Township of Springwater

Midhurst Secondary Plan Area

COMPREHENSIVE STORMWATER MANAGEMENT PLAN

FINAL REPORT

Volume 3 of 4

Appendix G to H-1

June 2020

Ainley GROUP
CONSULTING
ENGINEERS
PLANNERS

Appendix G

Hydrology Models

	Return Period					
Parameter	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
A	678.085	853.608	975.865	1146.275	1236.152	1426.408
B	4.699	4.699	4.699	4.922	4.699	5.273
C	0.781	0.766	0.760	0.757	0.751	0.759

Rainfall Intensity, I (mm/hr) = $A/(t+B)^C$, where t is time duration in minutes
Parameters based on rain gauge data for the period 1979 – 2003 for the Barrie WPCC Station #6110557
The IDF intensity value for Barrie WPCC Station were increased by 15% before calculating a, b, c values to account for climate change.

$$i = \frac{A}{(t_d + B)^C}$$

where,

i = the rainfall intensity (mm/hr)
t_d = the storm duration (minutes)
A, B, C = a function of the local intensity-duration data.

This shall apply where the upstream drainage area does not include large open space areas. Where peak flows from external areas enter a subdivision sewer system, the more critical case based on either the time of concentration including the external area or the time of concentration excluding the external area shall be used. Actual velocities of computed peak flows shall be used to estimate time of concentration.

Runoff coefficients are given by components of surface treatment and by land use. The land use values are intended as a guide only and the designer is expected to develop an appropriate coefficient using an arithmetic composite calculation as shown below:

$$C = \frac{(A_1C_1) + (A_2C_2) + \ldots}{A_t}$$

Where:
C = composite runoff coefficient (dimensionless)
$A_{1,2...}$ = area corresponding to specific land use or soils type (ha)
$C_{1,2...}$ = runoff coefficient corresponding to $A_{1,2...}$ (dimensionless)
A_t = total drainage area (ha)

Source: adapted from the Ministry of Transportation Drainage Management Manual, 1997, Equation 8.10.

The higher of the arithmetic composite runoff coefficient or the minimum required runoff coefficient by land use, provided in the following table, shall be used to compute design flows.

SERVICING AND STORMWATER MANAGEMENT IMPLEMENTATION REPORT

MIDHURST ROSE ALLIANCE INC.
TOWNSHIP OF SPRINGWATER

MIDHURST HEIGHTS DEVELOPMENT

PREPARED BY:

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MARCH 2018

CFCA FILE NO. 845-3675

CROZIER
CONSULTING ENGINEERS

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1.0 INTRODUCTION

CF Crozier & Associates Inc. has been retained by Midhurst Rose Alliance Inc. to complete a Servicing and Stormwater Management Implementation Report and accompanying design drawings to support the detailed design for a proposed residential development in the Community of Midhurst, Township of Springwater. The Midhurst Heights Development consists of an amalgamation of three properties known as Midhurst Rose Alliance, Midhurst Rose Alliance Cooney, and Midhurst Rose Alliance O'Brien, having a combined area of approximately 97ha. The Midhurst Heights Development is irregular in shape with several outparcels and is located east of Gill Road, north of Doran Road and west of Russell Road. The area of development is located northeast to the current extents of the Community of Midhurst, and is described as Parts of Lot 10 Concession 3, and Lot 11 Concession 3.

The Midhurst Heights Development was Draft Plan approved as part of Phase 1 of the Midhurst Secondary Plan. As such, the proposed development will need to comply with the Minutes of Settlement which were executed for Phase 1 of the Midhurst Secondary Plan.

Phase 1A and 1B of the development (hereafter referred to as the "Subject Development") are located in the western portion of the Midhurst Heights Development, and are the subject of this report. These two phases constitute approximately 23ha, and represent a total of 232 units, of the total 1440 units at full buildout of Phase 1, which terminates with Phase 1K. In addition to the 198 single detached and 34 townhouse dwellings, Phases 1A and 1B also include a stormwater management facility (SWMF), a water treatment plant/ sewage pumping station, a parkette, and a series of interconnected public right-of-ways. The site location and Draft Plan are illustrated in Figures 1 and 2 respectively. The Midhurst Heights Development Phasing Plan is available in Appendix A.

The civil works of the Subject Development have been designed with consideration given to the servicing and stormwater requirements at future stages of buildout. As such, infrastructure has been designed to accommodate subsequent phases of development.

C.F. Crozier & Associates is part of a team of consultants providing support for this development. Other members of the consulting team include:

- Weston Consulting (planning)
- Azimuth Environmental Consulting (ecology and natural heritage)
- GEO Morphix (geomorphology)
- Terraprobe Limited (geotechnical)
- Brodie & Associates (landscape architecture)

These consultants have prepared studies/ plans to support the planning application. This report prepared by Crozier should be read in conjunction with the work of the other team members.

2.0 SITE DESCRIPTION

The area of the Subject Development is characterized by active agricultural fields, as well as some woodland and pasture areas. On-site existing structures include private residences, and farm related structures.

On-site soils are comprised generally of 300mm of topsoil overlying silt soils with sand and trace gravel, based on preliminary geotechnical investigations completed by Ian D. Wilson Associates (2008). Simcoe County Soils Mapping identifies the soils onsite as Vasey sandy loam, which is classified by MTO Design Charts as AB type soil.

Drainage of the overall Midhurst Heights property is generally from the southeast to the northwest, with conveyance through minor onsite draws. Generally the pre-developed lands of Phases 1A and 1B exhibit westward drainage patterns, while areas of future phases exhibit more prominent northward drainage, utilizing two distinctive onsite draws.

3.0 ROAD STANDARD

Access to the Subject Development will be provided via two entrances/exits along Gill Road. Roadways will be constructed to facilitate future access to developable parcels of the Midhurst development, as well as to developable vacant lands to the north and south (owned by others). Upon full buildout of the Midhurst Heights Development, additional ingress and egress routes will be provided to both Doran Road, and Russell Road.

Internal roadways for Phases 1A and 1B will include approximately 1790m of local roads (20m ROW), as well approximately 500m of collector road (23m ROW) and will be constructed in accordance with the applicable engineering standards of the Township of Springwater and recommendations per the geotechnical consultant.

4.0 SANITARY SERVICING

Sanitary infrastructure currently does not exist within the Community of Midhurst. The overall sanitary servicing of lands within the Midhurst Secondary Plan will be completed per the direction of the Environmental Study Report (Ainley, 2017) which is currently under MOECC review.

Internal sanitary servicing for the Subject Development will be provided through the use of a gravity collection system along the public right-of-way with services to each unit. This system will drain to the proposed Sanitary Pump Station located at Block 1096, adjacent to Gill Road. External conveyance and treatment infrastructure will be completed by others concurrent to Phase 1A and 1B construction. Anticipated sanitary servicing demands for the Midhurst Heights Development, including future phases are approximately 113.09 L/s. Sanitary sewer design sheets including future phases are available in Appendix B. Refer to Drawing 101 and Drawing 106 for the General Site Servicing Plan and Sanitary Drainage Plan respectively.

5.0 WATER SERVICING

Municipal water distribution is currently not available to the Community of Midhurst. Overall water servicing of lands within the Midhurst Secondary Plan will be completed per the direction of the Environmental Study Report described in Section 4.0. As part of the overall water servicing strategy for Midhurst, a groundwater supply well will be completed within Block 1102, and will be constructed concurrent to Phases 1A and 1B. A temporary raw water line will be provided to convey water from this block to the proposed water treatment plant and reservoir at Block 1096. This temporary raw water line will be routed along the northern perimeter of the development lands. Upon further buildout of the subdivision, the temporary line will be decommissioned and replaced by a permanent line constructed along the internal right-of-ways from the well site to Block 1096. At this time, the permanent raw watermain will be constructed only to the Phase 1A and 1B eastern extent of Road 'A'. As roadway construction progresses during future phases, the watermain will be concurrently constructed, and will be commissioned upon roadway buildout to Block 1102 as part of Phase 1D.

Water distribution within the Subject Development will be provided by watermain within the public right-of ways with services for each unit. Anticipated peak domestic water servicing demands for Phases 1A and 1B are approximately 17.40L/s as shown in Appendix C. Distribution of domestic and

fire suppression water will be accomplished through the use of municipal watermains sized between 150mm and 300mm. Fire hydrant and valve spacing have been set based on the applicable Township standards. Refer to Drawings 101 and 101A respectively for the General Site Servicing Plan and Temporary Raw Water Watermain General Layout.

6.0 STORMWATER MANAGEMENT

6.1 Design Criteria

The management of stormwater and site drainage for the proposed development must comply with the policies and standards of the various agencies including the Township of Springwater, Nottawasaga Valley Conservation Authority, and Ministry of Environment and Climate Change. In addition, the Midhurst Heights Development needs to comply with the Minutes of Settlement for the Midhurst Secondary Plan Area. The agency stormwater management design criteria for the development is summarized below:

1. Development Standards
   - Urban cross section for public roadway with 5- year storm sewer system
   - Minor and major drainage system to convey frequent and infrequent rainfall/ runoff events, respectively
   - Lot grading 2% optimum

2. Water Quality Control
   - 80% removal efficiency of total suspended solids per MOECC 'enhanced protection' requirements.

3. Water Quantity Control
   - Control of the post development peak flows to pre-development levels for all storms up to and including the 100-year event.

4. Erosion Control
   - 48 hour detention of the 25mm event.

5. Midhurst Secondary Plan Minutes of Settlement
   - Compliance with the stormwater management requirements outlined in the Minutes of Settlement.

6.2 Existing Drainage Conditions

The Subject Development is located within the Matheson Creek watershed area, which eventually drains to Willow Creek. Overall, site drainage is from southeast to northwest.

Due to sandy nature of the area and fact that the Midhurst Heights Development is located near the headwaters of the watershed, none of the local drainage draws were considered legal outlets.

As part of the Master Drainage Plan works, an existing condition hydrologic analysis of the Matheson Creek was completed titled Midhurst Master Drainage Plan Technical Memo # 1 (Crozier, 2016).

Pre development drainage in the vicinity of the area has been modelled by Crozier, and drainage pathways are shown on Figure 3. The existing topography in the area of Subject Development drains primarily to the west property line, while areas of future phases of the Midhurst Heights Development drain to the north.

6.3 Proposed Drainage Conditions

As a legal outlet does not exist in the immediate vicinity of the Subject Development, an outlet pipe will be constructed to convey stormwater approximately 3km from the site to the Matheson Creek Tributary at Gill Road, which will constitute the legal outlet for the development. For Phases 1A and 1B, the quantity control strategy is to retain and infiltrate all runoff onsite for flows up to an including the 100 year and Timmins events. Consequently, these phases will not discharge stormwater offsite, and therefore the aforementioned outlet pipe will not be required to be constructed until buildout of future phases of the Midhurst Heights Development.

The Subject Development will be constructed to a fully urbanized system complete with curb and gutter and storm sewers. A dual drainage approach will consist of minor and major stormwater flow routes. The minor drainage system will consist of storm sewers and catchbasins sized to convey the 5-year design storm event. The major drainage system will provide overland stormwater flow routes within the road allowance and drainage easements. Both minor and major drainage systems will discharge stormwater to two inlets provided at the east and west of the SWM Facility. Storm sewer design sheets are available in Appendix D. See Drawing 107 for the Storm Drainage Plan.

External drainage areas to the south of the Development have been identified. These external areas will contribute runoff which will be captured by the site's minor and major conveyance systems, and will contribute flows to both the east and west inlets of the SWM Facility.

Considerations have also been made to minimize impacts to drainage patterns in the vicinity of the development. As such, flows outletting to the west and north of the Midhurst Development will be altered as little as possible. Post-development drainage is shown in Figure 4.

Typical lot grading across the development incorporates a front to back drainage design, with the high point located near to the front of the building envelope. Small depressions are to be included in the grading of rear yards to promote stormwater capture by the landscaping catchbasins which connect to rear lot infiltration trenches. The infiltration trenches have been designed to capture the first 25mm of runoff from the roof and rear and side yards of the associated lot. As runoff from this area is clean pre-treatment is not required. Grading of the right-of-way will be completed to facilitate overland flow to the two inlets of the SWM Facility. See Drawings 102A, 102B, 102C, 102D, 102E and 102F for Site Grading Plans.

An infiltration gallery has been included in the parkette within Phase 1B. This infiltration gallery will infiltrate a portion of the stormwater conveyed by the storm sewer system. Stormwater will be diverted into the infiltration gallery through the use of a diversion weir within the manhole. At this time the size of the diversion weir and the infiltration gallery have not been determined. Stormwater that is infiltrated by this infiltration gallery will be primarily roadway runoff and as such will require pre-treatment. An upstream oil and grit separator will be provided to ensure adequate pre-treatment. The sizing of this unit will be determined at a future stage of detailed design.

6.3.1 Quantity Control

As previously described, the Development will retain and infiltrate all on-site runoff prior to the construction of an outlet pipe at buildout of future phases. Consequently, as runoff from the Phase 1A and 1B will not have a surface outlet, post to pre-quantity control is not warranted.

