205.6
TP1-21	0.6 / 211.7	1.7 / 210.6
TP2-21	Not Observed	1.8 / 210.4
TP3-21	1.5 / 211.4	3.2 / 209.7
TP4-21	3.4 / 208.5	3.7 / 208.2
TP5-21	0.8 / 208.8	1.6 / 208.0
TP6-21	0.8 / 209.2	1.4 / 208.5
TP7-21	0.9 / 211.1	2.0 / 210.0
TP8-21	0.8 / 211.5	1.8 / 210.4
TP9-21	1.2 / 208.9	1.6 / 208.5
TP10-21	0.9 / 211.3	1.7 / 210.5
TP11-21	0.9 / 211.3	1.1 / 211.1

Note: Bedrock inferred within the boreholes; Bedrock confirmed in the test pits.

5.2.4 Groundwater

Groundwater seepage was not observed in any of the test holes during the drilling and excavation operations. Monitoring wells were installed by GHD in three (3) of the borehole locations (MW1-21, MW2-21 and MW3-21). All three monitoring wells were measured to be dry on August 27, 2021. Test hole information is available in Appendix A.

It is noted that groundwater may be subject to seasonal fluctuations and could rise and decline in response to major weather events.

5.2.5 Geotechnical Laboratory Test Results

A total of five soil samples were collected from native soils at select depths and tested for grain size distribution analysis. The laboratory test results are summarized in the following table and detailed test results are presented in Appendix B.

Table 5.2 Summary of Laboratory Results

Location	Depth (mbgs)	Grain Size Distribution				Observed Soil Unit
		%Gravel	%Sand	%Silt	%Clay	
MW1-21	1.5 – 1.8	35	40	19	6	SM – Silty Sand, Gravelly
MW3-21	2.3 – 2.6	30	45	19	6	SM – Silty Sand, Gravelly
BH4-21	0.8 – 1.1	0	35	57	8	ML – Sandy Silt
TP1-21	0.8 – 0.9	52	30	15	3	Sample of Weathered Bedrock
TP4-21	0.6 – 0.9	0	7	90	3	ML – Silt
Soil description based on Unified Soil Classification System (ASTM D 2487)						

5.2.6 Hydraulic Conductivity and Infiltration Testing Results

In-situ constant head permeameter testing was conducted at test pits TP3-21 (2 tests), TP7-21 and TP11-21 at depths from about 0.3 to 1.4 mbgs. The values obtained correlate to field saturated hydraulic conductivity (K_{fs}) values that range between 10^{-3} cm/sec and 10^{-4} cm/sec for the native soils within the zone tested and correlates to estimated infiltration rates ranging from about 50 to 75 mm/hour based upon Supplementary Guidelines to the Ontario Building Code 2012. The infiltration testing results are provided in Appendix C.

In-situ hydraulic response testing was completed in the monitoring wells installed in boreholes MW1-21, MW2-21 and MW3-21. The testing consisted of falling head testing since the monitoring wells were dry at the outset and was completed by introducing a known quantity of potable water in the monitoring wells and then measuring the water levels using a data logger programmed to record readings at three (3) second intervals. The data was analyzed using AQTESOLV and the Bouwer-Rice solution for each test. The testing indicated hydraulic conductivity values ranging from 10^{-4} cm/sec to 10^{-5} cm/sec within the screened interval of the tested native soils and weathered bedrock units. The results of the hydraulic response testing are presented graphically in Appendix C.

6. Discussion and Recommendations

A preliminary conceptual plan provided by the Client illustrated the proposed site location, road network and lot layout. Proposed invert grades for utility piping (storm, sanitary, water) were not available to GHD as of writing this report. It is expected that the residential buildings will be up to 2-storeys in height, possibly with basements where feasible (based on final grading, bedrock depths, etc).

Based upon the above comments and on the test hole information, and assuming them to be representative of the subsoil conditions across the Site, the following comments and recommendations are offered.

6.1 Site Preparation, Grading and Backfill

The test holes generally encountered a surficial layer of topsoil over compact to very dense native sandy silt and silty sand native soils, containing increasing amounts of gravel, cobbles and boulders with depth, underlain by bedrock.

Any topsoil, vegetation, disturbed earth, fill, organic and organic-bearing material should be removed from the footprint of the proposed building area and from within pavement areas prior to site grading activities. Care will be required during excavation to separate materials containing significant amounts of topsoil/organics or rootlets from the clean excavated material.

Prior to Site grading activity, the subgrade soils exposed after the removal of topsoil and disturbed native soils within the proposed buildings and unsuitable materials within proposed pavement areas should be visually inspected, compacted if required, and proof rolled using large axially loaded equipment. Any loose, organic, or unacceptable areas should be subexcavated and removed as directed by the Engineer and replaced with suitable fill materials compacted to a minimum of 98 percent Standard Proctor Maximum Dry Density (SPMDD). Clean earth fill used to raise grades in the proposed buildings and pavement areas should be placed in thin layers (200 mm thick or less) and compacted by a heavy appropriate roller to 100 percent SPMDD.

The native soils encountered at the Site are generally suitable for reuse as backfill to raise site grades (where required), or as backfill against foundation walls or as trench backfill during installation of buried services, provided they are free of organic material, and are within the optimum moisture content. Control of moisture content during placement and compaction will be essential for maintaining adequate compaction.

Installation of engineered fill, where required, must be continuously monitored on a full-time basis by qualified geotechnical personnel.

6.2 Service Installation

The proposed utility invert depths were not available to GHD at the time of writing this report. The material encountered during this investigation at the anticipated service invert elevations (2 to 3 mbgs) typically consists of native silty sand or weathered bedrock and bedrock. As such, a normal compacted Class “B” bedding is recommended for all underground services, where moisture conditions inside the trench will allow for placement and compaction of bedding material. Class “B” bedding is Granular “A”, or 19 mm crusher run limestone, as per Ontario Provincial Standard Specifications (OPSS). The minimum recommended bedding thickness for the underground services is 150 mm. If any bedding subgrade consists of unsuitable or otherwise incompetent soils, either subexcavate to competent soils, and/or thicken the bedding material to 300 mm. All bedding, surround, and cover materials should be compacted to at least 98 percent of its SPMDD.

It is recommended that covering of the underground services be accomplished using Granular “A”, sand, or other suitable material as allowed by the Municipality’s standards, to a minimum of 300 mm above the pipe. Compaction of this material should attain a minimum of 100 percent SPMDD. It is expected that some of the excavated soils may be suitable for reuse as trench backfill, conditional upon suitable moisture content (within 2 % of optimum), final review and approval by an experienced geotechnical engineer at the time of construction, and regular monitoring and inspection of such reuse throughout construction. Compaction of any native soil in service trenches is recommended to be a minimum of 98 % of its SPMDD.

In order to minimize possibility of differential settlement due to variable subgrade material, where bedding subgrade transitions from soil to bedrock, the bedding thickness can be increased up to 300 mm on the bedrock, and taper at 10H:1V back to the minimum 150 mm thickness as the pipe alignment advances away from the soil subgrade and further into the bedrock subgrade. Alternatively (for watermains) the Client may consider the use of restrained joints at locations where this transition occurs.

6.3 Road Construction

Based on the results of this investigation, we would recommend the following procedures be implemented to prepare the proposed asphalt paved access way and parking areas for its construction:

1. Remove all topsoil, organics, organic-bearing materials and other deleterious materials from the planned pavement areas to a minimum depth to allow for the new pavement structure at which point an assessment of the exposed soils by a member of GHD will deem whether further removal and/or placement of suitable geotextile material or other treatment is required.

2. Inspect and proof roll the subgrade for the purpose of detecting possible zones of overly wet or soft subgrade. Any deleterious areas thus delineated should be replaced with approved granular material compacted to a minimum of 98 percent of its SPMDD. Approved excavated soils can be reused as road subgrade backfill provided the soil is workable and at a moisture content that will permit adequate compaction. A final review and approval to reuse any soils must be made during construction.
3. Contour the subgrade surface to prevent ponding of water during the construction and to promote rapid drainage of the sub-base and base course materials.
4. To maximize drainage potential, 150 mm diameter perforated pipe subdrains should be installed below any curb lines. The pipe should be encased in filter fabric and surrounded by clear stone aggregate. It is recommended that the subdrains discharge to a suitable, frost-free outlet.
5. Construct transitions between varying depths of granular base materials at a rate of 1:10 minimum.

The subgrade materials in the proposed pavement areas will consist of native silty sand till or fill soils. The frost susceptibility of these soils is assessed as being generally moderate to high. In this regard, the following minimum flexible pavement structures are recommended for the construction of the new access and parking areas.

Table 6.1 Minimum Pavement Structure for Local Residential Roads

Profile	Material	Thickness (mm)	In Conformance with OPSS Form
Asphalt Surface	H.L.3	40	1150
Asphalt Base	H.L.8	50	
Granular Base	Granular “A”	150	1010
Granular Subbase	Granular “B”	300	

The following steps are recommended for optimum construction of paved areas:

1. The Granular “A” and “B” courses should be compacted to a minimum 100 percent of their respective SPMDD’s.
2. All asphaltic concrete courses should be placed, spread and compacted conforming to OPSS 310 or equivalent. All asphaltic concrete should be compacted to a minimum 92.0 percent of their respective laboratory Maximum Relative Densities (MRD’s).
3. Adequate drainage should be provided to ensure satisfactory pavement performance.

It is recommended that all fill material be placed in uniform lifts not exceeding 200 mm in thickness before compaction. It is suggested that all granular material used as fill should have an in-situ moisture content within 2 percent of their optimum moisture content. All granular materials should be compacted to 100 percent SPMDD. Granular materials should consist of Granular “A” and “B” conforming to the requirements of OPSS 1010 or equivalent.

The performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure that uniform subgrade moisture and density conditions are achieved as much as practically possible. It is noted that the above recommended pavement structures are for the end use of the project. The most severe loading conditions on pavement areas and the subgrade may occur during construction. As such, during construction of the project, the recommended granular depths may not be sufficient to support loadings encountered. Consequently, special provisions such as restricted lanes, half-loads during paving, etc. may be required, especially if construction is carried out during unfavourable weather.