A portion of the required onsite retention and infiltration will be met through the infiltration trenches/ galleries. However, The SWM Facility will provide the majority of the required stormwater retention and

infiltration, especially during large infrequent events. See Drawing 104A for Stormwater Management Facility Plan

The SWM Facility will be an infiltration basin, consisting of a "dry" section to provide infiltration, and a "wet" section to provide pre-treatment. The pre-treatment section of the facility has been sized to provide permanent pool and extended detention volumes to meet MOECC enhanced treatment criteria for areas that do not drain to rear yard infiltration trenches. An orifice plate will be provided to drawdown the extended detention volume of the pre-treatment section, with drainage provided to the dry section of the pond where runoff will infiltrate through the native soils. A 208mm orifice has been specified to provide extended detention of 24 hours within the wet portion of the pond to ensure adequate treatment of stormwater.

In addition to the infiltration basin an infiltration trench will be included beneath the access road of the pond to provide additional infiltration volume.

As the SWM Facility has been designed with consideration given to future phases of development, the facility has been sized in exceedance to the required storage capacity of Phases 1A and 1B. As development progresses through future phases, areas of the dry portion of the pond may be converted to pre-treatment/ wet pond areas to ensure continued adequate treatment of runoff. The Phase 1A and 1B configuration of the SWM Facility has been designed to provide the storage volumes presented in Table 1.

Table 1: SWM Facility Stage-Storage

SWM Facility: Stage- Storage Relationship		
Description	Elevation (m.a.s.l.)	Available Storage (m^3)
Bottom of Pool	276.67 (276.47 in Forebay)	---
Permanent Pool (Pre-Treatment Area Only)	278.67	10390 (Dead Storage)
Extended Detention (Pre Treatment Area Only)	278.97	2,290
High Water Level	280.67	115,580
Top of Berm	281.17	136,770

An emergency spillway will be constructed adjacent to Gill Road at the high water level to control overflow in the unlikely event that runoff volumes exceed the facility's capacity. Design specifications of the SWM Facility are available in Appendix E.

6.3.2 Post-Development Hydrologic Modeling

In order to confirm that the SWM Facility will have sufficient volume to retain and the infiltrate the 100-year and Timmins events, an OTTHYMO model of Phase 1A and 1B was prepared. This model discretized Phase 1A and 1B into rear yard catchments and extended right-of-way catchments. The extended right-of-way catchments were defined as areas between high points at the front of lots on either side of the right-of-way. To account for runoff retention by rear lot infiltration trenches, the initial abstraction parameters of rear yard catchments were increased to include abstraction of the first 25mm of runoff. The SWM Facility was model using a ROUTE RERVOIR command with negligible outflow. This modelling is available in Appendix F.

Rainfall for this model was simulated using 24 hour SCS Type 2 distribution and 4 hour Chicago distribution rainfall events, with Intensity- Duration- Frequency values per Township of Springwater

Engineering Standards. A 4 hour Chicago 25mm quality event and Timmins regional event were also simulated.

As all runoff for Phase 1A and 1B is to be captured and infiltrated onsite, pre-development hydrologic modelling was not warranted. The post-development model demonstrates that the pond design is more than sufficient to accommodate storage of onsite flows including the 100 year and regional Timmins events.

Delineation of the OTTHYMO modelling catchments is available in Figure 5. As shown in the Figure, catchments of the extended right-of-way area were subdivided into catchments draining into the east (103E-Imp) and west (102W-Imp) SWMF inlets. Similarly, rear yard catchments with overflow drainage to the west (103W-P) and east (103E-P) inlets have been similarly modelled. It should be noted that under standard operating conditions, these rear yard catchments would only contribute runoff to the SWMF after storage capacity of the rear yards infiltration trenches is exceeded. External areas to the south which will contribute runoff to the Subject Development have also been included in the model, and are characterized on the basis of drainage to the east or west pond inlet (103E-Ext and 103W-Ext respectively).

Based on the OTTHYMO modelling, it was determined that the required storage volume to control the aforementioned events is approximately 55,875 m^3. This value falls well within the approximately 113,030 m^3 of storage provided at the SWMF's high water level, prior to discharge through the emergency spillway. The required detention volumes and storm elevations in the SWM facility derived from this modelling are presented in Table 2.

Table 2: SWM Facility Operating Characteristics (Normal Operating Model)

Event		Storage Volume (m^3)	Water Surface Elevation
Chicago	2-Year	3,625	276.74
	5-Year	6,170	276.88
	10-Year	8,060	276.98
	25-Year	10,580	277.11
	50-Year	12,585	277.21
	100-Year	14,710	277.32
SCS	2-Year	6,825	276.91
	5-Year	12,095	277.27
	10-Year	15,990	277.37
	25-Year	21,270	277.63
	50-Year	25,395	277.87
	100-Year	29,620	278.01
Regional		55,875	279.05

*Note that water surface elevation corresponds to the water height in the dry section of the SWMF. In all cases excepting the Regional event, the water surface elevation in the pre-treatment section of the pond is 278.97, which corresponds to the height of the extended detention berm.

Additional modelling was completed to determine required detention volumes in the event that lot level infiltration measures failed. This scenario would result in all runoff, including that which falls on the 103E-P and 103W-P catchments to discharge to the SWMF. Model results are summarized in Table 3, and demonstrate that the pond design provides ample volume to accommodate this conservative scenario.

Table 3: SWM Facility Operating Characteristics (Normal Operating Model)

Event		Storage Volume (m^3)	Water Surface Elevation
Chicago	2-Year	3,940	276.76
	5-Year	6,585	276.90
	10-Year	8,520	277.00
	25-Year	11,090	277.14
	50-Year	13,125	277.24
	100-Year	15,275	277.34
SCS	2-Year	7,305	277.94
	5-Year	12,675	277.21
	10-Year	16,610	277.41
	25-Year	21,930	277.14
	50-Year	26,075	277.95
	100-Year	30,320	278.04
Regional		56,585	279.08

*Note that water surface elevation corresponds to the water height in the dry section of the SWMF. In all cases excepting the Regional event, the water surface elevation in the pre-treatment section of the pond is 278.97, which corresponds to the height of the extended detention berm.

6.3.3 Stormwater Quality and Erosion Control

Water quality control will be implemented to meet or exceed 80% total suspended solids removal efficiency as required for MOECC "Enhanced Treatment" and will be achieved using infiltration. Rear yard infiltration trenches will provide sufficient quality control for stormwater runoff from rooftops and rear-yards. The majority of runoff from areas where stormwater will require pre-treatment (i.e. roadways) will be discharged to the SWM Facility where it will be pretreated and subsequently infiltrated. A smaller volume of roadway runoff will be infiltrated through the previously discussed parkette infiltration gallery after undergoing pretreatment through an OGS unit. Refer to Table 4 for the quality control values for infiltration.

Table 3: Water Quality

Water Quality Requirements – Infiltration Measures			
Description	Storage Criteria (m^3/ha)	Required Volume (m^3)	Provided Volume (m^3)
Infiltration Trenches	36	270	5,840
SWM Facility	36	1,260	115,320

*Note: Infiltration measures require 36m^3/ha based on 73.5 percent impervious land surface. Storage Criteria determined as per MOECC Stormwater Management and Design Manual (2003)

The pre-treatment section of the SWM Facility has been sized to provide MOECC "Enhanced Treatment" of stormwater from extended right-of-way areas of Phase 1A and 1B, including providing a permanent pool and extended detention. Refer to Table 5 for the volume calculations for the wet portion of the SWM facility.

Table 4: Volume Calculations for Pre-Treatment

Water Quality Requirements –Pre-Treatment Pool for Infiltration Basin			
Description	Storage Criteria (m^3/ha)	Required Volume (m^3)	Provided Volume (m^3)
Permanent Pool	233	6,730	10,390
Extended Detention	40	1,394	2,290

*Note: Permanent pool requires 233m^3/ha based on 73.5% impervious land surface. Storage Criteria determined as per MOECC Stormwater Management and Design Manual (2003)

It should be noted that downstream erosion control is not a concern for these phases of development as all runoff is being infiltrated. However during future design of SWM Facility outflow characteristics, proper measures will be implemented to ensure adequate erosion control, including the 48 hour detention of the 25mm event.

6.3.4 Midhurst Secondary Plan Minutes of Settlement Stormwater Requirements

A primary requirement of the Midhurst Secondary Plan Minutes of Settlement is the infiltration of 25mm of runoff across the development. The ultimate strategy for achieving this infiltration requirement is to implement a combination of rear yard infiltration trenches, infiltration galleries, and infiltration within the SWM Facility.

As all runoff for Phase 1A and 1B will be infiltrated onsite, stormwater requirements including nutrient loading, peak flow control, volume control, extended detention, maximum infiltration, and thermal mitigation will be achieved as outlined in the Minutes of Settlement.

7.0 EROSION AND SEDIMENT CONTROLS DURING CONSTUCTION

Erosion and sediment controls will be implemented on-site prior to construction where required and as directed by the Developer and their site representative.

- Stone Mud Mat

Mud mat will be installed at the main access point to the site (Gill Road) to reduce the amount of mud tracking onto exiting paved roadways during site servicing operations.

- Dust Suppression

During earthwork activities, the Contractor will ensure that measures for dust suppression are provided as required, such as the application of water or lime.

- Silt Fencing

Silt fence will be installed where required to intercept sheet flow. Heavy duty silt fence will be located around the downstream side of the work zone limits. It should be noted that additional silt fencing may be added based on field decisions by the Site Engineer and Owner prior to, during and following construction.

- Flow Check Dams

Temporary straw bale and rock check dams will be utilized on-site in order to prevent any silt mitigation off site during and after construction activities. These dams will promote settling of suspended solids, and will reduce flow velocities. Sediment accumulation will be monitored and removed as necessary. The temporary rock check dams will be constructed in accordance with NVCA's Typical Rock Check Dam Erosion Control Device (BSD-24 Draft).

8.0 CONCLUSIONS & RECOMMENDATIONS

Based on the foregoing, we conclude that the proposed residential development can be adequately serviced.

1. Access to Phase 1A and 1B of the development will be provided by way of two roadway connections to Gill Road. Urban cross sections will be constructed in conformance to Township of Springwater engineering standards, and recommendations of the geotechnical consultant.
2. The development will be serviced via an internal gravity sewer system that will drain to the proposed Sanitary Pumping Station located at Block 1096. External conveyance and treatment infrastructure sewage will be completed by others concurrent to development construction.
3. Domestic water will be supplied through groundwater supply wells located in the east of the Midhurst Heights Development property. A temporary raw water line will be completed to convey groundwater to a treatment facility at Block 1096. Upon further buildout of Phase 1 of the development, the temporary raw water line will be decommissioned, and replaced with a permanent supply line located within the public right-of-way. The permanent supply line will be progressively constructed concurrent with construction of the right-of-way.
4. Low Impact Development infrastructure in the form of rear yard infiltration trenches will be implemented to capture and infiltrate the first 25mm of site runoff. Additional infiltration will be provided through the SWM Facility, and a parkette infiltration gallery.
5. An infiltration basin SWM Facility will be constructed in the northwest of the Subject Development to provide quantity control to store runoff from all events up to and including the 100 year and regional Timmins storms. An outlet from the pond will not be provided at this stage of development, as all applicable runoff flows will be controlled onsite and infiltrated/evaporated.
6. Infiltration infrastructure and the pre-treatment section of the SWM Facility will provide 'Enhanced Treatment' for all runoff onsite, ensuring removal of 80% total suspended solids.
7. In accordance with Township and NVCA standards, erosion and sediment control measures will be implemented during construction.

Therefore, we recommend approval of the Planning Applications for the Subject Development from the perspective of engineering servicing requirements.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Brendan Hummelen, P.Eng.
Project Engineer

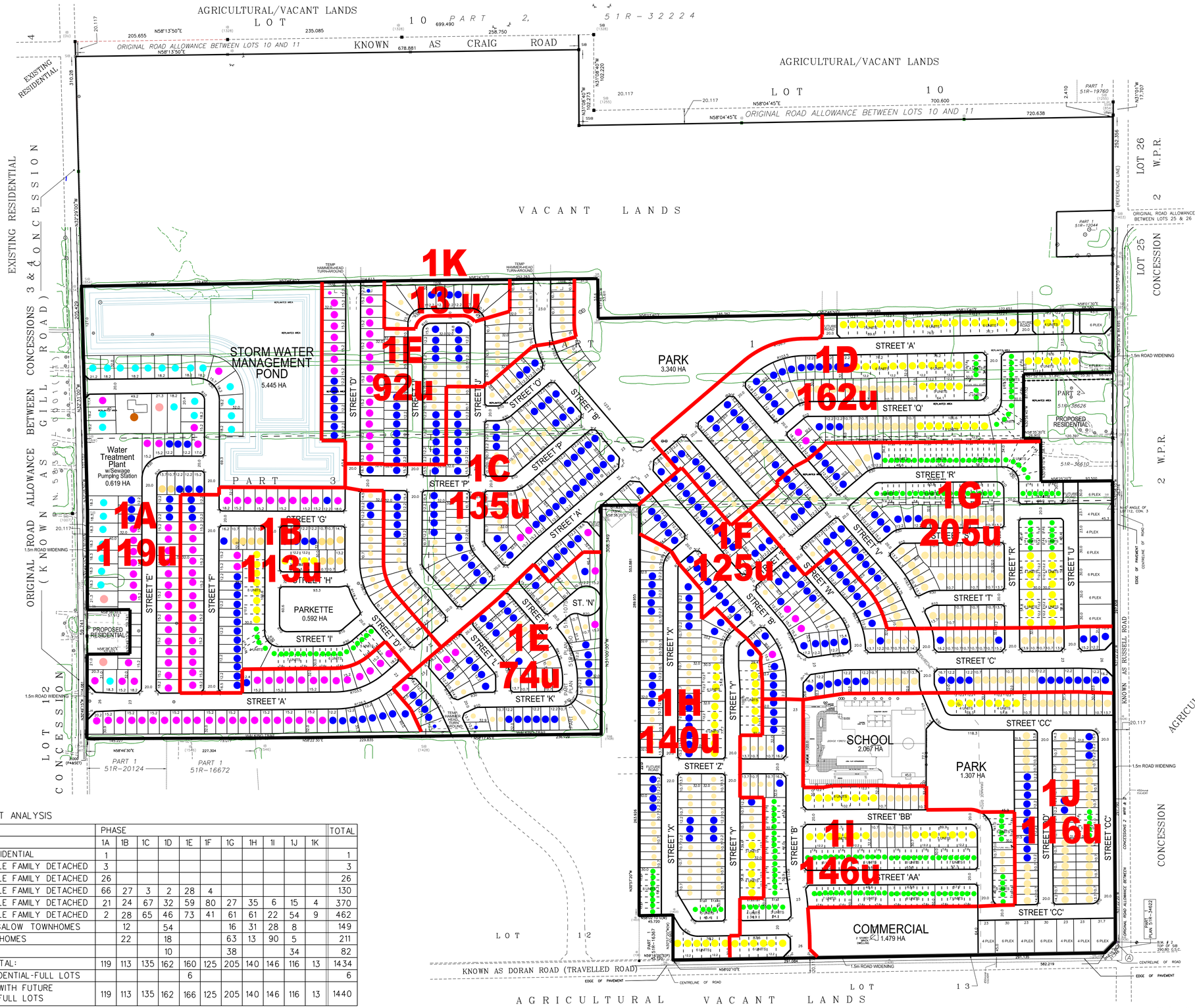
C.F. CROZIER & ASSOCIATES INC.

Brittany Robertson, P.Eng.
Project Manager

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APPENDIX A

Midhurst Heights Development Phasing Plan



DEVELOPMENT ANALYSIS

	PHASE											TOTAL
UNIT TYPE	1A	1B	1C	1D	1E	1F	1G	1H	1I	1J	1K	
EXISTING RESIDENTIAL	1											1
21.3 m SINGLE FAMILY DETACHED	3											3
18.2 m SINGLE FAMILY DETACHED	26											26
15.2 m SINGLE FAMILY DETACHED	66	27	3	2	28	4						130
12.2 m SINGLE FAMILY DETACHED	21	24	67	32	59	80	27	35	6	15	4	370
10.7 m SINGLE FAMILY DETACHED	2	28	65	46	73	41	61	61	22	54	9	462
12.2 m BUNGALOW TOWNHOMES		12		54			16	31	28	8		149
7.6 m TOWNHOMES		22		18			63	13	90	5		211
4/6 PLEX				10			38			34		82
UNIT SUB TOTAL:	119	113	135	162	160	125	205	140	146	116	13	1434
FUTURE RESIDENTIAL-FULL LOTS					6							6
UNIT TOTAL WITH FUTURE RESIDENTIAL-FULL LOTS	119	113	135	162	166	125	205	140	146	116	13	1440

ESTIMATED FUTURE RESIDENTIAL-PART LOTS (12), EQUAL AN EQUIVALENT OF 6 FULL LOTS: 6

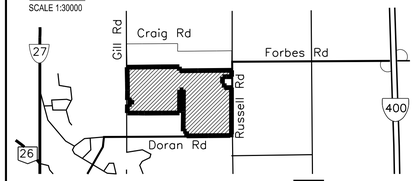
MIDHURST HEIGHTS DEVELOPMENT

PHASING PLAN

OF PART LOT 11, CONCESSION 3
AND PART OF LOT 12, CONCESSION 3
(GEOGRAPHIC TOWNSHIP OF VESPRA)
TOWNSHIP OF SPRINGWATER
COUNTY OF SIMCOE

WESTON CONSULTING
planning + urban design

KEY PLAN
SCALE 1:30000



PARKLAND DEDICATION REQUIREMENT

TOTAL UNITS FOR PARKLAND CALCULATION = 1446
RESIDENTIAL 1 HA/300 UNITS = 4.82 HA
COMMERCIAL: 2% NET AREA = 0.03 HA
TOTAL PARKLAND REQUIRED: 4.85 HA
TOTAL PARKLAND PROVIDED: 5.239 HA

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Toronto: 127 Berkeley St. Toronto, Ontario M5A 2X1 T. 416.640.9917 F. 905.738.6637

REVISIONS LIST

23 MAY 2014	Revise Parkette, Transitional Lotting & Future Road Blk.
21 MAY 2014	Revised Phasing Boundaries
14 MAY 2014	Revise school/park/adjacent lotting
4 APR 2014	Revised draft plan based on comments received

File Number:	4679
Drawn By:	SM / SB
Planner:	RG
Scale:	see scale bar
CAD:	4679/concepts/C24 Phasing Plan.dgn

Drawing Number: C24

APPENDIX B

Sanitary Sewer Design Sheet

CROZIER & ASSOCIATES
Consulting Engineers

Project No.: 845-3675
File Name: Midhurst Sanitary Design Sheet
Date: March 29, 2018
Design: J.K./F.K.

MIDHURST HEIGHTS DEVELOPMENT

SANITARY SEWER DESIGN SHEET

Ext. 1 Non-Residential Contribution = 7.3 l/s

Population
Low Density 3.13 p.p.u.
Med. Density 2.34 p.p.u.
High Density 1.67 p.p.u.

Manning's n = 0.013
Peak Factor (M) = 1+(14/(4+(P/1000)^0.5))
Avg. Daily/Capita Flow = 450 L/cap.d
Q infiltration = 0.23 L/ha.s

Location	FROM MH	TO MH	Length (m)	Catchment ID	Block Area (Ha)	TOTAL B. Area	# of Lots	Block Pop.	TOTAL trib pop	Peak Factor	Avg. Flow (l/s)	Peak Flow (l/s)	Infilt. (l/s)	Combined (l/s)	Pipe Diam (mm)	Upper Obv. El.	Lower Obv. El.	Upper Inv. El.	Lower Inv. El.	Slope (%)	Drop Across D.S. MH (m)	Cap. (l/s)	Vel. Full (m/s)	Ground Upper	Ground Lower	Cover Upper	Cover Lower
EX. 1	-	MH#1	-	EX. 1		73.33			3421					**84.62**											282.6		
STREET D	MH#1	MH#2	49.41	1	0.21	73.54	3	9	3430	3.39	17.86	60.60	16.91	**84.82**	450	279.43	279.34	278.98	278.89	0.17%	0.08	**117.55**	0.739	282.6	282.8	3.2	3.5
STREET A	MH#3	MH#4	63.93	2	0.46	0.46	5	16	16	4.39	0.08	0.37	0.11	**0.47**	200	285.50	284.86	285.30	284.66	1.00%	0.08	**32.80**	1.044	288.10	287.8	2.6	3.0
EX. 2	-	MH#4	-	EX.2	9.47	9.47	##	720	720	3.89	3.75	14.58	2.18	**16.76**	-	-	-	-	-	-	-	**-**	-	-	287.8	-	-
STREET D	MH#4	MH#5	83.47	3	0.35	10.28	6	19	755	3.88	3.93	15.24	2.36	**17.60**	200	284.78	282.84	284.58	282.64	2.33%	0.03	**50.06**	1.594	287.8	286	3.0	3.1
STREET I	MH#6	MH#5	53.28	4	0.29	0.29	5	12	12	4.41	0.06	0.28	0.07	**0.34**	200	283.66	283.13	283.46	282.93	1.00%	0.08	**32.80**	1.044	286.40	286	2.7	2.8
STREET D	MH#5	MH#7	29.80	5	0.15	10.72	2	6	773	3.87	4.03	15.58	2.47	**18.04**	200	282.81	282.16	282.61	281.96	2.16%	0.05	**48.20**	1.534	286	285.3	3.2	3.1
STREET D	MH#7	MH#8	23.74	6	0.15	10.87	2	6	779	3.87	4.06	15.69	2.50	**18.19**	200	282.11	281.61	281.91	281.41	2.12%	0.05	**47.76**	1.520	285.3	284.7	3.1	3.1
STREET H	MH#9	MH#8	43.98	7	0.23	0.23	3	9	9	4.42	0.05	0.21	0.05	**0.26**	200	281.94	281.50	281.74	281.30	1.00%	0.08	**32.80**	1.044	284.7	284.7	2.8	3.2
STREET D	MH#8	MH#10	24.23	8	0.11	11.21	2	6	794	3.86	4.14	15.97	2.58	**18.55**	200	281.56	281.05	281.36	280.85	2.13%	0.05	**47.87**	1.524	284.7	284.1	3.1	3.1
STREET D	MH#10	MH#2	55.29	9	0.28	11.49	5	16	810	3.86	4.22	16.27	2.64	**18.92**	200	281.00	279.71	280.80	279.51	2.33%	0.08	**50.06**	1.594	284.1	282.8	3.1	3.1
STREET G	MH#2	MH#11	107.92	10	0.78	85.81	13	41	4281	3.31	22.30	73.73	19.74	**100.77**	450	279.26	279.07	278.81	278.62	0.18%	0.03	**120.96**	0.761	282.8	283.43	3.6	4.4
STREET I	MH#6	MH#37	87.29	11	0.63	0.63	12	28	28	4.36	0.15	0.64	0.14	**0.78**	200	283.65	282.75	283.45	282.55	1.04%	0.05	**33.45**	1.065	286.40	285.4	2.7	2.6
STREET I	MH#37	MH#12	20.49	11A	0.33	0.96	5	12	40	4.33	0.21	0.90	0.22	**1.12**	200	282.70	282.40	282.50	282.20	1.45%	0.05	**39.49**	1.257	285.4	285.2	2.7	2.8
STREET I	MH#12	MH#13	61.48	12	0.38	1.34	5	12	52	4.31	0.27	1.17	0.31	**1.48**	200	282.35	281.44	282.15	281.24	1.48%	0.03	**39.90**	1.270	285.2	284.2	2.8	2.8
STREET H	MH#9	MH#13	66.73	13	0.49	0.49	0	0																			
							4	9	9	4.42	0.05	0.21	0.11	**0.32**	200	281.94	281.27	281.74	281.07	1.00%	0.08	**32.80**	1.044	284.7	284.2	2.8	3.0