6.4 Foundations

In general, it is recommended that structural loading for one- to two-storey buildings be supported on spread and continuous strip footings for column and load bearing walls, respectively. The footings should be founded on the compact native soils, bedrock, or on engineered fill placed directly on the compact native soils or bedrock. The following table summarizes the depths at which suitably competent soils and bedrock were first encountered in each test hole:

Table 6.2 Depth to Competent Bearing Soil and Bedrock

Borehole ID	Depth / Elevation to competent native soils (mbgs / m)	Depth / Elevation to Practical Refusal (Inferred / Confirmed Sound Bedrock , mbgs / m)
MW1-21	0.8 / 211.1	4.0 / 207.8
MW2-21	0.8 / 209.5	2.7 / 205.6
MW3-21	0.3 / 212.1	1.7 / 210.6
BH4-21	1.2 / 207.1	1.8 / 210.4
TP1-21	0.4 / 211.9	3.2 / 209.7
TP2-21	0.6 / 211.6	3.7 / 208.2
TP3-21	1.2 / 211.6	1.6 / 208.0
TP4-21	1.5 / 210.3	1.4 / 208.5
TP5-21	0.8 / 208.8	2.0 / 210.0
TP6-21	0.5 / 209.5	1.8 / 210.4
TP7-21	0.3 / 211.7	1.6 / 208.5
TP8-21	0.3 / 211.8	1.7 / 210.5
TP9-21	0.8 / 209.3	1.1 / 211.1
TP10-21	0.6 / 211.6	4.0 / 207.8
TP11-21	0.8 / 211.4	2.7 / 205.6

For design purposes, and based on one- to two-storey residential houses, it is generally recommended that footings constructed on the compact native soils, bedrock or engineered fill be proportioned using the following bearing capacities:

Table 6.3 Preliminary Bearing Pressure for Foundation Design

Parameter	Bearing Pressure				
	Sound Bedrock	Compact Undisturbed Native Soils	Engineering Fill		
			Rock-based Fill[2]	Granular Fill[3]	Earth Borrow Fill [3]
Factored Bearing Capacity at ULS [1]	1 MPa	180 kPa	255 kPa	205 kPa	155 kPa
Bearing Capacity at SLS		120 kPa	150 kPa	120 kPa	90 kPa

Notes:
(1) Resistance factor Φ =0.5 applied to the ULS bearing pressure for design purposes.
(2) At least 1m of Rock-based fill. Quality of material is to be approved prior to use as engineered fill.
(3) At least 0.3m of Granular or Earth Borrow fill. Quality of material is to be approved prior to use as engineered fill.

Any engineered fill upon which footings are placed must be a minimum thickness corresponding to the notes that accompany the above table. Rock-based fill must be completely encapsulated with suitable filter fabric to minimize any migration of fine-grained particles from surrounding soils into the voids within the rock fill. Footings (and foundation walls) placed on engineered fill must be suitably reinforced; as a minimum, and where not already specified in the design drawings, this reinforcing should use 2 continuous runs of 15M rebar throughout the footings, and 2 runs of 15M rebar throughout near the top and bottom of the foundation walls.

The following is recommended for the construction of any engineered fill for the foundations:

1. Remove any and all existing vegetation, topsoil, fill, organics, and organic-bearing soils to the competent, undisturbed native soil from within the area of the proposed engineered fill.
2. The area of the engineered fill should extend horizontally 1m beyond the outside edge of the building foundations and then extend downward at a 1:1 slope to the competent native soil.
3. The base of the engineered fill area must be approved by a member of GHD prior to placement of any fill, to ensure that all unsuitable materials have been removed, that the materials encountered are similar to those observed, and that the subgrade is suitable for the engineered fill.
4. All engineered fill material is to be approved by GHD at the time of construction.
5. Place approved engineered fill, in maximum 200 mm lifts, compacted to 100 percent of its SPMDD. Any fill material placed under sufficiently wet conditions should consist of an approved, rock-based fill, with the inclusion of appropriate geotextile fabric around the rock-based fill should the rock fill contain enough voids to warrant.
6. Full time testing and inspection of the engineered fill will be required, to ensure compliance with material and compaction specifications.

Under no circumstances should the foundations be placed above organic materials, loose, frozen subgrade, construction debris, or within ponded water. Prior to forming, all foundation excavations must be inspected and approved by a member of GHD's geotechnical group. This will ensure that the foundation bearing material has been prepared properly at the foundation subgrade level and that the soils exposed are similar to those encountered during this investigation.

Should basement or otherwise subgrade areas be incorporated into any of the buildings' designs, it is recommended that for drainage purposes, perimeter drains be installed about the structure. The subdrains would serve to drain seepage water that infiltrates the backfill. The drains should consist of a perforated pipe, at least 150 mm in diameter, surrounded by clear, crushed stone and suitable filter protection. The drain should discharge to a positive sump or other permanent frost free outlet. It is also strongly recommended that the building's foundation walls be sealed and waterproofed.

For foundations constructed in accordance with the foregoing manner, total and differential settlements are estimated to be less than 25 mm.

6.5 Depth of Frost Penetration

It is recommended that all exterior foundations or footings in unheated areas have a minimum soil cover of at least 1.4 m in according to OPSD 3090.101 (2010), or equivalent insulation. Footings for heated structures, such as perimeter foundation for the proposed building structure, must be provided with a minimum of 1.2 m of earth cover or equivalent insulation.

During winter construction exposed surfaces to support foundations must be protected against freezing by means of loose straw and tarpaulins, heating, etc.

6.6 Seismic Site Classification

The latest Ontario Building Code (OBC) requires the assignment of a Seismic Site Class for calculations of earthquake design forces and the structural design based on a two percent probability of exceedance in 50 years. According to the latest OBC, the Seismic Site Class is a function of soil profile, and is based on the average properties of the subsoil strata to a depth of 30 m below the ground surface. The OBC provides the following three methods to obtain the average properties for the top 30 m of the subsoil strata:

– Average shear wave velocity.
– Average Standard Penetration Test (SPT) values (uncorrected for overburden).
– Average undrained shear strength.

For design purposes, based on the criteria listed in Table 4.1.8.4.A. of the OBC and the results obtained from standard penetration resistance of the underlying subsurface conditions, estimated undrained shear strength and our knowledge of the regional geology, a Seismic Site Class 'C' can be used for the design of the proposed buildings.

6.7 Slab-On-Grade Construction

Floors may generally be constructed as normal slabs-on-grade, on granular or 19 mm clear stone over native, inorganic subsoils. The floor slab should be formed over a base course consisting of at least 150 mm of Granular "A" backfill as per OPSS or (19 mm clear stone beneath basement areas) compacted to a minimum of 100 percent of its SPMDD. All grade increases or infilling below the granular "A" or clearstone should be constructed in accordance with the engineered fill steps provided in Section 6.5 of this report. If the groundwater table is intersected by any basement excavations, the floor slabs should incorporate under slab drains, and a vapour barrier should be installed beneath the slab to prevent migration of moisture vapour. All fill placed as engineered fill must be inspected, approved and compaction verified by personnel from GHD.

6.8 Basement and Retaining Walls

It is recommended that free draining backfill to basement and retaining walls be provided. Walls located above the groundwater table may be designed for lateral earth pressures using the following equation:

p = k (w h + q), where:

- p = the lateral earth pressure in kPa acting on the subsurface wall at depth h;
- ka= the coefficient of active earth pressure;

  (= 0.3 for walls restrained from the bottom only);

  (= 0.5 for walls restrained at the top and bottom*);
- kp= the coefficient of passive earth pressure, (= 3.0);
- w= the granular or native soil bulk density in kN/m^3;

  (= 21.0 kN/m^3 for well compacted, OPSS-approved Granular "B" or native soils);
- h = the depth (in metres) below the exterior grade at which the earth pressure is being calculated; and
- q = the equivalent value of any surcharge (in kN/m3) acting on the ground surface adjacent to the walls.

(*) This value is recommended for rigid walls retaining compacted backfill.

The recommended value for the coefficient for sliding friction between the soil and the concrete is 0.4. Also, any additional surcharge loading that will influence the wall must be taken into account in its design.

6.9 Storm Water Management Pond

It is GHD's understanding that a SWM pond is proposed in the southwest corner of the site and is to be located within the area of test holes TP7-21 and MW3-21 as shown on the Test Hole Location Plan. The proposed base elevation of the SWM pond is not known at the time of writing this report, however it is expected that the bottom of the SWP will consist of gravelly silty sand native soils or bedrock. The hydraulic conductivity of the sandy gravel is expected to be on the order of about 10^{-3} to 10^{-4} cm/sec and the hydraulic conductivity of the bedrock is expected to range from 10^{-1} to 10^{-7} cm/sec depending on the presence of fractures and voids within the bedrock. (Note that even greater hydraulic conductivities may exist within the bedrock where larger fractures, voids, or other groundwater conduits exist and are intersected by excavations).

Based on the soils observed, and the assumed base elevations, it appears that construction of the SWM pond in this area is feasible. In general, excavation of the soils and/or bedrock for the SWM pond are expected to be straightforward, provided that appropriate measures are taken during construction to minimize any overland or near-surficial flow of water into the area. Groundwater and surficial water inflow into the open SWM pond excavation may be encountered depending on the time of the year in which construction is conducted, however this is expected to be controlled by pumping from within the excavation, along with further measures if required including up-gradient cutoff trenching with appropriate drainage outletting.

It is recommended that the SWM pond subgrade surfaces be proof rolled, and a representative of GHD approve the subgrade prior to construction of the berms. Construction of the berms may utilize excavated soils, such as the sandy silt or gravelly silty sand native soils. Such operations should place soils in lifts no thicker than 150 mm prior to compaction, and compacted to at least 95 percent SPMDD. The native, undisturbed soils or the fractured / weathered bedrock are not expected to have a sufficiently low permeability where they could substitute for a liner, as such the bottom of the SWM pond must be lined with a more suitable (i.e less hydraulically conductive) material.

Liner material should have a hydraulic conductivity of no greater than 10^{-6} cm/sec. The thickness of the liner typically depends on the hydraulic conductivity of the material used. Liners constructed using materials with the maximum allowable hydraulic conductivity (10^{-6} cm/sec) should be a minimum of 450 mm thick, and may be required to be as thick as 600 mm if containing high amounts of gravel and/or cobbles. Liners constructed with less permeable materials, such as clay soils containing hydraulic conductivity of 10^{-8} cm/sec or lower are typically required to be a minimum of 300 mm in thickness. The liner should be placed in lifts no thicker than 150 mm prior to compaction, and compacted to 100 percent SPMDD. It is recommended that compaction of any liner material be carried out under dry weather conditions and at an in-situ moisture content within 2 percent of the material's optimum moisture content. The surface of each liner lift should be scarified prior to placement of the overlying lift. Failure to achieve this will result in a poor performance and a liner with a higher relative hydraulic conductivity. It is noted that materials encountered during this investigation are typically expected to possess hydraulic conductivities greater than 10^{-6} cm/sec (with elevated sand and gravel content), and are therefore generally expected to be unsuitable for use as the SWM pond liner. Further geotechnical assessment of the exposed SWM pond subgrade and any soils being considered for reuse as a liner material should be made during construction.

For the purpose of the proposed SWP, the soils observed should be stable from slip circle failure if sloped at 3 horizontal to 1 vertical (3H:1V) or flatter in the long term both above and below the water table. Between the stable water level and the expected high water level, it is recommended that the slopes be lessened to 4H:1V (or flatter) to guard against erosion by wavelet action. The native material will require vegetative root mass (or otherwise suitable erosion protection) to minimize erosional forces on exposed slopes.

Slopes and berms of the SWP should be constructed so as to reduce or eliminate the effects of surficial erosion. Features to do so may include slope vegetation, installation of erosion or gabion mats, rip rap, and/or other acceptable stabilizing features.

6.10 Excavation and Temporary Shoring

The Occupational Health and Safety Act (OHSA) regulations require that if workmen must enter an excavation deeper than 1.2 m, the excavation must be suitably sloped and/or braced in accordance with the OHSA requirements. OHSA specifies maximum slope of the excavations for four broad soil types as summarized in the following table:

Soil Type	Base of Slope	Maximum Slope Inclination
1	Within 1.2 metres of bottom	1 horizontal to 1 vertical
2	Within 1.2 metres of bottom of trench	1 horizontal to 1 vertical
3	From bottom of excavation	1 horizontal to 1 vertical
4	From bottom of excavation	3 horizontal to 1 vertical

The earth fill and native soils underlying the Site are considered Type 3 soils above groundwater level, and Type 4 if affected by surface water or groundwater seepage. If the above recommended excavation side slopes cannot be maintained due to lack of space or any other reason, the excavation side slopes must be supported by an engineered shoring system. The shoring system should be designed in accordance with Canadian Engineering Foundation Manual (4th Edition) and the OHSA Regulations for Construction Projects.

Depending on the depth of foundations and underground services, construction excavation operations will likely encounter and extend into bedrock. It is recommended that a unit price allowance for bedrock removal be included in the construction contract due to the variable bedrock elevations that are expected during the proposed construction, should any bedrock require excavating. Excavation of any highly fractured / weathered bedrock may be possible using a large hydraulic backhoe. The use of hydraulic breaking techniques and/or blasting (combined with precondition surveys of surrounding properties and vibration monitoring during construction) may be required.

6.11 Temporary Dewatering Requirements

Groundwater seepage was not observed in any of the test holes during the drilling and excavation operations. The monitoring wells installed in boreholes MW1-21, MW2-21 and MW3-21 were measured to be dry on August 27, 2021. In the long-term, seasonal fluctuations of groundwater may occur. Perched groundwater could accumulate within the fill or at the interface between the bedrock and overburden soils after heavy precipitation and/or during spring thaw; however, is expected to be seasonal and temporary based upon the conditions observed during our geotechnical investigation. A permanent groundwater table was not encountered during this drilling program.

Based on the conditions observed during the drilling, and the anticipated excavation depths for the proposed development, groundwater seepage is not expected but could occur at some locations depending on the time of the year. Any groundwater or surficial water infiltration into open excavations is expected to be controlled by pumping from a sump to an acceptable outlet. Should any excavations extend into the bedrock, groundwater-bearing zones may be encountered within any bedding planes and/or fractures and/or other such conduits within the bedrock. Based on hydraulic response testing conducted on the installed monitoring wells, any seepage encountered within the native soils and weathered bedrock may be expected to have a hydraulic conductivity value ranging from 10^{-4} cm/sec to 10^{-5} cm/sec. It should be noted that hydraulic conductivities can vary over a vertical and horizontal extent, and may be outside the stated range if pockets or zones of sand, gravelly soils or more fractured bedrock is intersected.

If short-term pumping of groundwater at volumes greater than 50,000 L/day and less than 400,000 L/day is required during the construction stage, a permit through the Environmental Activity and Sector Registry (EASR) must be obtained. The EASR streamlines the process and water pumping may begin once the EASR registration is completed, the fee paid and supporting document prepared. If water taking in excess of 400,000 litres/day is required, a Permit to Take Water (PTTW) must be obtained in advance. PTTW applications may take up to 90 working days for the Ministry of the Environment, Conservation and Parks (MECP) to review and approve. The actual rate of groundwater taking performed during construction will be a function of the final design, time of year, and the contractor's schedule, equipment, and techniques.

It is recommended that prior to commencing the construction, consideration be given to the excavation of a series of trial excavations to determine more accurately the soil behaviour and whether or not any significant dewatering works will be required.

6.12 Infiltration Rates for LID Design

In-situ constant head permeameter testing was conducted at test pits TP3-21 (2 tests), TP7-21 and TP11-21 at depths from about 0.3 to 1.4 mbgs. The values obtained correlate to field saturated hydraulic conductivity (K_{fs}) values that range between 10^{-3} cm/sec and 10^{-4} cm/sec for the native soils within the zone tested and correlates to estimated infiltration rates ranging from about 50 to 75 mm/hour based upon Supplementary Guidelines to the Ontario Building Code 2012. The infiltration testing results are provided in Appendix C.

It is noted that slight variations in the soil stratigraphy may cause variations in the permeability of the soil in both vertical and horizontal orientations.

A safety correction factor from Appendix C of the Low Impact Strom Water Management Planning and Design Guide must be applied to the measured infiltration rates once the base elevation for the LID feature is determined.

LIDs can be applied to any soil type; however, it is recommended that more permeable zones are targeted and that sub-grade infiltration locations be kept away from private lands. LIDs require maintenance and long-term care. If possible, naturally occurring infiltration strategies such as roof water discharged via downspouts to sodded lawns with adequate topsoil depths and minimum flow path distances are recommended. As indicated above, the LID features will be designed by others.

6.13 General Recommendations

6.13.1 Wells

The monitoring wells installed as part of this investigation were recorded and reported to the MECP, are still present and active as of writing this report, and are the property of the site's Owner. Any decommissioning of wells on-site must be performed by an appropriately- licensed and experienced well contractor, in compliance with O.Reg. 903.

6.13.2 Test Pit During Tendering

It is strongly recommended that test pits be excavated at representative locations of this Site during the construction tendering phase, with mandatory attendance of interested contractors. This will allow them to make their own assessments of any groundwater, soil and bedrock conditions at the Site and how these will affect their proposed construction methods, techniques and schedules.

6.13.3 Subsoil Sensitivity

The native subsoils are susceptible to strength loss or deformation if saturated or disturbed by construction traffic. Therefore, where the subgrade consists of approved soil, care must be taken to protect the exposed subgrade from excess moisture and from construction traffic.

6.13.4 Winter Construction

The subsoils encountered across the site are frost-susceptible and freezing conditions could cause problems to the structures. As preventive measures, the following recommendations are presented:

1. During winter construction, exposed surfaces intended to support foundations must be protected against freezing by means of loose straw and tarpaulins, heating, etc.

2. Care must be exercised so that any sidewalks and/or asphalt pavements do not interfere with the opening of doors during the winter when the soils are subject to frost heave. This problem may be minimized by any one of several means, such as keeping the doors well above outside grade, installing structural slabs at the doors, and by using well-graded backfill and positive drainage, etc.
3. Because of the frost heave potential of the soils during winter, it is recommended that the trenches for exterior underground services be excavated with shallow transition slopes in order to minimize the abrupt change in density between the granular backfill, which is relatively non-frost susceptible, and the more frost-susceptible native soils.

6.13.5 Construction Monitoring

The foundation installations and Engineered Fill placement must be closely monitored and inspected by qualified personnel to ensure consistency with the design bearing. The on-site review of the condition of the foundation soil as the foundations are constructed is an integral part of the geotechnical design function and is required by Section 4.2.2.2 of the Ontario Building Code 2012.

Qualified Geotechnical personnel should inspect and test all stages of the proposed development. Specifically, they should ensure that the materials and conditions comply with this geotechnical assessment report. In addition, qualified geotechnical personnel should provide material testing services prior to and during backfilling and grade raising operation. Should soil conditions be encountered that vary from those described in this report, our office should be informed immediately such that the proper measures are undertaken.

7. Limitations of the Investigation

This report is intended solely for DPH Developments Inc. and their designers and is prohibited for use by others without GHD's prior written consent. This report is considered GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevation and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of geotechnical engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

All details of design and construction are rarely known at the time of completion of a geotechnical study. The recommendations and comments made in the study report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, GHD will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design.

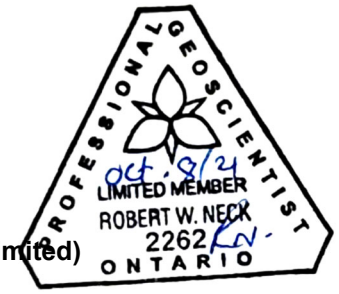
By issuing this report, GHD is the geotechnical engineer of record. It is recommended that GHD be retained during construction of all foundations and during earthwork operations to confirm the conditions of the subsoil are actually similar to those observed during our study. The intent of this requirement is to verify that conditions encountered during construction are consistent with the findings in the report and that inherent knowledge developed as part of our study is correctly carried forward to the construction phases.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments included in this report are based on the results obtained at the test locations only. The subsurface conditions confirmed at the

test locations may vary at other locations. The subsurface conditions can also be significantly modified by the construction activities on site (e.g., excavation, dewatering and drainage, blasting, pile driving, etc.). These conditions can also be modified by exposure of soils or bedrock to humidity, dry periods or frost. Soil and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations and conditions may become apparent during construction which could not be detected or anticipated at the time of our investigation. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations. If changed conditions are identified during construction, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by GHD is completed.

All of Which is Respectfully Submitted,

GHD



Leandro Ramos, P.Eng.

Robert Neck, P. Geo. (Limited)

Figures

Data Disclaimer

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Paper Size ANSI A

0 70 140 210 280

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 18N

N

GHD

DPH DEVELOPMENTS
158 ALBINE STREET, NORWOOD, ON
PT LOTS 18 & 19, CON 8, GEO. TOWNSHIP OF ASPHODEL
TOWNSHIP OF ASPHODEL-NORWOOD
COUNTY OF PETERBOROUGH

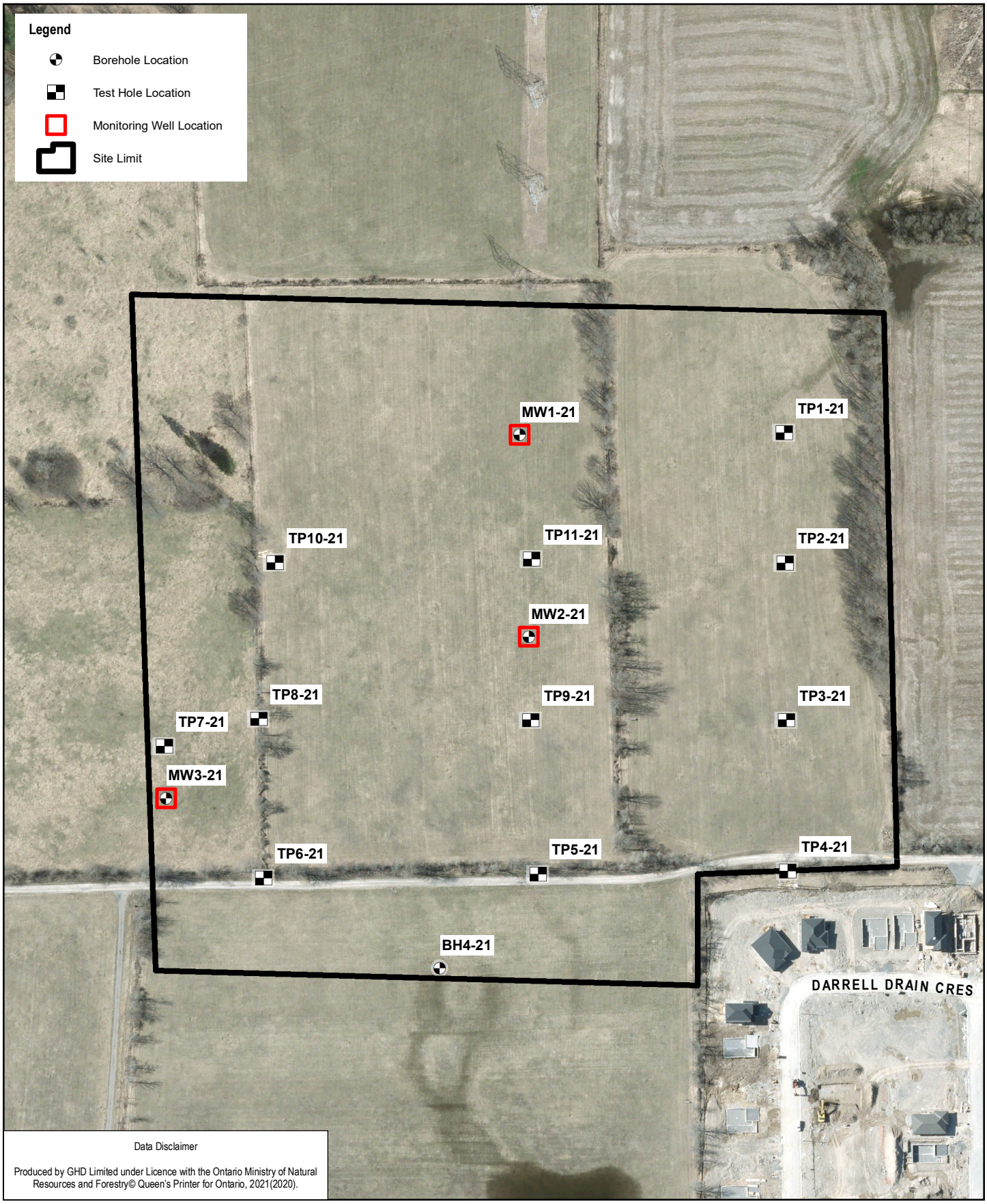
GEOTECHNICAL INVESTGATION
SITE LOCATION PLAN

Project No. **11231077**
Revision No.
Date **Sep 2021**

FIGURE 1

O:\GIS\PROJECTS\11231000s\11231077\Layouts\202109_RPT001\11231077_202109_RPT001_GIS001 - Site Location Plan.mxd
Print date: 24 Sep 2021 - 08:43

Data source: © County of Peterborough, 2018.