STREET I	MH#13	MH#11	81.97	14	0.26	2.09	3	7	68	4.29	0.35	1.52	0.48	**2.00**	200	281.20	280.01	281.00	279.81	1.45%	0.08	**39.49**	1.257	284.2	283.43	3.0	3.4
STREET G	MH#11	MH#14	81.97	15	0.61	88.51	10	31	4380	3.30	22.81	75.23	20.36	**102.89**	450	279.04	278.88	278.59	278.43	0.19%	0.08	**124.27**	0.781	283.43	284.6	4.4	5.8
STREET F	MH#15	MH#16	84.45	16	0.56	0.56	9	28	28	4.36	0.15	0.64	0.13	**0.76**	200	284.44	283.60	284.24	283.40	1.00%	0.03	**32.80**	1.044	287	286.2	2.6	2.6
STREET F	MH#16	MH#17	82.39	17	0.73	1.29	13	41	69	4.28	0.36	1.54	0.30	**1.84**	200	283.57	282.40	283.37	282.20	1.41%	0.03	**38.95**	1.240	286.2	285.40	2.6	3.0
STREET F	MH#17	MH#14	80.05	18	0.54	1.83	8	25	94	4.25	0.49	2.08	0.42	**2.50**	200	282.37	281.55	282.17	281.35	1.03%	0.03	**33.29**	1.060	285.40	284.6	3.0	3.1
STREET F	MH#14	MH#18	74.00	19	0.25	90.59	3	9	4483	3.29	23.35	76.79	20.84	**104.92**	450	278.80	278.66	278.35	278.21	0.19%	0.08	**124.27**	0.781	284.6	284.00	5.8	5.3
STREET F	MH#19	MH#20	46.68	20	0.37	0.37	4	13	13	4.40	0.07	0.30	0.09	**0.38**	200	282.49	282.03	282.29	281.83	1.00%	0.05	**32.80**	1.044	285.20	284.9	2.7	2.8
STREET F	MH#20	MH#21	12.82	21	0.20	0.57	2	6	19	4.38	0.10	0.43	0.13	**0.56**	200	281.98	281.84	281.78	281.64	1.00%	0.05	**32.80**	1.044	284.9	284.9	2.9	3.0
STREET F	MH#21	MH#18	96.51	22	0.53	1.10	6	19	38	4.34	0.20	0.86	0.25	**1.11**	200	281.79	280.97	281.59	280.77	0.86%	0.08	**30.42**	0.968	284.9	284.00	3.1	3.0
STREET E	MH#18	MH#22	73.40	23	0.56	92.25	10	31	4552	3.28	23.71	77.82	21.22	**106.34**	450	278.58	278.43	278.13	277.98	0.20%	0.05	**127.50**	0.802	284.00	284.5	5.4	6.1
STREET E	MH#22	MH#23	14.91	24	0.09	92.34	1	3	4555	3.28	23.72	77.87	21.24	**106.41**	450	278.38	278.35	277.93	277.90	0.20%	0.05	**127.50**	0.802	284.5	284.7	6.1	6.3
STREET E	MH#23	MH#24	24.50	25	0.33	92.67	0	0	4555	3.28	23.72	77.87	21.31	**106.48**	450	278.30	278.25	277.85	277.80	0.20%	0.08	**127.50**	0.802	284.7	284.9	6.4	6.6
STREET A	MH#3	MH#25	43.89	26	0.42	0.42	6	19	19	4.38	0.10	0.43	0.10	**0.53**	200	285.51	285.06	285.31	284.86	1.00%	0.05	**32.80**	1.044	288.10	287.9	2.6	2.9
STREET A	MH#25	MH#26	91.53	27	0.78	1.20	12	38	57	4.30	0.30	1.28	0.28	**1.55**	200	285.01	284.55	284.81	284.35	0.50%	0.03	**23.19**	0.738	287.9	287.5	2.9	2.9
STREET A	MH#26	MH#15	89.43	28	0.63	1.83	9	28	85	4.26	0.44	1.89	0.42	**2.31**	200	284.52	284.08	284.32	283.88	0.50%	0.03	**23.19**	0.738	287.5	287	2.9	3.0
STREET A	MH#15	MH#27	83.98	29	0.47	2.30	6	19	104	4.24	0.54	2.30	0.53	**2.83**	200	284.05	283.63	283.85	283.43	0.50%	0.08	**23.19**	0.738	287	287.1	3.0	3.4
STREET E	MH#27	MH#28	101.99	30	0.69	2.99	10	31	135	4.21	0.70	2.96	0.69	**3.64**	200	283.55	283.04	283.35	282.84	0.50%	0.03	**23.19**	0.738	287.1	286.2	3.5	3.2
STREET E	MH#28	MH#29	100.00	31	0.77	3.76	12	38	173	4.17	0.90	3.76	0.86	**4.62**	200	283.01	282.51	282.81	282.31	0.50%	0.03	**23.19**	0.738	286.2	285.5	3.2	3.0
STREET E	MH#29	MH#24	84.48	32	0.70	4.46	12	38	211	4.14	1.10	4.55	1.03	**5.57**	200	282.48	282.06	282.28	281.86	0.50%	0.08	**23.19**	0.738	285.5	284.9	3.0	2.8
STREET E	MH#24	OUT 1	18.00	-	-	97.13	0	0	4766	3.26	24.82	81.03	22.34	**110.67**	450	-	-	277.72	-	0.21%	-	**130.65**	0.821	284.9	-	-	-
STREET A	MH#27	MH#38	47.79	33	0.35	0.35	5	16	16	4.39	0.08	0.37	0.08	**0.45**	200	284.47	282.74	284.27	282.54	3.62%	0.08	**62.40**	1.986	287.1	285.5	2.6	2.8
STREET A	MH#38	MH#30	44.19	33A	0.34	0.69	4	13	29	4.36	0.15	0.66	0.16	**0.82**	200	282.50	282.28	282.30	282.08	0.50%	0.08	**23.19**	0.738	285.5	285.1	3.0	2.9
GILL RD.	MH#30	MH#31	109.97	34	0.48	1.17	3	9	38	4.34	0.20	0.86	0.27	**1.13**	200	282.19	281.46	281.99	281.26	0.66%	0.53	**26.65**	0.848	285.1	284.1	2.9	2.6
GILL RD.	MH#31	MH#32	110.00	35	0.70	1.87	6	19	57	4.30	0.30	1.28	0.43	**1.71**	200	280.93	280.33	280.73	280.13	0.55%	0.33	**24.32**	0.774	284.1	283.02	3.1	2.7
GILL RD.	MH#32	MH#33	70.31	36	0.36	2.23	3	9	66	4.29	0.34	1.47	0.51	**1.99**	200	280.00	279.21	279.80	279.01	1.12%	0.08	**34.71**	1.105	283.02	282.32	3.0	3.1
STREET F	MH#19	MH#34	67.04	37	0.68	0.68	5	16	16	4.39	0.08	0.37	0.16	**0.52**	200	282.50	279.88	282.30	279.68	3.90%	0.03	**64.77**	2.062	285.20	282.6	2.7	2.8
STREET F	MH#34	MH#35	58.07	38	0.30	0.98	3	9	25	4.37	0.13	0.57	0.23	**0.79**	200	279.48	279.16	279.28	278.96	0.55%	0.08	**24.32**	0.774	282.6	282.4	3.2	3.2
GILL RD.	MH#35	MH#36	67.28	39	0.37	1.35	3	9	34	4.35	0.18	0.77	0.31	**1.08**	200	279.08	278.75	278.88	278.55	0.50%	0.03	**23.19**	0.738	282.4	282.4	3.3	3.7
GILL RD.	MH#36	MH#33	67.45	40	0.49	1.84	0	0	34	4.35	0.18	0.77	0.42	**1.19**	200	278.72	278.38	278.52	278.18	0.50%	0.07	**23.19**	0.738	282.4	282.32	3.7	3.9
GILL RD.	MH#33	OUT-2	14.90	-	-	4.07	0	0	100	4.24	0.52	2.21	0.94	**3.15**	200	-	-	278.11	-	0.66%	-	**26.65**	0.848	-	-	-	-
PUMPING STATION	-	-	-	-	-	101.20	0	0	4866	3.26	25.34	82.52	23.28	**113.09**	-	-	-	-	-	-	-	**-**	-	-	-	-	-

APPENDIX C

Domestic Water Design Flows

File: 845-3675
Date: January 23, 2018
By: BP
Check By:

Midhurst Heights Development (Phases 1A, 1B)- Domestic Water Design Criteria

Developed Site Area		23.40	ha
Number of Residential Units- Single Detached		198	units
Number of Residential Units- Townhouse		34	units
Total Number of Units		232	units
Persons Per Unit		3.2	persons/unit
Residential Population		742	persons

Domestic Water Design Flows

Residential (Per MOECC Design Guidelines/ Springwater Standards)		450	L/C-day

Total Domestic Water Design Flows

Average Residential Daily Flow		3.87	L/sec
Max Day Peak Factor	Per MOECC Design Guidlines	2.75	
Max Day Demand Flow		**10.63**	L/sec
Peak Hour Factor	Minimum Factor per Springwater Township	4.50	
Peak Hour Flow		**17.40**	L/sec

APPENDIX D

Storm Sewer Design Sheets

CROZIER CONSULTING ENGINEERS

PROJECT: Midhurst Heights Development
PROJECT No.: 845-3675
FILE: Storm Sewer Design

MIDHURST HEIGHTS DEVELOPMENT

5 YEAR - STORM SEWER DESIGN MODEL

DESIGN: JK
CHECK: DF
UPDATED: March 1, 2018

FREQUENCY	5 YEARS			100 YEARS			
5 YEARS	Coef. A=	26.1	Coef. B= -0.690	Coef. A=	45.10	Coef. B=	-0.661

TIME OF CONCENTRATION 15.00 MANNINGS "n" 0.01

CATCHMENT AREA I.D.	FR MH NO	TO MH NO	RUN-OFF AREA (A) (Ha)	RUN-OFF COEFF (C_5)	RUN-OFF A x C	Cummul. A x C	TIME OF CONC. (min.)	I (mm/hr)	Q (l/sec)	SLOPE (%)	DROP ACROSS DS MH	PIPE DIA. (mm)	VEL. (m/sec)	LENGTH (m)	TIME OF FLOW (min)	CAPACITY (l/sec)	PIPE INV ELEV. FALL (m)	PIPE INV ELEV. UPPER END	PIPE INV ELEV. LOWER END	GROUND ELEV. UPPER END	GROUND ELEV. LOWER END	COVER UPPER END	COVER LOWER END
											OUTLET #1												
EX.1	RLCB#6	STMH#1	1.56	0.25	0.390																		
100A			0.05	0.55	0.028	0.418	43.68	32.49	**37.71**	0.700		300	1.14	72.16	1.05	**80.91**							
	STMH#1	STMH#2			0.028	0.418	44.73	31.96	**37.10**	0.700		300	1.14	49.59	0.72	**80.91**	0.35	286.26	285.91	288.10	287.83	1.54	1.62
EXT.2	STMH#2	STMH#3	9.52	0.60	5.712		22.90																
100			0.14	0.55	0.077																		
101			0.16	0.70	0.112																		
102			0.22	0.55	0.121	6.440	22.90	50.73	**908.19**	2.300		600	3.29	83.47	0.42	**931.19**	1.92	285.41	283.49	287.83	285.87	1.82	1.78
103	STMH#4	STMH#3	0.24	0.70	0.168	0.168	15.00	67.93	**31.73**	1.690		300	1.78	47.84	0.45	**125.71**	0.81	284.60	283.79	286.46	285.87	1.56	1.78
104	STMH#3	STMH#6	0.12	0.70	0.084	6.692	23.32	50.10	**931.90**	2.400		600	3.36	20.81	0.10	**951.22**	0.50	283.46	282.96	285.87	285.39	1.81	1.83
105	STMH#6	STMH#7	0.23	0.55	0.127	6.818	23.43	49.94	**946.63**	2.400		600	3.36	34.71	0.17	**951.22**	0.83	282.91	282.08	285.39	284.57	1.88	1.89
106	STMH#8	STMH#7	0.18	0.30	0.054																		
107			0.13	0.70	0.091	0.145	15.00	67.93	**27.38**	1.150		300	1.47	36.70	0.42	**103.70**	0.42	282.97	282.55	284.77	284.57	1.50	1.72
108	STMH#7	STMH#10	0.07	0.70	0.049	7.012	23.60	49.69	**968.67**	2.300		675	3.56	23.39	0.11	**1274.82**	0.54	282.00	281.46	284.57	284.06	1.89	1.92
109	STMH#10	STMH#11	0.11	0.55	0.061																		
110			0.04	0.70	0.028																		
111			0.15	0.55	0.083																		
112			0.11	0.55	0.061																		
113			0.07	0.70	0.049	7.293	23.71	49.53	**1004.21**	2.300		675	3.56	56.96	0.27	**1274.82**	1.31	281.43	280.12	284.06	282.78	1.95	1.98
	ST.MH#4	ST.MH#56								1.000		300		40.48			0.40	284.60	284.20	286.46	286.05	1.56	1.55
114	ST.MH#56	ST.MH#12	0.3	0.55	0.165	0.165																	
115			0.06	0.70	0.042	0.207	15.00	67.93	**39.09**	1.370		300	1.60	49.51	0.52	**113.19**	0.68	284.06	283.38	286.05	285.32	1.69	1.64
116	ST.MH#12	ST.MH#53	0.3	0.55	0.165																		
117			0.08	0.70	0.056	0.428	15.52	66.37	**78.96**	1.280		300	1.55	19.91	0.21	**109.40**	0.25	283.30	283.04	285.32	285.08	1.72	1.74
118	ST.MH#53	ST.MH#13	0.14	0.70	0.098																		
119			0.45	0.55	0.248	0.774	15.73	65.74	**141.36**	0.700		375	1.33	62.08	0.78	**146.69**	0.43	282.54	282.11	285.08	284.20	2.16	1.72

CROZIER CONSULTING ENGINEERS

PROJECT: Midhurst Heights Development
PROJECT No.: 845-3675
FILE: Storm Sewer Design

MIDHURST HEIGHTS DEVELOPMENT

5 YEAR - STORM SEWER DESIGN MODEL

DESIGN: JK
CHECK: DF
UPDATED: March 1, 2018

FREQUENCY	5 YEARS			100 YEARS			
5 YEARS	Coef. A=	26.1	Coef. B= -0.690	Coef. A=	45.10	Coef. B=	-0.661