Paper Size ANSI A

0 10 20 30 40

Metres

Map Projection: Transverse Mercator
Horizontal Datum: North American 1983
Grid: NAD 1983 UTM Zone 18N

N

GHD

DPH DEVELOPMENTS
158 ALBINE STREET, NORWOOD, ON
PT LOTS 18 & 19, CON 8, GEO. TOWNSHIP OF ASPHODEL
TOWNSHIP OF ASPHODEL-NORWOOD
COUNTY OF PETERBOROUGH

GEOTECHNICAL INVESTGATION
TEST HOLE PLAN

Project No. **11231077**
Revision No.
Date **Sep 2021**

FIGURE 2

Appendices

Appendix A

Stratigraphy Logs

REFERENCE No.: 11231077 ENCLOSURE No.: 1

BOREHOLE No.: MW1-21
ELEVATION: 211.90 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern CHECKED BY: L Ramos
DATE (START): 18 August 2021 DATE (FINISH): 18 August 2021

LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

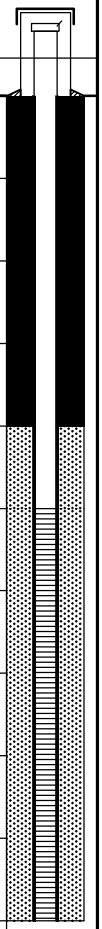
NORTHING: 4919307 EASTING: 261628

Depth (Feet)	Depth (Metres)	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content %	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		211.90		GROUND SURFACE						
0				**TOPSOIL** (300 mm)						
1		211.59				SS1a	75	9	2-2-2-2	4
	0.5	211.44		**NATIVE:** ML - SANDY SILT, gravelly, trace clay, loose, light brown, moist		SS1b		11	--	--
2				SM - SILTY SAND, gravelly, trace clay, cobbles, very dense, brown, moist		SS2a	100	12	6-21-50/5cm	71+
3	1.0					SS2b		4	--	--
4										
5	1.5			gravel: 35%, sand 40%, silt: 19%, clay: 6%		SS3	83	3	40-50/15cm	50+
6		210.07		**WEATHERED BEDROCK**						
	2.0					AS4		2	--	--
7						SS5	0	2	50/7.5cm	50+
8	2.5									
9										
10	3.0	208.85		**END OF BOREHOLE**		SS6	0	1	50/0cm	50+
11				**NOTES:**						
	3.5			- Borehole open and dry upon completion						
12				- Borehole terminated at 3.1 m bgs due to auger refusal (solid bedrock inferred)						
13	4.0			- 51 mm Monitoring well installed to 3.1 m bgs, 1.5 m screen						
14				- Water level dry August 27, 2021						
	4.5			- bgs denotes 'below ground surface'						
15										
16										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
Atterberg limits (%) w_p w_l
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

0.91 m
1.22 m
1.52 m
3.05 m



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REFERENCE No.: 11231077 ENCLOSURE No.: 2

BOREHOLE No.: MW2-21
ELEVATION: 210.34 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern CHECKED BY: L Ramos
DATE (START): 18 August 2021 DATE (FINISH): 18 August 2021

LEGEND
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

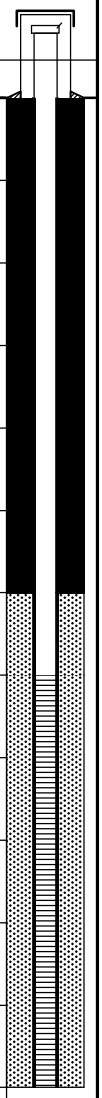
NORTHING: 4919275 EASTING: 261657

Depth (Feet)	Depth (Metres)	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content %	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		210.34		GROUND SURFACE						
0				**TOPSOIL** (300 mm)						
1	0.5	210.04		**NATIVE:** ML - SANDY SILT, gravelly, with clay, loose, light brown, moist		SS1	46	9	4-2-2-4	4
3	1.0	209.43		SM - SILTY SAND, gravelly, trace clay, cobbles, very dense, brown, moist		SS2a	75	11	9-14-15-16	29
4						SS2b		5	--	--
5	1.5									
6	2.0					SS3	83	4	14-31-42-35	73
7										
8	2.5	208.00		**WEATHERED BEDROCK**		SS4	100	4	50/5cm	50+
9										
10	3.0					SS5	0	5	50/0cm	50+
11	3.5					AS6		2	--	--
12		206.68		**END OF BOREHOLE**						
13	4.0			**NOTES:** - Borehole open and dry upon completion - Borehole terminated at 3.7 m bgs due to auger refusal (solid bedrock inferred) - 51 mm Monitoring well installed to 3.7 m bgs, 1.5 m screen - Water level dry August 27, 2021 - bgs denotes 'below ground surface'						
14										
15	4.5									
16										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
W_p W_l Atterberg limits (%)
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

0.91 m
1.83 m
2.13 m
3.66 m



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REFERENCE No.: 11231077 ENCLOSURE No.: 3

BOREHOLE No.: MW3-21
ELEVATION: 211.74 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern CHECKED BY: L Ramos
DATE (START): 18 August 2021 DATE (FINISH): 18 August 2021

LEGEND
- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- WATER LEVEL

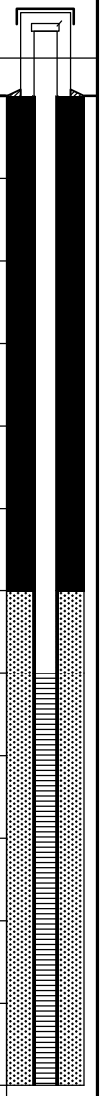
NORTHING: 4919153 EASTING: 261503

Depth (Feet)	Depth (Metres)	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		211.74		GROUND SURFACE				%		
0		211.59		**TOPSOIL** (150 mm)						
1				**NATIVE:** SM - SILTY SAND, gravelly, trace clay, cobbles, very dense, brown, moist		SS1	50	2	10 10 11 12	21
2	0.5									
3	1.0					SS2	93	3	12-20-50/7.5cm	70+
4										
5	1.5									
6						SS3	100	1	21-35-50/7.5cm	85+
7	2.0			gravel: 30%, sand 44%, silt: 19%, clay: 6%						
8	2.5					SS4	100	2	14-26-50/0cm	76+
9										
10	3.0					SS5	100	2	50/15cm	50+
11		208.39		**WEATHERED BEDROCK**						
12	3.5					SS6	0	--	50/0cm	50+
13	4.0	207.78		**END OF BOREHOLE**						
14				**NOTES:** - Borehole open and dry upon completion - Borehole terminated at 4.0 m beg due to auger refusal (solid bedrock inferred) - 51 mm Monitoring well installed to 3.7 m beg, 1.5 m screen - Water level dry August 27, 2021 - bgs denotes 'below ground surface'						
15	4.5									
16										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
Atterberg limits (%) w_p w_l
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90

0.91 m
1.83 m
2.13 m
3.66 m



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REFERENCE No.: 11231077 ENCLOSURE No.: 4

BOREHOLE No.: BH4-21
ELEVATION: 208.30 m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern CHECKED BY: L Ramos
DATE (START): 18 August 2021 DATE (FINISH): 18 August 2021

NORTHING: 4919102 EASTING: 261664

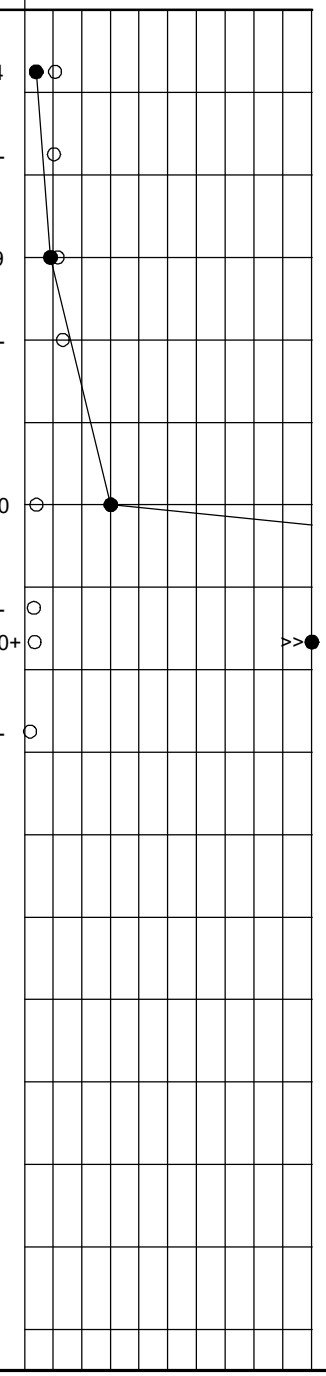
LEGEND

- SS - SPLIT SPOON
- ST - SHELBY TUBE
- AU - AUGER PROBE
- ▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery/ TCR(%)	Moisture Content	Blows per 15cm/ RQD(%)	'N' Value/ SCR(%)
		208.30		GROUND SURFACE				%		
0		208.15		**TOPSOIL** (150 mm)						
1				**NATIVE:** ML - SANDY SILT, trace clay, loose, light brown, moist		SS1	80	11	1-2-2-2	4
	0.5			reddish brown		SS1b		10	--	--
2										
3				gravel: 0%, sand 35%, silt: 57%, clay: 8%		SS2a	75	12	2-4-5-11	9
	1.0			brown						
4		207.08		SM - SILTY SAND, gravelly, trace clay, cobbles, very dense, brown, moist		SS2b		13	--	--
5	1.5									
6						SS3	50	4	15-14-16-14	30
	2.0									
7		206.17		**WEATHERED BEDROCK**		AS4		3	--	--
8	2.5					SS5	50	4	50/10cm	500+
9		205.56				AS6		2	--	--
				END OF BOREHOLE						
10	3.0			**NOTES:** - Borehole caving to 2.4 m bgs and dry upon completion - Borehole terminated at 2.7 m beg due to auger refusal (solid bedrock inferred) - bgs denotes 'below ground surface'						
11										
	3.5									
12										
13	4.0									
14										
	4.5									
15										
16										