TIME OF CONCENTRATION 15.00 MANNINGS "n" 0.01

CATCHMENT AREA I.D.	FR MH NO	TO MH NO	RUN-OFF AREA (A) (Ha)	COEFF (C_5)	A x C	Cummul. A x C	TIME OF CONC. (min.)	I (mm/hr)	Q (l/sec)	SLOPE (%)	DROP ACROSS DS MH	PIPE DIA. (mm)	VEL. (m/sec)	LENGTH (m)	TIME OF FLOW (min)	CAPACITY (l/sec)	PIPE INV ELEV. FALL (m)	UPPER END	LOWER END	GROUND ELEV. UPPER END	LOWER END	COVER UPPER END	LOWER END
120	ST.MH#8	ST.MH#13	0.23	0.70	0.161																		
121			0.41	0.30	0.123	0.284	15.00	67.93	**53.63**	1.220		300	1.51	73.23	0.81	**106.81**	0.89	282.97	282.08	284.77	284.20	1.50	1.82
122	ST.MH#13	ST.MH#55	0.1	0.70	0.070	1.128	16.51	63.58	**199.30**	1.300		375	1.81	37.49	0.35	**199.91**	0.49	282.00	281.51	284.20	283.65	1.83	1.77
123	ST.MH#55	ST.MH#16	0.32	0.55	0.176																		
124			0.24	0.55	0.132																		
125			0.23	0.70	0.161																		
126			0.09	0.70	0.063	1.660	16.85	62.68	**289.18**	1.040		450	1.83	44.49	0.41	**290.75**	0.46	281.44	280.98	283.65	283.48	1.76	2.05
127	ST.MH#27	ST.MH#16	0.11	0.70	0.077	0.077	15.00	67.93	**14.54**	1.400		300	1.62	81.97	0.84	**114.42**	1.15	282.80	281.65	284.60	283.48	1.50	1.53
128	ST.MH#16	ST.MH#18	0.12	0.70	0.084	1.821	17.26	61.66	**312.07**	0.530		525	1.45	95.83	1.10	**313.09**	0.51	280.90	280.39	283.48	282.64	2.06	1.72
129	ST.MH#18	ST.MH#11	0.42	0.70	0.294	2.115	15.84	65.41	**384.51**	0.810		525	1.79	12.08	0.11	**387.06**	0.10	280.36	280.26	282.64	282.78	1.75	1.99
130	ST.MH#11	OUTLET-1	0.13	0.55	0.072																		
			0.15	0.70	0.105	9.584	23.97	49.15	**1309.55**	0.530		900	2.07	86.42	0.70	**1317.93**	0.46	279.90	279.44	282.78		1.98	
	ST.MH#1	ST.MH#20								0.500		300		52.70			0.26	286.30	286.04	288.10	287.92	1.50	1.58
131	RLCB#5	CB#25	0.05	0.55	0.028																		
EXT.3			2.21	0.25	0.553	0.580	44.83	31.91	**51.46**	0.700	0.00	300	1.14	37.22	0.54	**80.91**					287.92		
132	CB#25	ST.MH#20	0.17	0.55	0.094	0.674	44.83	31.91	**59.75**	0.700		300	1.14	7.50	0.11	**80.91**							
133	ST.MH#20	ST.MH#21	0.12	0.70	0.084	0.758	45.65	31.52	**66.37**	0.500		375	1.12	52.62	0.78	**123.98**	0.26	285.90	285.64	287.92	287.66	1.65	1.65
EXT.4	RLDCBMH#53	ST.MH#21	2.57	0.25	0.643	0.643	42.95	32.87	**58.71**	0.700		375	1.33	43.69	0.55	**146.69**							
135	ST.MH#21	ST.MH#50	0.19	0.55	0.105																		
136			0.21	0.70	0.147	1.652	46.43	31.15	**143.01**	0.500		450	1.27	58.60	0.77	**201.60**	0.29	285.56	285.27	287.66	287.36	1.65	1.64
137	ST.MH#50	ST.MH#22	0.22	0.70	0.154																		
138			0.10	0.70	0.070	1.876	47.20	30.80	**160.58**	0.500		450	1.27	71.44	0.94	**201.60**	0.36	285.13	284.77	287.36	287.05	1.78	1.83
139	ST.MH#29	ST.MH#22	0.07	0.70	0.049	0.049	15.00	67.93	**9.25**	0.330		300	0.79	83.98	1.78	**55.55**	0.28	285.18	284.90	286.98	287.05	1.50	1.85
EXT.5	RLCB#3	DCB9	1.86	0.25	0.465	0.465																	
141			0.20	0.55	0.110	0.575	41.98	33.39	**53.38**	0.700		300	1.14	37.75	0.55	**80.91**							
142	ST.MH#22	ST.MH#25	0.25	0.70	0.175	2.675	48.14	30.38	**225.90**	0.650		450	1.45	72.70	0.84	**229.86**	0.47	284.69	284.22	287.05	286.26	1.91	1.59

CROZIER CONSULTING ENGINEERS

PROJECT: Midhurst Heights Development
PROJECT No.: 845-3675
FILE: Storm Sewer Design

MIDHURST HEIGHTS DEVELOPMENT

5 YEAR - STORM SEWER DESIGN MODEL

DESIGN: JK
CHECK: DF
UPDATED: March 1, 2018

FREQUENCY	5 YEARS			100 YEARS			
5 YEARS	Coef. A=	26.1	Coef. B= -0.690	Coef. A=	45.10	Coef. B=	-0.661

TIME OF CONCENTRATION 15.00 MANNINGS "n" 0.01

CATCHMENT AREA I.D.	FR MH NO	TO MH NO	RUN-OFF AREA (A) (Ha)	RUN-OFF COEFF (C_5)	RUN-OFF A x C	Cummul. A x C	TIME OF CONC. (min.)	I (mm/hr)	Q (l/sec)	SLOPE (%)	DROP ACROSS DS MH	PIPE DIA. (mm)	VEL. (m/sec)	LENGTH (m)	TIME OF FLOW (min)	CAPACITY (l/sec)	PIPE INV ELEV. FALL (m)	PIPE INV ELEV. UPPER END	PIPE INV ELEV. LOWER END	GROUND ELEV. UPPER END	GROUND ELEV. LOWER END	COVER UPPER END	COVER LOWER END
143	ST.MH#25	ST.MH#26	0.26	0.55	0.143																		
144			0.27	0.70	0.189	3.007	48.98	30.02	**250.93**	0.960		450	1.76	60.78	0.58	**279.35**	0.58	284.19	283.60	286.26	285.68	1.62	1.63
145	ST.MH#26	ST.MH#51	0.3	0.55	0.165																		
146			0.29	0.55	0.160																		
147			0.22	0.70	0.154	3.485	49.56	29.78	**288.53**	1.030		450	1.82	60.78	0.56	**289.35**	0.63	282.93	282.30	285.68	285.10	2.30	2.35
148	ST.MH#51	ST.MH#27	0.2	0.70	0.140																		
149			0.3	0.55	0.165	3.790	50.11	29.55	**311.37**	0.530		525	1.45	52.66	0.61	**313.09**	0.28	282.23	281.95	285.10	284.60	2.34	2.12
	ST.MH#27	ST.MH#57				3.790	50.11	29.55	**311.37**	0.530		525	1.45	29.58	0.34	**313.09**	0.16	281.87	281.72	284.60	284.32	2.20	2.08
150	ST.MH#57	ST.MH#28	0.14	0.70	0.098																		
151			0.5	0.55	0.275	4.163	50.72	29.31	**339.18**	0.630		525	1.58	44.42	0.47	**341.35**	0.28	281.69	281.41	284.32	284.02	2.11	2.09
	ST.MH#29	ST.MH#30								0.850		300	1.26	55.99	0.74	**89.15**	0.48	285.20	284.72	286.98	286.52	1.48	1.50
152	ST.MH#30	ST.MH#31	0.17	0.70	0.119	0.119	15.00	67.93	**22.47**	0.730		300	1.17	75.98	1.08	**82.62**	0.55	284.69	284.14	286.52	285.96	1.53	1.52
153	ST.MH#31	ST.MH#32	0.23	0.70	0.161	0.280	16.08	64.74	**50.39**	0.730		300	1.17	75.98	1.08	**82.62**	0.55	284.10	283.54	285.96	285.41	1.56	1.57
154	ST.MH#32	ST.MH#54	0.24	0.70	0.168	0.448	17.17	61.89	**77.08**	0.710		300	1.15	70.55	1.02	**81.48**	0.50	283.52	283.02	285.41	284.89	1.59	1.57
155	ST.MH#29	ST.MH#41	0.18	0.70	0.126	0.126	15.00	67.93	**23.79**	2.990		300	2.37	70.67	0.50	**167.21**	2.11	285.18	283.07	286.98	284.92	1.50	1.55
156	ST.MH#41	ST.MH#42	0.27	0.70	0.189	0.315	15.50	66.42	**58.16**	0.370		300	0.83	21.30	0.43	**58.82**	0.08	283.04	282.96	284.92	285.10	1.58	1.84
EXT.6	DI#1	STMH#43	1.25	0.50	0.625	0.625	15.00	67.93	**118.03**	0.500		375	1.12	16.43	0.24	**123.98**							
157	RLCB#2	STMH#43	0.44	0.55	0.242	0.242	15.00	67.93	**45.70**	0.500		300	0.97	15.08	0.26	**68.38**	0.08	283.49	283.41	284.49	285.54		1.83
	STMH#43	STMH#42				0.867	15.26	67.13	**161.80**	0.350		450	1.06	43.98	0.69	**168.67**	0.15	283.27	283.12	285.54	285.10	1.82	1.53
158	STMH#42	STMH#44	0.24	0.55	0.132	1.314	15.95	65.11	**237.84**	0.700		450	1.50	62.66	0.70	**238.54**	0.44	282.81	282.37	285.10	284.50	1.84	1.68
159	STMH#44	STMH#45	0.08	0.70	0.056	1.370	16.65	63.22	**240.77**	0.980		450	1.77	62.11	0.58	**282.24**	0.61	282.34	281.73	284.50	283.89	1.71	1.71
160	RLDCBMH#54	STMH#45	0.52	0.83	0.432	0.432	15.00	67.93	**81.51**	0.300		375	0.87	49.24	0.94	**96.03**	0.15	281.43	281.28	282.40	283.89		2.23
161	STMH#45	STMH#46	0.05	0.83	0.042	1.843	17.23	61.73	**316.31**	0.550		525	1.47	78.71	0.89	**318.94**	0.43	281.13	280.70	283.89	283.12	2.23	1.90
162	STMH#46	STMH#52	0.43	0.55	0.237																		
163			0.13	0.70	0.091	2.171	18.12	59.62	**359.79**	0.700		525	1.66	75.68	0.76	**359.82**	0.53	280.66	280.13	283.12	282.36	1.93	1.70
	STMH#35	STMH#38								2.820		300		45.63			1.29	283.36	282.07	285.21	283.92	1.55	1.55
164	STMH#38	STMH#39	0.15	0.70	0.105	0.105	15.00	67.93	**19.83**	1.390		300	1.61	55.52	0.57	**114.01**	0.77	281.17	280.40	283.92	281.90	2.45	1.20
165	STMH#39	STMH#40	0.36	0.70	0.252	0.357	15.57	66.19	**65.69**	0.230		375	0.76	32.10	0.70	**84.09**	0.07	280.32	280.24	281.90	282.32	1.21	1.70
	STMH#40	STMH#48				0.357	16.28	64.21	**63.72**	0.180		450	0.76	67.33	1.48	**120.96**	0.12	280.18	280.06	282.32	282.42	1.69	1.91
166	STMH#48	STMH#47	0.33	0.55	0.182	0.539	17.75	60.48	**90.53**	0.180		450	0.76	50.21	1.10	**120.96**	0.09	280.02	279.93	282.42	282.20	1.95	1.82
167	STMH#47	STMH#52	0.59	0.90	0.531																		
168			0.20	0.70	0.140	1.210	18.85	58.02	**195.08**	0.210		525	0.91	28.26	0.52	**197.08**	0.06	279.86	279.80	282.20	282.36	1.82	2.03
	STMH#52	CBMH#58				3.380	19.37	56.94	**535.09**	0.240		750	1.23	7.44	0.10	**545.39**	0.02	279.69	279.67	282.36	282.31	1.92	1.89
169	CBMH#58	CBMH#59	0.13	0.70	0.091	3.471	19.47	56.74	**547.54**	0.250		750	1.26	45.78	0.61	**556.64**	0.11	279.64	279.53	282.31	281.92	1.92	1.64
170	CBMH#59	STMH#54	0.44	0.55	0.242	3.713	20.08	55.56	**573.46**	0.270		750	1.31	39.99	0.51	**578.48**	0.11	279.50	279.39	281.92	284.89	1.67	4.75
171	STMH#54	STMH#33	0.22	0.70	0.154	4.315	20.58	54.60	**655.02**	0.210		825	1.23	30.13	0.41	**657.80**	0.06	279.31	279.25	284.89	284.59	4.75	4.52

CROZIER CONSULTING ENGINEERS

PROJECT: Midhurst Heights Development
PROJECT No.: 845-3675
FILE: Storm Sewer Design

MIDHURST HEIGHTS DEVELOPMENT

5 YEAR - STORM SEWER DESIGN MODEL

DESIGN: JK
CHECK: DF
UPDATED: March 1, 2018

FREQUENCY	5 YEARS			100 YEARS			
5 YEARS	Coef. A=	26.1	Coef. B=	-0.690	Coef. A=	45.10	Coef. B=	-0.661

TIME OF CONCENTRATION 15.00 MANNINGS "n" 0.01

CATCHMENT AREA I.D.	FR MH NO	TO MH NO	RUN-OFF AREA (A) (Ha)	RUN-OFF COEFF (C_5)	RUN-OFF A x C	Cummul. A x C	TIME OF CONC. (min.)	I (mm/hr)	Q (l/sec)	SLOPE (%)	DROP ACROSS DS MH	PIPE DIA. (mm)	VEL. (m/sec)	LENGTH (m)	TIME OF FLOW (min)	CAPACITY (l/sec)	PIPE INV ELEV. FALL (m)	PIPE INV ELEV. UPPER END	PIPE INV ELEV. LOWER END	GROUND ELEV. UPPER END	GROUND ELEV. LOWER END	COVER UPPER END	COVER LOWER END
	STMH#33	STMH#34				4.315	20.99	53.87	**646.21**	0.210		825	1.23	18.22	0.25	**657.80**	0.04	279.20	279.16	284.59	284.47	4.57	4.49
172	STMH#34	STMH#28	0.59	0.70	0.413	4.728	21.24	53.44	**702.37**	0.240		825	1.32	71.09	0.90	**703.22**	0.17	279.11	278.94	284.47	284.02	4.54	4.26
	STMH#35	STMH#36								0.920		300		33.03			0.30	283.36	283.06	285.21	284.95	1.55	1.59
	STMH#36	STMH#37								1.020		300		20.69			0.21	283.00	282.79	284.95	284.83	1.65	1.74
173	STMH#37	STMH#60	0.19	0.70	0.133	0.133	15.00	67.93	**25.12**	0.860		300	1.27	53.22	0.70	**89.68**	0.46	282.74	282.28	284.83	284.34	1.79	1.76
174	STMH#60	STMH#28	0.18	0.70	0.126																		
175			0.40	0.55	0.220	0.479	15.70	65.83	**87.66**	0.860		375	1.47	37.62	0.43	**162.59**	0.32	282.13	281.81	284.34	284.02	1.83	1.84
176	STMH#28	HWL#1	0.12	0.70	0.084	9.454	22.14	51.93	**1364.76**	0.570		900	2.15	33.79	0.26	**1366.75**	0.19			284.02			

APPENDIX E

Forebay Design Sheets

Water Quality Requirements

Stage-Storage Calculations

Orifice Plate Calculations

Project # 845-3675
Project Name: Midhurst Heights
Prepared by: BP
Date: 02/22/18

SWMF FOREBAY DESIGN CALCULATIONS (West Inlet)

	Variable	*Value*
Forebay Settling length	Length of forebay (m)	50.0
	Width of forebay (m)	25.0
	Length-to-width ratio of forebay	2.0
	Peak flow rate from forebay in quality event (m^3/s)	0.150
	Settling velocity (m/s)	0.0003
	Required Forebay length (m)	**32**
Dispersion Length	Inlet flowrate in 5 year event (m^3/s)	1.35
	Depth of the permanent pool in the forebay (m)	2.2
	Desired velocity in the forebay (m/s)	0.5
	Length of dispersion (m)	**10**
Velocity in forebay check	Depth of Forebay in 10 Year Event (m)**	2.20
	Cross sectional area (m^2)	61.6
	10yr Flowrate (m^3/s)	1.78
	Velocity in forebay (m/s)*	**0.03**
Forebay Bottom Width	Length of forebay (m)	50.0
	Minimum Forebay Bottom Width (m)	**6.25**
DESIGN FOREBAY LENGTH (m)		**50**
DESIGN BOTTOM WIDTH (m)		**11**

* Desired maximum average velocity in the forebay is 0.15m/s, per MOE, 2003, Page 4-56
** Represents depth of forebay, not actual 10-year depth.

Project # 845-3675
Project Name: Midhurst Heights
Prepared by: BP
Date: 02/22/18

SWMF FOREBAY DESIGN CALCULATIONS (East Inlet)

	Variable	*Value*
Forebay Settling length	Length of forebay (m)	70.0
	Width of forebay (m)	25.0
	Length-to-width ratio of forebay	2.8
	Peak flow rate from forebay in quality event (m^3/s)	0.150
	Settling velocity (m/s)	0.0003
	Required Forebay length (m)	**37**
Dispersion Length	Inlet flowrate in 5 year event (m^3/s)	0.65
	Depth of the permanent pool in the forebay (m)	2.2
	Desired velocity in the forebay (m/s)	0.5
	Length of dispersion (m)	**5**
Velocity in forebay check	Depth of Forebay in 10 Year Event (m)**	2.20
	Cross sectional area (m^2)	61.6
	10yr Flowrate (m^3/s)	0.88
	Velocity in forebay (m/s)*	**0.01**
Forebay Bottom Width	Length of forebay (m)	70.0
	Minimum Forebay Bottom Width (m)	**8.75**
DESIGN FOREBAY LENGTH (m)		**70**
DESIGN BOTTOM WIDTH (m)		**11**

* Desired maximum average velocity in the forebay is 0.15m/s, per MOE, 2003, Page 4-56
** Represents depth of forebay, not actual 10-year depth.

Water Quality Requirements

Project #: 845-3675
Project: Midhurst Heights
Date: February 23/2018
By: BP

Water Quality Requirements for SWMF

Areas Contributing	*Area (ha)*	*% Imp*	*25mm RV (mm)*	*25mm RV (m^3)*
Onsite Impervious Areas	9.27	73.5	18.17	168
West External Catchment	7.90	1.8	2.99	24
East External Catchment	11.10	0.6	2.99	33
SWMF	6.58	44.4	9.80	64

MOE Total WQ Volume (m^3/ha)	233
MOE ED Volume (m^3/ha)	40
MOE ED Volume (m^3)	1394
MOE PP Volume (m^3/ha)	193
MOE PP Volume (m^3)	6726
Pond Required ED Volume (m^3)	1394
Pond Required PP Volume (m^3)	6726
Available ED Volume at 0.30m Depth (m^3)	2290
Provided PP Volume (m^3)	10390

CROZIER & ASSOCIATES
Consulting Engineers

Project: 845-3675
Project No.: Midhurst Heights
File: Stage Storage Discharge
Design by: BP
Date: March 5, 2018

SWMF Stage Storage Characteristics

Pond Storage Dimensions

Elev. (m)	Depth Above Bottom (m)	Area (sqm)	Storage Volume* (cu.m)
276.67	**0.00**	***18069***	**0**
276.77	0.10	18425	1825
276.87	0.20	18781	3685
276.97	*0.30*	19138	*5581*
277.07	0.40	19494	7513
277.17	*0.50*	19850	*9480*
277.27	0.60	20206	11483
277.37	0.70	20562	13521
277.47	0.80	20918	15595
277.57	0.90	21275	17705
277.67	1.00	21631	19850
277.77	1.10	21987	22031
277.87	1.20	22343	24247
277.97	1.30	22699	26499
278.07	1.40	23055	28787
278.17	1.50	23412	31110
278.27	1.60	23768	33469
278.37	1.70	24124	35864
278.47	1.80	24480	38294
278.57	1.90	24836	40760
278.67	2.00	25192	43261
278.77	2.10	25549	45799
278.87	2.20	25905	48371
278.97	**2.30**	**26261**	**50980**
279.07	2.40	32764	56485
279.12	2.45	33025	58129
279.22	2.55	33546	61458
279.32	2.65	34067	64839
279.42	2.75	34589	68271
279.52	2.85	35110	71756
279.62	2.95	35631	75293
279.72	3.05	36153	78883
279.82	3.15	36674	82524
279.92	3.25	37195	86217
280.02	3.35	37717	89963
280.12	3.45	38238	93761
280.22	3.55	38759	97610
280.32	3.65	39280	101512
280.42	3.75	39802	105467
280.52	3.85	40323	109473
280.62	3.95	40844	113531
280.67	**4.00**	**41105**	**115580**
280.77	4.10	41615	119716
280.87	4.20	42124	123903
280.97	4.30	42634	128141
281.07	4.40	43143	132430
281.17	**4.50**	**43653**	**136769**

* Table 1 Volumes of for elevations up to 278.97m do not include ED provided volume in pre-treatement area (2287 cu.m)

CROZIER & ASSOCIATES
Consulting Engineers

Project: 845-3675
Project No.: Midhurst Heights
File: Extended Detention
Design by: BP
Date: March 5, 2018

EXTENDED DETENTION SPECIFICATIONS - SWM FACILITY
(Per MOECC)

Extended Detention Volume (Area x runoff from 25mm event)		290
t (drawdown time - seconds, *hours in italics*)	*24.0*	86400
Ao (cross section area of orifice - sqm)		0.0340
(maximum water elevation above orifice for extended detention- m)		0.30
C (discharge coefficient)		0.64
Ap (average surface area for extended detention - sqm)		7625

t = 2*Ap*(h^0.5)/(C*Ao*(g*2)^0.5)

Ao = 0.03410035 sqm d = 208 mm

Extended Detention Orifice Diameter (as designed) d = **208** mm

APPENDIX F

Hydraulic Parameter Sheets

Visual OTTHYMO Model

Project Name:	Midhurst Heights	**D.A. NAME**	**SWMF**
Project Number:	845-3675	**D.A. AREA (ha)**	**6.57**
Date:	1/24/2018		
By:	B. Powers		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment SWMF

Curve Number Calculation

Soil Types Present:

Type	ID	Hydrologic Group	% Area	Area
Vasey Sandy Loam	Vasl	AB	100	6.57
				0
				0
				0
Total Area Check				6.57

Impervious Landuses Present:

	Roadway		Sidewalk		Driveway		Building		SWMF*		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0	98	0	98	0	98	0.695	98	2.225	98	2.92	286.16
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Arec	0		0		0		0.695		2.225			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0		0		0		3.65	59	0		3.65	215.35
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Arec	0		0		0		3.65		0			

Pervious Area Calculations	Total Pervious Area	3.65
	Composite Pervious Curve Number	59
Impervious Area Calculations	Total Directly Connected Area	2.225
	Total Indirectly Connected Area	0.695
	Total Impervious Area	2.92
	% X imp	33.9
	% T imp	44.4
	Total Area Check	6.57

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	3.65	18.25
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	1	209	0.013

CROZIER & ASSOCIATES
Consulting Engineers

Project Name:	Midhurst Heights	**D.A. NAME**	**103E-IMP**
Project Number:	845-3675	**D.A. AREA (ha)**	**2.7**
Date:	1/24/2018		
By:	B. Powers		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 103E-IMP

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey Sandy Loam	Vasl	AB	100	2.7
				0
				0
				0
Total Area Check				2.7

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0.9	98	0.2912	98	0.7626	98		98		98	1.9824	194.2752
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Arec	0.9286		0.2912		0.7626		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0	46	0	51	0	50	0.7176	59	0	68	0.7176	42.3384
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Arec	0		0		0		0.7176		0			

	Pervious Area Calculations	Total Pervious Area	0.7176
		Composite Pervious Curve Number	59
	Impervious Area Calculations	Total Directly Connected Area	1.9824
		Total Indirectly Connected Area	0
		Total Impervious Area	1.9824
		% X imp	73.4
		% T imp	73.4
		Total Area Check	2.7

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.7176	3.588
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	10	0.25
Impervious	2.0	1	134	0.013

CROZIER & ASSOCIATES
Consulting Engineers

Project Name:	Midhurst Heights	**D.A. NAME**	**103W-IMP**
Project Number:	845-3675	**D.A. AREA (ha)**	**6.57**
Date:	1/24/2018		
By:	B. Powers		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 103W-IMP

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey Sandy Loam	Vasl	AB	100	6.57
				0
				0
				0
Total Area Check				6.57

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	1.9	98	0.7097	98	2.26	98		98		98	4.8257	472.9186
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Arec	1.856		0.7097		2.26		0		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0		0		0		1.7443	59	0		1.7443	102.9137
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Arec	0		0		0		1.7443		0			

	Pervious Area Calculations	Total Pervious Area	1.7443
		Composite Pervious Curve Number	59
	Impervious Area Calculations	Total Directly Connected Area	4.8257
		Total Indirectly Connected Area	0
		Total Impervious Area	4.8257
		% X imp	73.5
		% T imp	73.5
		Total Area Check	6.57

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.7443	8.7215
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	10	0.25
Impervious	2.0	1	209	0.013

CROZIER & ASSOCIATES
Consulting Engineers

Project Name:	Midhurst Heights	**D.A. NAME**	**103E-P**
Project Number:	845-3675	**D.A. AREA (ha)**	**3.2**
Date:	1/24/2018		
By:	B. Powers		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 103E-P

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey Sandy Loam	Vasl	AB	100	3.2
				0
				0
				0
Total Area Check				3.2

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0	98	0	98	0	98	1.887	98	0	98	1.887	184.926
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Arec	0		0		0		1.887		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0	46	0	51	0	50	1.313	59	0	68	1.313	77.467
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Arec	0		0		0		1.313		0			