Shear test (Cu) △ Field
Sensitivity (S) □ Lab
○ Water content (%)
Atterberg limits (%) W_p W_l
● "N" Value (blows / 12 in.-30 cm)

10 20 30 40 50 60 70 80 90



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REFERENCE No.: 11231077 ENCLOSURE No.: 5

TEST PIT No.: TP1-21
ELEVATION: 212.33 m

TEST PIT REPORT

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 212.33	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ INF
				TOPSOIL (250 mm)	GS1			
1		212.08						
		211.95		**NATIVE:** SM - SILTY SAND, reddish brown, moist	GS2			
	0.5			ML - SANDY SILT, light brown, moist				
2		211.72		**WEATHERED BEDROCK**				
				gravel: 52%, sand 30%, silt: 15%, clay: 3%	GS3			
3	1.0							
4								
5	1.5				GS4			
		210.60		**END OF TEST PIT**				
6				**NOTES:**				
	2.0			- No noticeable groundwater seepage or accumulation at completion of test pit				
7				- Test pit terminated at 1.7 m bgs due to solid bedrock refusal				
8	2.5			- bgs denotes 'below ground surface'				
9								
10	3.0							
11								
	3.5							
12								
13	4.0							

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REFERENCE No.: 11231077 ENCLOSURE No.: 6

TEST PIT REPORT

TEST PIT No.: TP2-21
ELEVATION: 212.21 m

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 212.21	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ INF
				TOPSOIL (250 mm)				
		211.96			GS1			
1				**NATIVE:** ML - SANDY SILT, light brown, moist				
	0.5							
2		211.60		SM - SILTY SAND, gravelly, trace clay, cobbles, brown, moist	GS2			
3				Cobbles and boulders				
	1.0							
4					GS3			
5	1.5							
6		210.38		**END OF TEST PIT**				
	2.0			**NOTES:** - No noticeable groundwater seepage or accumulation at completion of test pit - Test pit terminated at 1.8 m bgs due to solid bedrock refusal - bgs denotes 'below ground surface'				
7								
8	2.5							
9								
10	3.0							
11								
	3.5							
12								
13	4.0							

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REFERENCE No.: 11231077 ENCLOSURE No.: 7

TEST PIT REPORT

TEST PIT No.: TP3-21
ELEVATION: 212.87 m

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 212.87	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ INF
				TOPSOIL (250 mm)	GS1			
		212.62						
1				**NATIVE:**				
		212.47		SM - SILTY SAND, reddish brown, moist	GS2			
	0.5			ML - SANDY SILT, light brown, moist				
2								
3								
	1.0							
4		211.65		SM - SILTY SAND, gravelly, trace clay, cobbles, brown, moist	GS3			
	1.5	211.35		**WEATHERED BEDROCK**				
5								
6								
	2.0							
7								
8								
	2.5							
9								
10								
	3.0				GS4			
		209.67		**END OF TEST PIT**				
11				**NOTES:**				
	3.5			- No noticeable groundwater seepage or accumulation at completion of test pit				
12				- Test pit terminated at 3.2 m bgs due to solid bedrock refusal				
				- bgs denotes 'below ground surface'				
13								
	4.0							

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REFERENCE No.: 11231077 ENCLOSURE No.: 8

TEST PIT No.: TP4-21
ELEVATION: 211.87 m

TEST PIT REPORT

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 211.87	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ INF
				TOPSOIL (300 mm)				
					GS1			
1		211.56		**NATIVE:**	GS2			
		211.41		SM - SILTY SAND, reddish brown, moist				
	0.5			ML - SANDY SILT, light brown, moist				
2				gravel: 0%, sand 7%, silt: 90%, clay: 3%	GS3			
3								
	1.0							
4								
5	1.5	210.34		SM - SILTY SAND, gravelly, trace clay, cobbles, brown, moist				
				cobbles and boulders				
6								
	2.0							
7								
8								
	2.5							
9								
10	3.0							
11		208.51		**WEATHERED BEDROCK**	GS4			
	3.5							
12		208.21		**END OF TEST PIT**				
				NOTES:				
				- No noticeable groundwater seepage or accumulation at completion of test pit				
13	4.0			- Test pit terminated at 3.7 m bgs due to solid bedrock refusal				
				- bgs denotes 'below ground surface'				

File: G:\11231077\WORKSHARE\DESIGN\GINT\11231077-DWG-21-09-22, TESTPIT LOGS.GPJ Library File: GHD_GEOTECH_V10.GLB Report: TEST PIT LOG Date: 4/10/21

REFERENCE No.: 11231077 ENCLOSURE No.: 9

TEST PIT No.: TP5-21
ELEVATION: 209.65 m

TEST PIT REPORT

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 209.65	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ INF
				TOPSOIL (325 mm)				
1		209.33						
	0.5			**NATIVE:** SM - SILTY SAND, reddish brown, moist	GS1			
2		209.10		ML - SANDY SILT, light brown, moist	GS2			
		208.84		**WEATHERED BEDROCK**				
3	1.0				GS3			
4								
5	1.5				GS4			
		208.03		**END OF TEST PIT**				
6				**NOTES:**				
	2.0			- No noticeable groundwater seepage or accumulation at completion of test pit				
7				- Test pit terminated at 1.6 m bgs due to solid bedrock refusal				
8	2.5			- bgs denotes 'below ground surface'				
9								
10	3.0							
11								
	3.5							
12								
13	4.0							

File: G:\11231077\WORKSHARE\DESIGN\GINT\11231077-DWG-21-09-22, TESTPIT LOGS.GPJ Library File: GHD_GEOTECH_V10.GLB Report: TEST PIT LOG Date: 4/10/21

REFERENCE No.: 11231077 ENCLOSURE No.: 10

TEST PIT No.: TP6-21
ELEVATION: 209.94 m

TEST PIT REPORT

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 209.94	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ INF
		209.73		**TOPSOIL** (200 mm)				
1				**NATIVE:** ML - SANDY SILT, light brown, moist	GS1			
	0.5	209.53		SM-SILTY SAND, gravelly, trace clay, cobbles, brown, moist				
2					GS2			
		209.18		**WEATHERED BEDROCK**				
3	1.0							
4					GS3			
		208.51						
5	1.5			**END OF TEST PIT**				
6				**NOTES:** - No noticeable groundwater seepage or accumulation at completion of test pit - Test pit terminated at 1.4 m bgs due to solid bedrock refusal - bgs denotes 'below ground surface'				
7	2.0							
8								
	2.5							
9								
10	3.0							
11								
	3.5							
12								
13	4.0							

File: G:\11231077\WORKSHARE\DESIGN\GINT\11231077-DWG-21-09-22, TESTPIT LOGS.GPJ Library File: GHD_GEOTECH_V10.GLB Report: TEST PIT LOG Date: 4/10/21

REFERENCE No.: 11231077 ENCLOSURE No.: 11

TEST PIT No.: TP7-21
ELEVATION: 212.00 m

TEST PIT REPORT

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 212.00	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ / INF
		211.87		**TOPSOIL** (125 mm)				
1				**NATIVE:** SM - SILTY SAND, gravelly, trace clay, cobbles, brown, moist	GS1			
	0.5							
2								
3		211.09		**WEATHERED BEDROCK**				
	1.0							
4								
5	1.5				GS2			
6								
	2.0	210.02		**END OF TEST PIT**				
7				**NOTES:** - No noticeable groundwater seepage or accumulation at completion of test pit - Test pit terminated at 2.0 m bgs due to solid bedrock refusal - bgs denotes 'below ground surface'				
8	2.5							
9								
10	3.0							
11								
	3.5							
12								
13	4.0							

File: G:\11231077\WORKSHARE\DESIGN\GINT\11231077-DWG-21-09-22, TESTPIT LOGS.GPJ Library File: GHD_GEOTECH_V10.GLB Report: TEST PIT LOG Date: 4/10/21

REFERENCE No.: 11231077 ENCLOSURE No.: 12

TEST PIT No.: TP8-21
ELEVATION: 212.15 m

TEST PIT REPORT

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 212.15	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ INF
				TOPSOIL (175 mm)				
		211.98			GS1			
1		211.85		**NATIVE:** SM - SILTY SAND, reddish brown, moist				
				SM - SILTY SAND, gravelly, trace clay, cobbles, brown, moist	GS2			
	0.5							
2		211.54		**WEATHERED BEDROCK**				
3								
	1.0							
4								
5								
	1.5				GS3			
		210.38						
6				**END OF TEST PIT**				
				NOTES:				
				- No noticeable groundwater seepage or accumulation at completion of test pit				
	2.0			- Test pit terminated at 1.8 m bgs due to solid bedrock refusal				
7				- bgs denotes 'below ground surface'				
8								
	2.5							
9								
10								
	3.0							
11								
	3.5							
12								
13								
	4.0							

File: G:\11231077\WORKSHARE\DESIGN\GINT\11231077-DWG-21-09-22, TESTPIT LOGS.GPJ Library File: GHD_GEOTECH_V10.GLB Report: TEST PIT LOG Date: 4/10/21

REFERENCE No.: 11231077 ENCLOSURE No.: 13

TEST PIT No.: TP9-21
ELEVATION: 210.08 m

TEST PIT REPORT

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 210.08	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ INF
				TOPSOIL (300 mm)				
1		209.77		**NATIVE:** SM - SILTY SAND, reddish brown, moist	GS1			
	0.5	209.57		ML - SANDY SILT, light brown, moist cobbles and boulders	GS2			
2								
		209.27		SM - SILTY SAND, gravelly, trace clay, cobbles, brown, moist				
3	1.0				GS3			
4		208.86		**WEATHERED BEDROCK**				
					GS4			
5	1.5	208.45		**END OF TEST PIT**				
6				**NOTES:** - No noticeable groundwater seepage or accumulation at completion of test pit - Test pit terminated at 1.6 m bgs due to solid bedrock refusal - bgs denotes 'below ground surface'				
	2.0							
7								
8	2.5							
9								
10	3.0							
11								
	3.5							
12								
13	4.0							

File: G:\11231077\WORKSHARE\DESIGN\GINT\11231077-DWG-21-09-22, TESTPIT LOGS.GPJ Library File: GHD_GEOTECH_V10.GLB Report: TEST PIT LOG Date: 4/10/21

REFERENCE No.: 11231077 ENCLOSURE No.: 14

TEST PIT No.: TP10-21
ELEVATION: 212.18 m

TEST PIT REPORT

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 212.18	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ INF
				TOPSOIL (250 mm)				
1		211.85		**NATIVE:** ML - SANDY SILT, light brown, moist	GS1			
	0.5	211.63		SM - SILTY SAND, gravelly, trace clay, cobbles, brown, moist				
2					GS2			
3		211.27		**WEATHERED BEDROCK**				
	1.0							
4					GS3			
5	1.5							
		210.51		**END OF TEST PIT**				
6				**NOTES:** - No noticeable groundwater seepage or accumulation at completion of test pit - Test pit terminated at 1.7 m bgs due to solid bedrock refusal - bgs denotes 'below ground surface'				
	2.0							
7								
8								
	2.5							
9								
10	3.0							
11								
	3.5							
12								
13								
	4.0							

File: G:\11231077\WORKSHARE\DESIGN\GINT\11231077-DWG-21-09-22, TESTPIT LOGS.GPJ Library File: GHD_GEOTECH_V10.GLB Report: TEST PIT LOG Date: 4/10/21

REFERENCE No.: 11231077 ENCLOSURE No.: 15

TEST PIT No.: TP11-21
ELEVATION: 212.21 m

TEST PIT REPORT

CLIENT: DPH Developments Inc
PROJECT: Geotechnical Investigation, Norwood Park Phase 4
LOCATION: Albine Street, Norwood
DESCRIBED BY: J McEachern DATE: 27 August 2021
CHECKED BY: L Ramos DATE: 27 August 2021

LEGEND

GSE - GRAB SAMPLE (environmental)
GS - GRAB SAMPLE (geotechnical)
Cu - SHEAR TEST
CHEM - CHEMICAL ANALYSIS
OVC - ORGANIC VAPOR CONCENTRATION
INF - INFILTRATION
▼ - WATER LEVEL

Depth Feet	Depth Metres	Elevation (m) BGS 212.21	Symbol	STRATIGRAPHY	Sample Type & Number	OVC ppm	Tests Type	▼ INF
				TOPSOIL (250 mm)				
1		211.90		**NATIVE:** ML - SANDY SILT, light brown, moist				
	0.5							
2					GS1			
		211.45		SM - SILTY SAND, gravelly, trace clay, cobbles, brown, moist	GS2			
3		211.29		**WEATHERED BEDROCK**	GS3			
	1.0	211.14						
4				**END OF TEST PIT**				
				NOTES:				
5	1.5			- No noticeable groundwater seepage or accumulation at completion of test pit				
				- Test pit terminated at 1.1 m bgs due to solid bedrock refusal				
6				- bgs denotes 'below ground surface'				
	2.0							
7								
8								
	2.5							
9								
10	3.0							
11								
	3.5							
12								
13								
	4.0							

File: G:\11231077\WORKSHARE\DESIGN\GINT\11231077-DWG-21-09-22, TESTPIT LOGS.GPJ Library File: GHD_GEOTECH_V10.GLB Report: TEST PIT LOG Date: 4/10/21

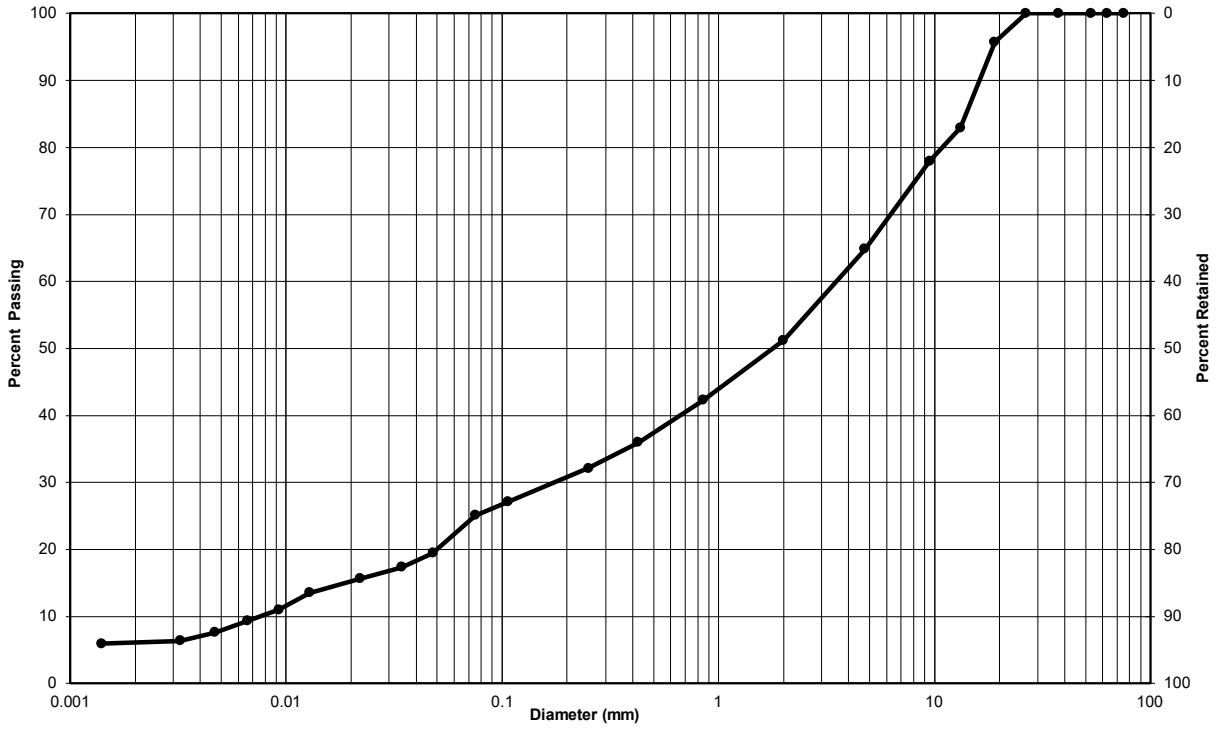
Appendix B

Geotechnical Laboratory Test Results

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	DPH Developments	**Lab No.:**	SS-21-70
Project/Site:	Norwood Subdivision	**Project No.:**	11231077

Borehole no.:	MW1-21	Sample no.:	SS3
Depth:	1.5 to 1.8m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Gravelly, silty sand	35	40	25
Silt-size particles (%):	19		
Clay-size particles (%) (<0.002mm):	6		

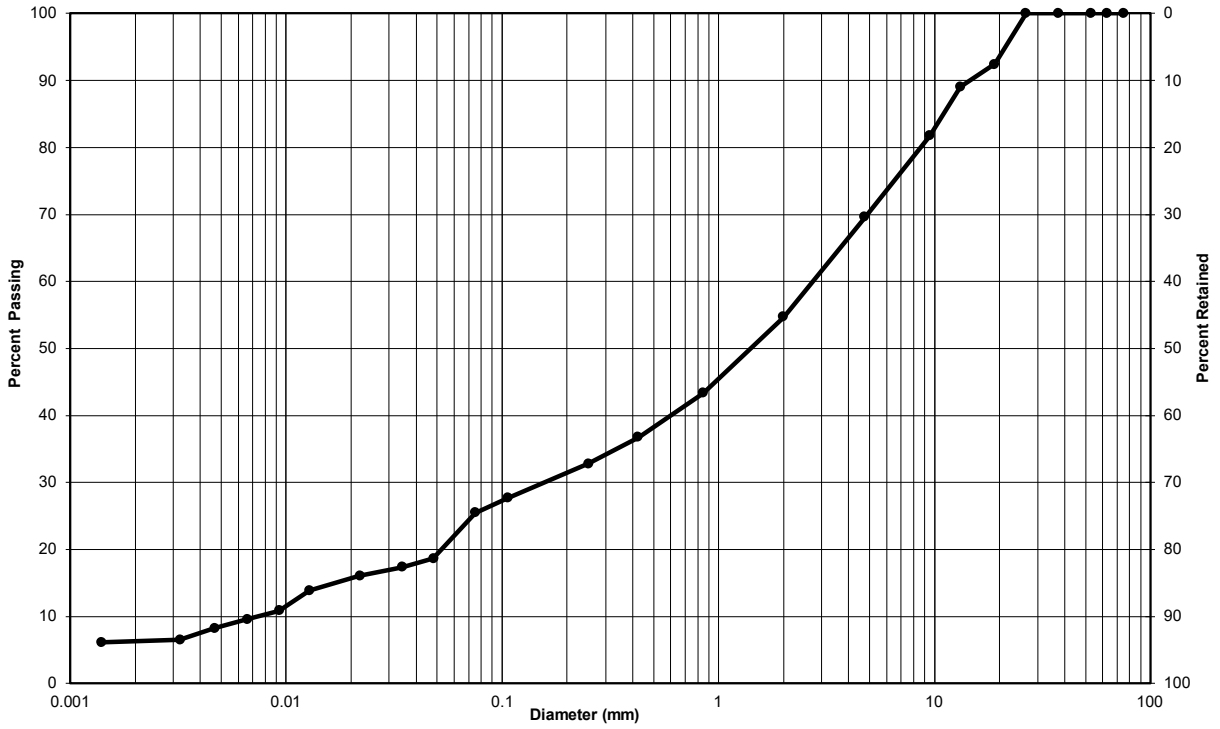
Remarks:

Performed by:	Jade Gorman	**Date:**	August 27, 2021
Verified by:	Joe Sullivan	**Date:**	September 7, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	DPH Developments	**Lab No.:**	SS-21-70
Project/Site:	Norwood Subdivision	**Project No.:**	11231077

Borehole no.:	MW3-21	Sample no.:	SS4
Depth:	2.3 to 2.6m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Gravelly, silty sand	30	44	25
Silt-size particles (%):	19		
Clay-size particles (%) (<0.002mm):	6		

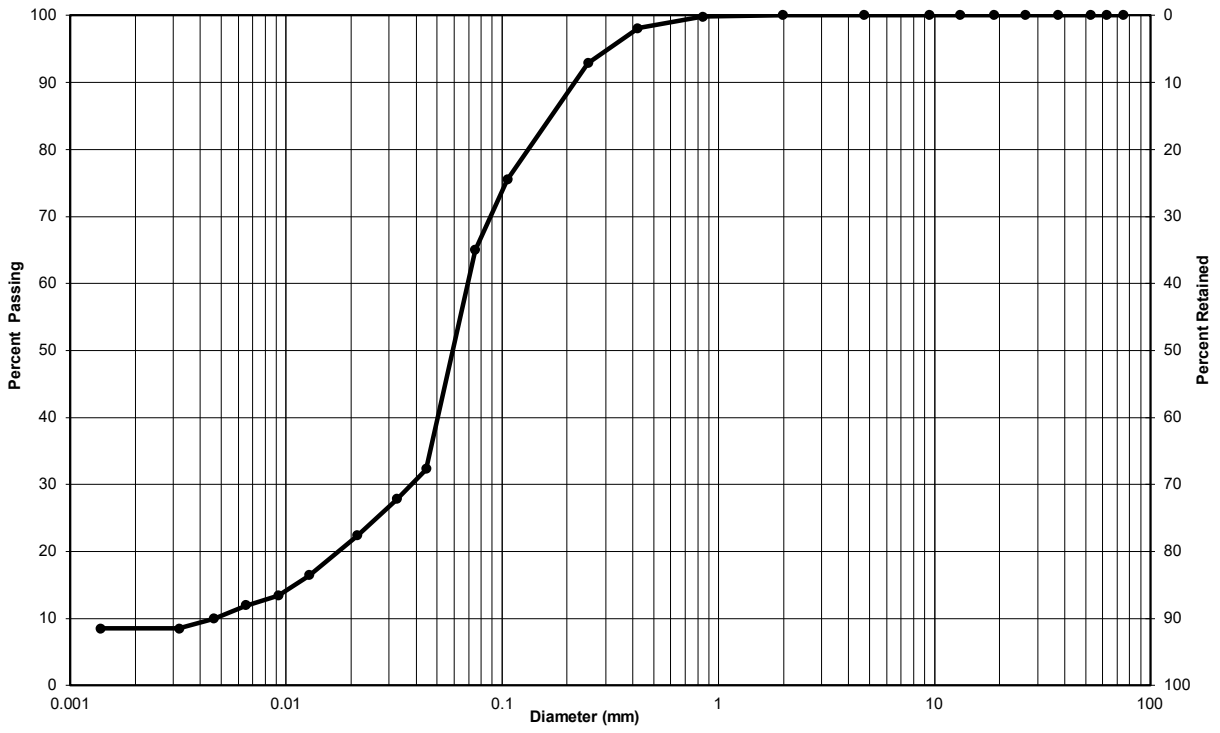
Remarks:

Performed by:	Jade Gorman	**Date:**	August 27, 2021
Verified by:	Joe Sullivan	**Date:**	September 7, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	DPH Developments	**Lab No.:**	SS-21-70
Project/Site:	Norwood Subdivision	**Project No.:**	11231077

Borehole no.:	BH4-21	Sample no.:	SS2A
Depth:	0.8 to 1.1m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

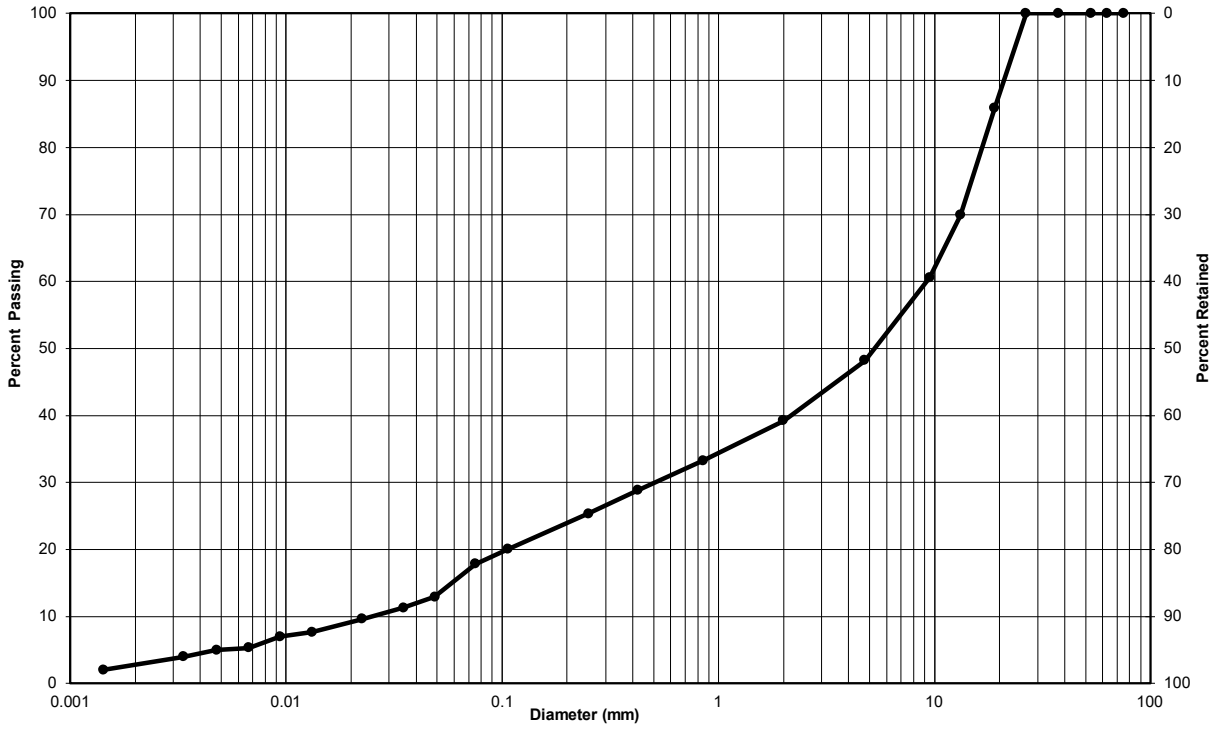
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sandy silt	0	35	65
Silt-size particles (%):	57		
Clay-size particles (%) (<0.002mm):	8		

Remarks:

Performed by:	Jade Gorman	**Date:**	August 27, 2021
Verified by:	Joe Sullivan	**Date:**	September 7, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	DPH Developments	**Lab No.:**	SS-21-74
Project/Site:	Norwood Park Subdivision - Phase 4	**Project No.:**	11231077
Borehole no.:	TP1-21	Sample no.:	GS3
Depth:	0.8 to 0.9m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silty gravel with sand (GM)	52	30	18
Silt-size particles (%):	15		
Clay-size particles (%) (<0.002mm):	3		

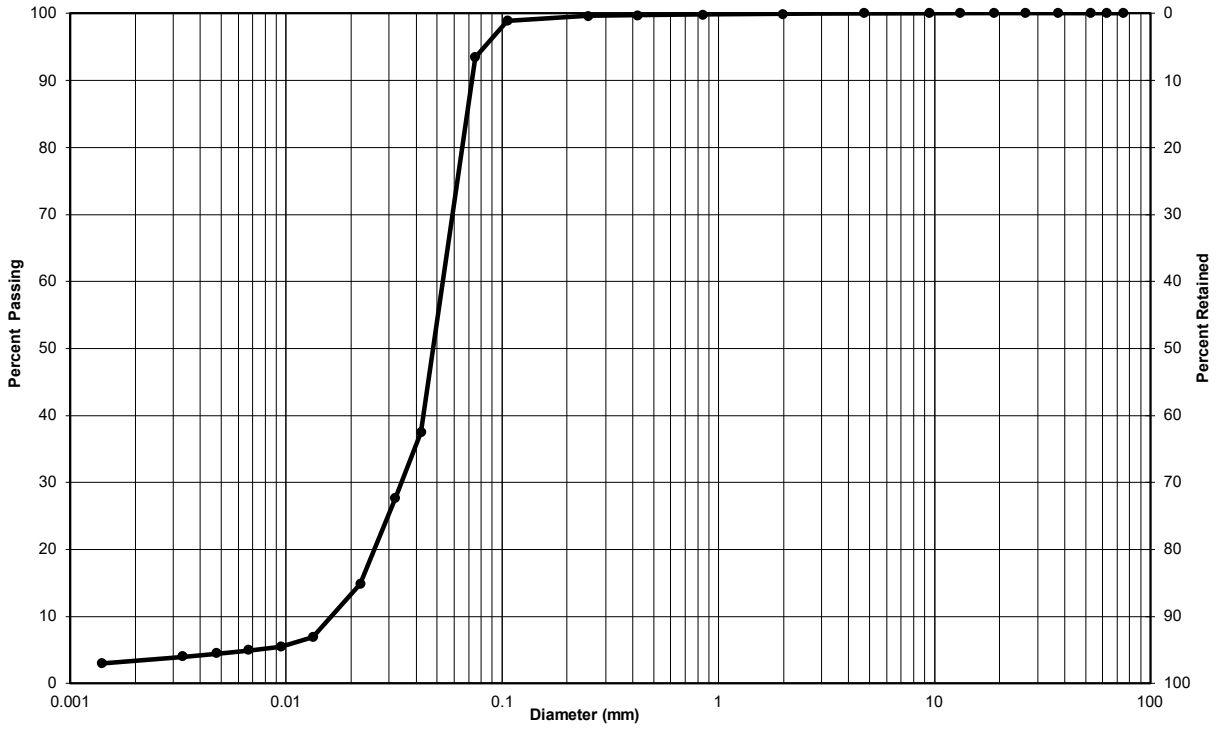
Remarks:

Performed by:	Jade Gorman	**Date:**	September 3, 2021
Verified by:	Joe Sullivan	**Date:**	September 13, 2021

Particle-Size Analysis of Soils (Geotechnical) (USCS) (ASTM D422)

Client:	DPH Developments	**Lab No.:**	SS-21-74
Project/Site:	Norwood Park Subdivision - Phase 4	**Project No.:**	11231077

Borehole no.:	TP4-21	Sample no.:	GS3
Depth:	0.6 to 0.9m	Enclosure:	



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Unified Soil Classification System					

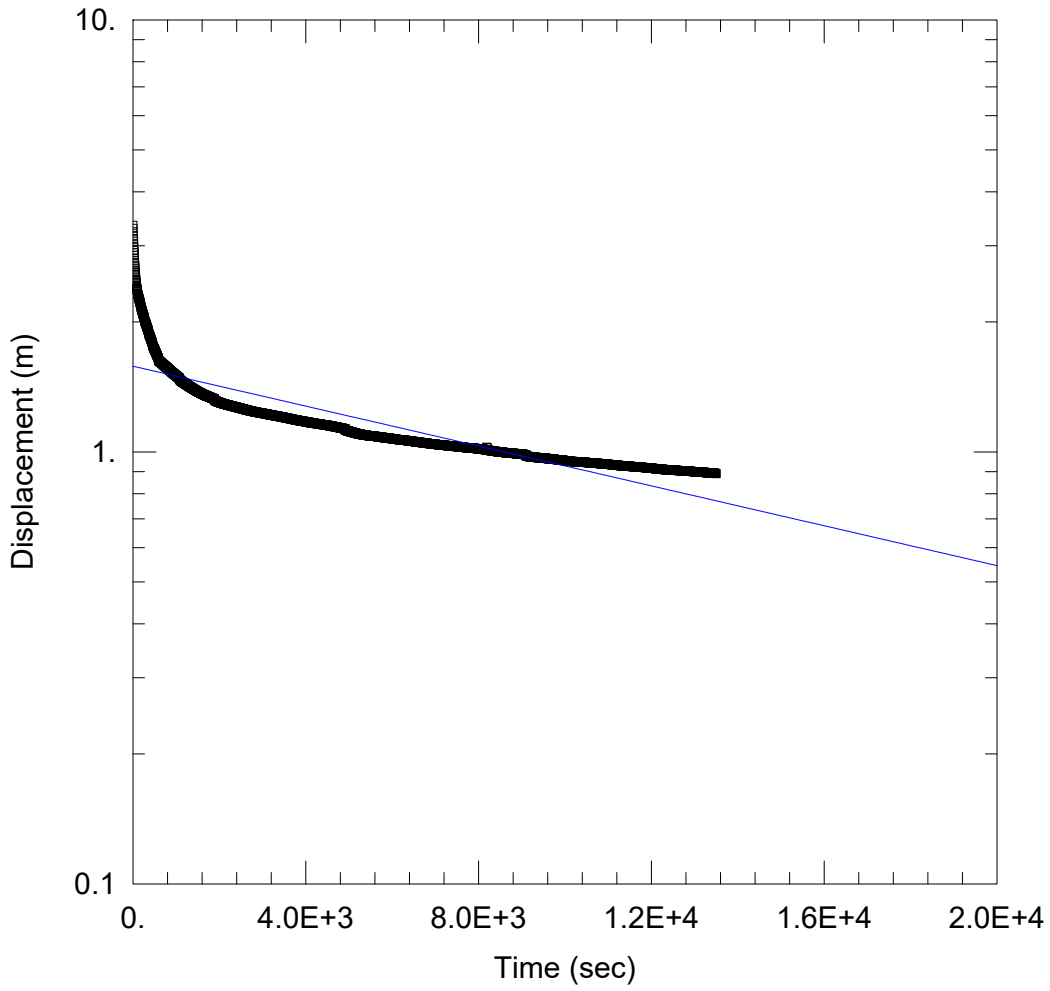
Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Silt (ML)	0	7	93
Silt-size particles (%):	90		
Clay-size particles (%) (<0.002mm):	3		

Remarks:

Performed by:	Jade Gorman	**Date:**	September 3, 2021
Verified by:	Joe Sullivan	**Date:**	September 13, 2021