	Pervious Area Calculations	Total Pervious Area	1.313
		Composite Pervious Curve Number	59
	Impervious Area Calculations	Total Directly Connected Area	0
		Total Indirectly Connected Area	1.887
		Total Impervious Area	1.887
		% X imp	0.0
		% T imp	59.0
		Total Area Check	3.2

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.313	6.565
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	30.0	2	20	0.25
Impervious	27.0	0.5	146	0.013

CROZIER & ASSOCIATES
Consulting Engineers

Project Name:	Midhurst Heights	**D.A. NAME**	**103W-P**
Project Number:	845-3675	**D.A. AREA (ha)**	**4.3**
Date:	1/24/2018		
By:	B. Powers		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 103W-P

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey Sandy Loam	Vasl	AB	100	4.32
				0
				0
				0
Total Area Check				4.32

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0	98	0	98	0	98	2.55	98	0	98	2.55	249.9
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Arec	0		0		0		2.55		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0	46	0	51	0	50	1.77	59	0	68	1.77	104.43
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Arec	0		0		0		1.77		0			

	Pervious Area Calculations	Total Pervious Area	1.77
		Composite Pervious Curve Number	59
	Impervious Area Calculations	Total Directly Connected Area	0
		Total Indirectly Connected Area	2.55
		Total Impervious Area	2.55
		% X imp	0.0
		% T imp	59.0
		Total Area Check	4.32

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.77	8.85
Cultivated	7	0	0

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	30.0	2	20	0.25
Impervious	27.0	1	170	0.013

CROZIER & ASSOCIATES
Consulting Engineers

Project Name:	Midhurst Heights	D.A.	103W-EXT
Project Number:	845-3675	D.A.	7.9
Date:	2/16/2018		
By:	B.Powers		

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 103W-EXT

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey Sandy Loam	Vasl	AB	44.0%	3.49
Dundonald Sandy Loam	Dsl	AB	66.0%	5.24
				0
				0
Total Area				8.7

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0	98	0	98	0.4018	98	0.1397	98	0	98	0.542	53.067
Dsl	0	98	0	98	0.2875	98	0.1114	98	0	98	0.399	39.0922
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0		0		0.6893		0.2511		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0.65	46	0.00		0.00		0.30	59	2.0	68	2.95	183.80
Dsl	0.73	46	0.00		0.00		1.45	59	2.66	68	4.84	300.17
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	1.38		0.00		0.00		1.75		4.7			

Composite Area Calculations	Total Pervious Area	7.8
	Total Impervious Area	0.1
	% Impervious	1.8%
	Composite Curve Number	72.6
	Total Area Check	7.9

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey Sandy Loam		Dundonald Sandy		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	1.38	13.7569	0.25	0.65	0.25	0.73		0		0	0.34392175
Meadow	8	0	0		0.00		0.00		0		0	0
Wetland	16	0	0		0.00		0.00		0		0	0
Lawn	5	1.7477	8.7383	0.10	0.30	0.10	1.45		0		0	0.174766
Cultivated	7	5	32.6918	0.35	2.01	0.35	2.66		0		0	1.63458855
Impervious	2	0.9404	1.8808	0.95	0.54	0.95	0.40		0		0	0.89338
Composite IA		8.734	6.53398	Composite Runoff Coefficient								0.383709861

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Cultivated	340	4	1.18%	2.7	0.29	0.32	0.22	0.22	0.25	0.17	0.68	0.46

Appropriate calculated time to peak:	0.46	Appropriate Method:	Airport

CROZIER & ASSOCIATES
Consulting Engineers

Project Name:	Midhurst Heights	D.A.	103E-EXT
Project Number:	845-3675	D.A.	11.1
Date:	2/16/2018		
By:	B.Powers		

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 103E-EXT

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey Sandy Loam	Vasl	AB	8.0%	0.89
Dundonald Sandy Loam	Dsl	AB	92.0%	10.19
				0
				0
Total Area				11.1

Impervious Landuses Present:												
	Roadway		Sidewalk		Driveway		Building		SWMF		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0	98	0	98	0	98	0	98	0	98	0	0
Dsl	0	98	0	98	0.025	98	0.045	98	0	98	0.07	6.86
0		98		98		98		98		98	0	0
0		98		98		98		98		98	0	0
Subtotal Area	0		0		0.025		0.045		0			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
Vasl	0.00	46	0.00		0.00		0.09	59	0.8	68	0.90	60.08
Dsl	0.91	46	0.00		0.00		0.00	59	9.21	68	10.12	668.36
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.91		0.00		0.00		0.09		10.0			

Composite Area Calculations	Total Pervious Area	11.0
	Total Impervious Area	0.1
	% Impervious	0.6%
	Composite Curve Number	66.4
	Total Area Check	11.1

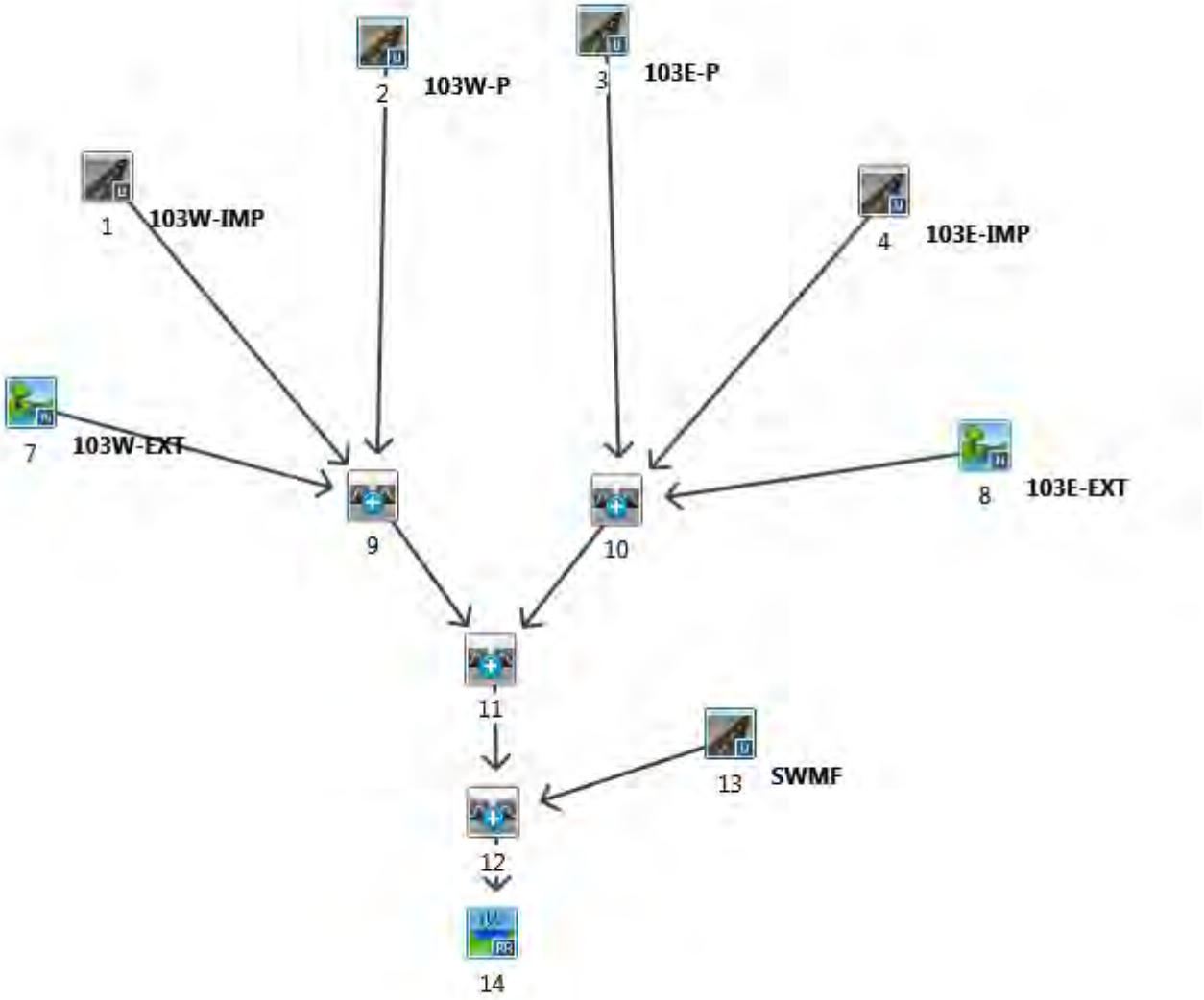
Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey Sandy Loam		Dundonald Sandy		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.91	9.11124	0.25	0	0.25	1		0		0	0.227781
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0.0886	0.4432	0.10	0	0.10	0		0		0	0.008864
Cultivated	7	10	70.1337	0.35	1	0.35	9		0		0	3.506685
Impervious	2	0.07	0.14	0.95	0	0.95	0		0		0	0.0665
Composite IA		11.089	7.19895	Composite Runoff Coefficient								0.343847473

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
Cultivated	512	2.5	0.49%	2.7	0.19	0.75	0.51	0.51	0.44	0.30	1.18	0.79