Appendix C

Hydraulic Conductivity and Infiltration Testing Results



MW1-21 - FALLING HEAD TEST

Data Set: G:\...\11231077 - Falling Head Test MW1-21.aqt
Date: 10/05/21 Time: 09:28:34

PROJECT INFORMATION

Company: GHD
Client: DPH Developments Inc.
Project: 11231077
Location: Norwood Park Subdivision Ph.4
Test Well: MW1-21
Test Date: August 27, 2021

AQUIFER DATA

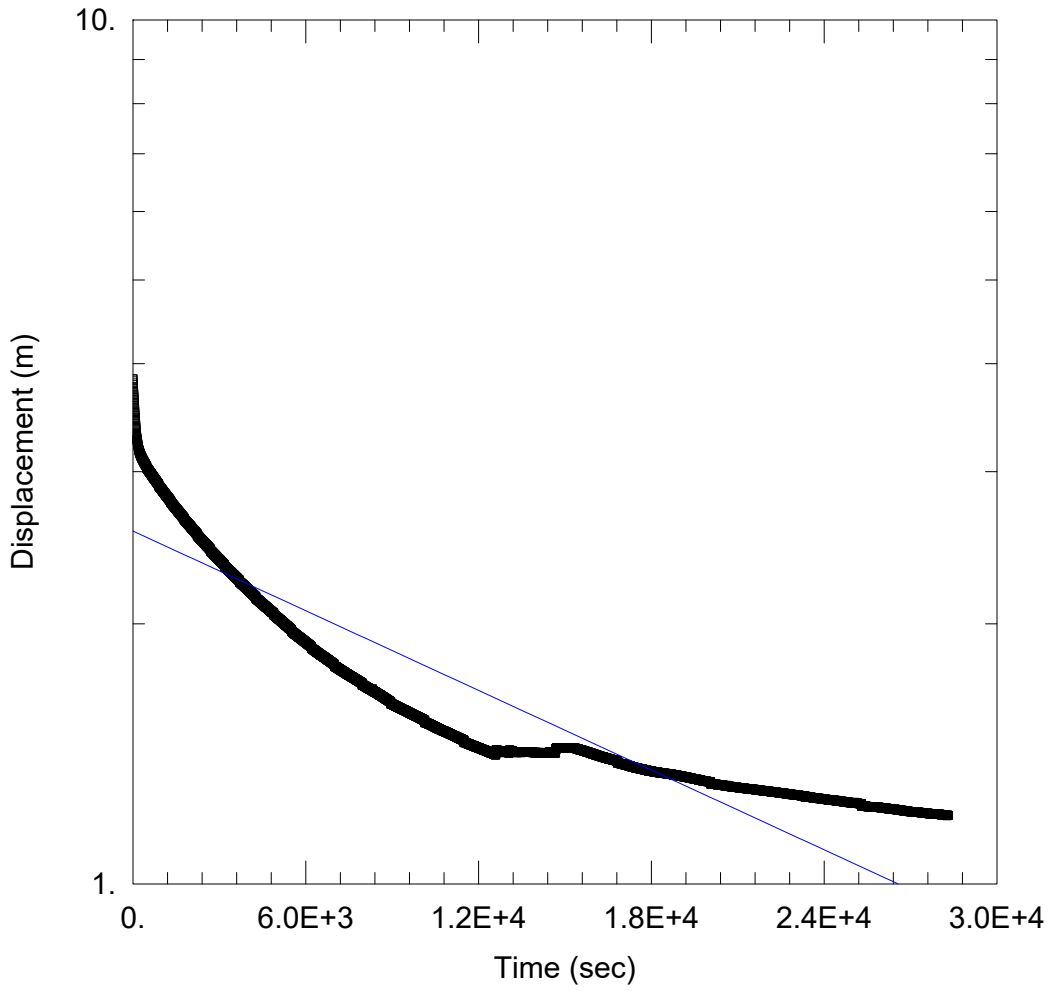
Saturated Thickness: 0.1 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW1-21)

Initial Displacement: 3.345 m
Total Well Penetration Depth: 1.6 m
Casing Radius: 0.025 m
Static Water Column Height: 0.1 m
Screen Length: 1.5 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 3.661E-5 cm/sec
y0 = 1.579 m



MW2-21 - FALLING HEAD TEST

Data Set: G:\...\11231077 - Falling Head Test MW2-21.aqt
Date: 10/05/21 Time: 09:31:47

PROJECT INFORMATION

Company: GHD
Client: DPH Developments Inc.
Project: 11231077
Location: Norwood Park Subdivision Ph.4
Test Well: MW2-21
Test Date: August 27, 2021

AQUIFER DATA

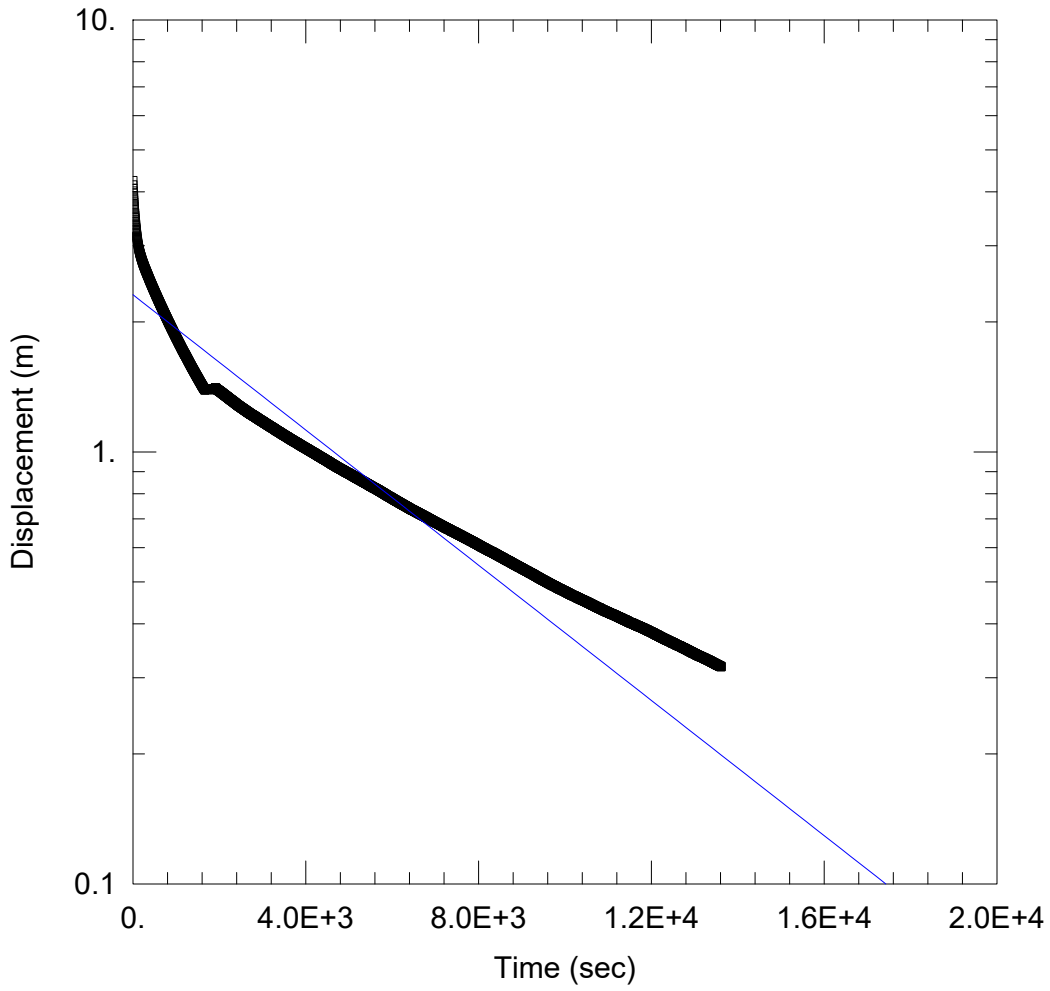
Saturated Thickness: 0.1 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW2-21)

Initial Displacement: 3.842 m
Total Well Penetration Depth: 1.6 m
Casing Radius: 0.025 m
Static Water Column Height: 0.1 m
Screen Length: 1.5 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 2.439E-5 cm/sec
y0 = 2.561 m



MW3-21 - FALLING HEAD TEST

Data Set: G:\...\11231077 - Falling Head Test MW3-21.aqt
Date: 10/05/21 Time: 09:34:44

PROJECT INFORMATION

Company: GHD
Client: DPH Developments Inc.
Project: 11231077
Location: Norwood Park Subdivision Ph.4
Test Well: MW3-21
Test Date: August 27, 2021

AQUIFER DATA

Saturated Thickness: 0.1 m
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW3-21)

Initial Displacement: 4.249 m
Total Well Penetration Depth: 1.6 m
Casing Radius: 0.025 m
Static Water Column Height: 0.1 m
Screen Length: 1.5 m
Well Radius: 0.025 m

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.0001241 cm/sec
y0 = 2.311 m

Appendix C.2: Infiltration Testing (in-situ)

Project No. 11231077
Date: August 27, 2021
Equipment: ETC Pask Permeameter

Location:	TP-3	TP-3	TP-7	TP-11
Depth of hole:	0.3 m	1.4 m	0.6 m	0.6 m
	Test 1	Test 1	Test 1	Test 1

Elapsed Time (minutes)	Permeameter Level (cm)	Elapsed Time (minutes)	Permeameter Level (cm)	Elapsed Time (minutes)	Permeameter Level (cm)	Elapsed Time (minutes)	Permeameter Level (cm)
0.0	40.0	0.0	40.0	0.0	45.5	0.0	43.5
0.5	37.0	0.5	36.9	0.5	44.8	0.5	41.3
1.0	34.3	1.0	35.9	1.5	42.5	1.0	40.4
1.5	31.9	1.5	35.0	2.0	40.5	1.5	39.5
2.0	29.5	2.0	34.5	2.5	36.5	2	38.5
2.5	27.5	2.5	33.5	3.0	32.5	2.5	37.8
3.0	25.5	3.0	32.9	3.5	24.5	3.0	36.9
3.5	23.5	3.5	--	4.0	20.5	3.5	36.3
4.0	21.5	4.0	31.6	4.5	16.5	4.0	35.5
4.5	19.5	4.5	31.3	5.0	12.5	4.5	34.8
5.0	17.5	5.0	30.5	5.5	8.5	5.0	34.0
5.5	16.0	5.5	30.0	6.0	4.5	5.5	33.3
6.0	14.0	6.0	29.6	6.5	0.5	6.0	32.5
6.5	12.0	7.0	28.6			6.5	31.8
7.0	10.5	8.0	27.7			7.0	31.2
7.5	9.0	9.0	27.0			7.5	30.4
8	7.5	10	26.3			8.0	29.8
8.5	6.0	11.0	25.6			8.5	29.2
9.0	4.5	12.0	24.8			9.0	28.4
9.5	3.0	13.0	24.1			10.0	27.2
10.0	1.5	14.0	23.4			11.0	25.6
		15.0	22.7			12.0	24.4
						14.0	22.0
						16.0	19.6
						18.0	17.2

Quasi Steady Flow Rate ® (cm/min)	3	0.7	8	1.2
Field-saturated Hydraulic Conductivity (Ksf) (m/sec)	1.60E-05	3.70E-06	4.30E-05	6.40E-06