Appropriate calculated time to peak:	0.79	Appropriate Method:	Airport

Midhurst Heights Development (CFCA# 845-3675)
OTTHYMO Model Schematic



Normal Operating Model Output (Chicago)

```
V    V   I    SSSSS  U   U    A    L
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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\d947d6a6-17ae-4fbd-aa08-611e7485c5b0\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\d947d6a6-17ae-4fbd-aa08-611e7485c5b0\scen

DATE: 03/29/2018 TIME: 03:37:00

USER:

COMMENTS: Chicago 2 year

****
** Run 01 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\5cf8a784-b299-441e-9da3-8b3a9f40f925\c9b502ef
Ptotal= 29.17 mm	Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	1.72	1.08	7.70	2.08	4.86	3.08	2.30
0.17	1.83	1.17	11.94	2.17	4.42	3.17	2.21
0.25	1.95	1.25	28.32	2.25	4.05	3.25	2.13
0.33	2.09	1.33	95.76	2.33	3.75	3.33	2.05
0.42	2.25	1.42	36.80	2.42	3.49	3.42	1.98
0.50	2.45	1.50	19.89	2.50	3.27	3.50	1.92
0.58	2.69	1.58	13.58	2.58	3.08	3.58	1.86
0.67	2.99	1.67	10.33	2.67	2.91	3.67	1.80

Normal Operating Model Output (Chicago)

0.75	3.38	1.75	8.37	2.75	2.76	3.75	1.75
0.83	3.90	1.83	7.06	2.83	2.63	3.83	1.70
0.92	4.63	1.92	6.11	2.92	2.51	3.92	1.65
1.00	5.75	2.00	5.41	3.00	2.40	4.00	1.61

CALIB NASHYD (0007) ID= 1 DT= 1.0 min					
	Area (ha)=	7.90	Curve Number (CN)=	72.6	
	Ia (mm)=	6.50	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.46			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	1.72	1.017	7.70	2.017	4.86	3.02	2.30
0.033	1.72	1.033	7.70	2.033	4.86	3.03	2.30
0.050	1.72	1.050	7.70	2.050	4.86	3.05	2.30
0.067	1.72	1.067	7.70	2.067	4.86	3.07	2.30
0.083	1.72	1.083	7.70	2.083	4.86	3.08	2.30
0.100	1.83	1.100	11.94	2.100	4.42	3.10	2.21
0.117	1.83	1.117	11.94	2.117	4.42	3.12	2.21
0.133	1.83	1.133	11.94	2.133	4.42	3.13	2.21
0.150	1.83	1.150	11.94	2.150	4.42	3.15	2.21
0.167	1.83	1.167	11.94	2.167	4.42	3.17	2.21
0.183	1.95	1.183	28.32	2.183	4.05	3.18	2.13
0.200	1.95	1.200	28.32	2.200	4.05	3.20	2.13
0.217	1.95	1.217	28.32	2.217	4.05	3.22	2.13
0.233	1.95	1.233	28.32	2.233	4.05	3.23	2.13
0.250	1.95	1.250	28.32	2.250	4.05	3.25	2.13
0.267	2.09	1.267	95.76	2.267	3.75	3.27	2.05
0.283	2.09	1.283	95.76	2.283	3.75	3.28	2.05
0.300	2.09	1.300	95.76	2.300	3.75	3.30	2.05
0.317	2.09	1.317	95.76	2.317	3.75	3.32	2.05
0.333	2.09	1.333	95.76	2.333	3.75	3.33	2.05
0.350	2.25	1.350	36.80	2.350	3.49	3.35	1.98
0.367	2.25	1.367	36.80	2.367	3.49	3.37	1.98
0.383	2.25	1.383	36.80	2.383	3.49	3.38	1.98
0.400	2.25	1.400	36.80	2.400	3.49	3.40	1.98
0.417	2.25	1.417	36.80	2.417	3.49	3.42	1.98
0.433	2.45	1.433	19.89	2.433	3.27	3.43	1.92
0.450	2.45	1.450	19.89	2.450	3.27	3.45	1.92
0.467	2.45	1.467	19.89	2.467	3.27	3.47	1.92
0.483	2.45	1.483	19.89	2.483	3.27	3.48	1.92
0.500	2.45	1.500	19.89	2.500	3.27	3.50	1.92
0.517	2.69	1.517	13.58	2.517	3.08	3.52	1.86
0.533	2.69	1.533	13.58	2.533	3.08	3.53	1.86
0.550	2.69	1.550	13.58	2.550	3.08	3.55	1.86
0.567	2.69	1.567	13.58	2.567	3.08	3.57	1.86
0.583	2.69	1.583	13.58	2.583	3.08	3.58	1.86
0.600	2.99	1.600	10.33	2.600	2.91	3.60	1.80
0.617	2.99	1.617	10.33	2.617	2.91	3.62	1.80
0.633	2.99	1.633	10.33	2.633	2.91	3.63	1.80
0.650	2.99	1.650	10.33	2.650	2.91	3.65	1.80
0.667	2.99	1.667	10.33	2.667	2.91	3.67	1.80
0.683	3.38	1.683	8.37	2.683	2.76	3.68	1.75
0.700	3.38	1.700	8.37	2.700	2.76	3.70	1.75
0.717	3.38	1.717	8.37	2.717	2.76	3.72	1.75
0.733	3.38	1.733	8.37	2.733	2.76	3.73	1.75

0.750	3.38	1.750	8.37	2.750	2.76	3.75	1.75
0.767	3.90	1.767	7.06	2.767	2.63	3.77	1.70
0.783	3.90	1.783	7.06	2.783	2.63	3.78	1.70
0.800	3.90	1.800	7.06	2.800	2.63	3.80	1.70
0.817	3.90	1.817	7.06	2.817	2.63	3.82	1.70
0.833	3.90	1.833	7.06	2.833	2.63	3.83	1.70
0.850	4.63	1.850	6.11	2.850	2.51	3.85	1.65
0.867	4.63	1.867	6.11	2.867	2.51	3.87	1.65
0.883	4.63	1.883	6.11	2.883	2.51	3.88	1.65
0.900	4.63	1.900	6.11	2.900	2.51	3.90	1.65
0.917	4.63	1.917	6.11	2.917	2.51	3.92	1.65
0.933	5.75	1.933	5.41	2.933	2.40	3.93	1.61
0.950	5.75	1.950	5.41	2.950	2.40	3.95	1.61
0.967	5.75	1.967	5.41	2.967	2.40	3.97	1.61
0.983	5.75	1.983	5.41	2.983	2.40	3.98	1.61
1.000	5.75	2.000	5.41	3.000	2.40	4.00	1.61

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.056 (i)
TIME TO PEAK (hrs)= 2.017
RUNOFF VOLUME (mm)= 4.334
TOTAL RAINFALL (mm)= 29.165
RUNOFF COEFFICIENT = 0.149

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

CALIB STANDHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32 Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		2.32	8.42	
over (min)		16.00	29.00	
Storage Coeff.	(min)=	15.82 (ii)	28.35 (ii)	
Unit Hyd. Tpeak	(min)=	16.00	29.00	
Unit Hyd. peak	(cms)=	0.18	0.04	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.02	0.019 (iii)
TIME TO PEAK	(hrs)=	3.18	2.13	2.13
RUNOFF VOLUME	(mm)=	2.17	3.19	3.18
TOTAL RAINFALL	(mm)=	29.17	29.17	29.17
RUNOFF COEFFICIENT	=	0.07	0.11	0.11

***** 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.

Normal Operating Model Output (Chicago)

CALIB					
STANDHYD (0001)	Area (ha)=	6.57			
ID= 1 DT= 1.0 min	Total Imp(%)=	73.50	Dir. Conn.(%)=	73.50	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		95.76	5.23	
over (min)		5.00	7.00	
Storage Coeff. (min)=		4.05 (ii)	6.13 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.26	0.18	
				TOTALS
PEAK FLOW	(cms)=	0.89	0.02	0.902 (iii)
TIME TO PEAK	(hrs)=	1.37	1.45	1.38
RUNOFF VOLUME	(mm)=	27.16	2.91	20.74
TOTAL RAINFALL	(mm)=	29.17	29.17	29.17
RUNOFF COEFFICIENT	=	0.93	0.10	0.71

(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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	6.57	0.902	1.38	20.74
	+ ID2= 2 (0002):	4.32	0.019	2.13	3.18
	ID = 3 (0009):	10.89	0.902	1.38	13.77

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0009):	10.89	0.902	1.38	13.77
	+ ID2= 2 (0007):	7.90	0.056	2.02	4.33
	ID = 1 (0009):	18.79	0.906	1.38	9.81

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0008)	Area (ha)=	11.10	Curve Number (CN)=	66.4	
ID= 1 DT= 1.0 min	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.79			

Normal Operating Model Output (Chicago)

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.041 (i)
TIME TO PEAK (hrs)= 2.533
RUNOFF VOLUME (mm)= 3.206
TOTAL RAINFALL (mm)= 29.165
RUNOFF COEFFICIENT = 0.110

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

| CALIB STANDHYD (0003) | Area (ha)= 3.20
|ID= 1 DT= 1.0 min | Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.89	1.31	
Dep. Storage (mm)=	27.00	30.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	146.06	20.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	2.32	8.42	
over (min)	14.00	27.00	
Storage Coeff. (min)=	14.44 (ii)	26.97 (ii)	
Unit Hyd. Tpeak (min)=	14.00	27.00	
Unit Hyd. peak (cms)=	0.20	0.04	
			TOTALS
PEAK FLOW (cms)=	0.00	0.01	0.014 (iii)
TIME TO PEAK (hrs)=	3.15	2.08	2.08
RUNOFF VOLUME (mm)=	2.17	3.19	3.18
TOTAL RAINFALL (mm)=	29.17	29.17	29.17
RUNOFF COEFFICIENT =	0.07	0.11	0.11

***** 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 (0004) | Area (ha)= 2.70
|ID= 1 DT= 1.0 min | Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

	IMPERVIOUS	PERVIOUS (i)	
Surface Area (ha)=	1.98	0.72	
Dep. Storage (mm)=	2.00	5.00	
Average Slope (%)=	1.00	2.00	
Length (m)=	134.16	20.00	
Mannings n =	0.013	0.250	
Max.Eff.Inten.(mm/hr)=	95.76	5.23	
over (min)	5.00	7.00	
Storage Coeff. (min)=	3.10 (ii)	6.25 (ii)	
Unit Hyd. Tpeak (min)=	5.00	7.00	
Unit Hyd. peak (cms)=	0.30	0.17	
			TOTALS

Normal Operating Model Output (Chicago)

PEAK FLOW	(cms)=	0.40	0.01	0.402 (iii)
TIME TO PEAK	(hrs)=	1.37	1.45	1.37
RUNOFF VOLUME	(mm)=	27.17	2.91	20.74
TOTAL RAINFALL	(mm)=	29.17	29.17	29.17
RUNOFF COEFFICIENT	=	0.93	0.10	0.71

(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 (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.014	2.08	3.18
+ ID2= 2 (0004):	2.70	0.402	1.37	20.74
ID = 3 (0010):	5.90	0.402	1.37	11.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	0.402	1.37	11.22
+ ID2= 2 (0008):	11.10	0.041	2.53	3.21
ID = 1 (0010):	17.00	0.403	1.37	5.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	0.403	1.37	5.99
+ ID2= 2 (0009):	18.79	0.906	1.38	9.81
ID = 3 (0011):	35.79	1.306	1.37	7.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0013)
ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.92	3.66
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	209.44	30.00

Normal Operating Model Output (Chicago)

Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		95.76	8.05	
over (min)		5.00	12.00	
Storage Coeff. (min)=		4.05 (ii)	11.42 (ii)	
Unit Hyd. Tpeak (min)=		5.00	12.00	
Unit Hyd. peak (cms)=		0.26	0.10	
				TOTALS
PEAK FLOW (cms)=		0.41	0.05	0.425 (iii)
TIME TO PEAK (hrs)=		1.37	1.57	1.38
RUNOFF VOLUME (mm)=		27.17	3.60	11.56
TOTAL RAINFALL (mm)=		29.17	29.17	29.17
RUNOFF COEFFICIENT	=	0.93	0.12	0.40

(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 (0012)		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		35.79	1.306	1.37	7.99
+ ID2= 2 (0013):		6.58	0.425	1.38	11.56
ID = 3 (0012):		42.37	1.729	1.37	8.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)		OUTFLOW	STORAGE		OUTFLOW	STORAGE
IN= 2---> OUT= 1		(cms)	(ha.m.)		(cms)	(ha.m.)
DT= 1.0 min		0.0000	0.0000		0.0001	5.0000

		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0012)		42.370	1.729	1.37	8.55
OUTFLOW: ID= 1 (0014)		42.370	0.000	8.62	0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=435.00
MAXIMUM STORAGE USED (ha.m.)= 0.3621

```
V    V   I    SSSSS  U   U    A    L
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
```

Normal Operating Model Output (Chicago)

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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\06de3219-9bfd-43f8-af26-f83daa01611d\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\06de3219-9bfd-43f8-af26-f83daa01611d\scen

DATE: 03/29/2018 TIME: 03:36:59

USER:

COMMENTS: Chicago 5 year

****
** Run 02 **
****

| READ STORM | Filename: C:\Users\bpowers\AppData\Local\Temp\5cf8a784-b299-441e-9da3-8b3a9f40f925\14e70428
| Ptotal= 41.27 mm | Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	2.85	1.08	11.23	2.08	7.39	3.08	3.73
0.17	3.01	1.17	16.72	2.17	6.78	3.17	3.59
0.25	3.20	1.25	37.22	2.25	6.27	3.25	3.47
0.33	3.41	1.33	125.51	2.33	5.84	3.33	3.36
0.42	3.66	1.42	47.75	2.42	5.47	3.42	3.25
0.50	3.95	1.50	26.72	2.50	5.15	3.50	3.15
0.58	4.31	1.58	18.81	2.58	4.88	3.58	3.06
0.67	4.75	1.67	14.67	2.67	4.63	3.67	2.97
0.75	5.31	1.75	12.12	2.75	4.41	3.75	2.89
0.83	6.05	1.83	10.38	2.83	4.21	3.83	2.82
0.92	7.08	1.92	9.11	2.92	4.04	3.92	2.75
1.00	8.62	2.00	8.15	3.00	3.88	4.00	2.68

| CALIB NASHYD (0007) | Area (ha)= 7.90 | Curve Number (CN)= 72.6
|ID= 1 DT= 1.0 min | Ia (mm)= 6.50 | # of Linear Res.(N)= 3.00

Normal Operating Model Output (Chicago)

---------- U.H. Tp(hrs)= 0.46

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.85	1.017	11.23	2.017	7.39	3.02	3.73
0.033	2.85	1.033	11.23	2.033	7.39	3.03	3.73
0.050	2.85	1.050	11.23	2.050	7.39	3.05	3.73
0.067	2.85	1.067	11.23	2.067	7.39	3.07	3.73
0.083	2.85	1.083	11.23	2.083	7.39	3.08	3.73
0.100	3.01	1.100	16.72	2.100	6.78	3.10	3.59
0.117	3.01	1.117	16.72	2.117	6.78	3.12	3.59
0.133	3.01	1.133	16.72	2.133	6.78	3.13	3.59
0.150	3.01	1.150	16.72	2.150	6.78	3.15	3.59
0.167	3.01	1.167	16.72	2.167	6.78	3.17	3.59
0.183	3.20	1.183	37.21	2.183	6.27	3.18	3.47
0.200	3.20	1.200	37.22	2.200	6.27	3.20	3.47
0.217	3.20	1.217	37.22	2.217	6.27	3.22	3.47
0.233	3.20	1.233	37.22	2.233	6.27	3.23	3.47
0.250	3.20	1.250	37.22	2.250	6.27	3.25	3.47
0.267	3.41	1.267	125.51	2.267	5.84	3.27	3.36
0.283	3.41	1.283	125.51	2.283	5.84	3.28	3.36
0.300	3.41	1.300	125.51	2.300	5.84	3.30	3.36
0.317	3.41	1.317	125.51	2.317	5.84	3.32	3.36
0.333	3.41	1.333	125.51	2.333	5.84	3.33	3.36
0.350	3.66	1.350	47.76	2.350	5.47	3.35	3.25
0.367	3.66	1.367	47.75	2.367	5.47	3.37	3.25
0.383	3.66	1.383	47.75	2.383	5.47	3.38	3.25
0.400	3.66	1.400	47.75	2.400	5.47	3.40	3.25
0.417	3.66	1.417	47.75	2.417	5.47	3.42	3.25
0.433	3.95	1.433	26.72	2.433	5.15	3.43	3.15
0.450	3.95	1.450	26.72	2.450	5.15	3.45	3.15
0.467	3.95	1.467	26.72	2.467	5.15	3.47	3.15
0.483	3.95	1.483	26.72	2.483	5.15	3.48	3.15
0.500	3.95	1.500	26.72	2.500	5.15	3.50	3.15
0.517	4.31	1.517	18.81	2.517	4.88	3.52	3.06
0.533	4.31	1.533	18.81	2.533	4.88	3.53	3.06
0.550	4.31	1.550	18.81	2.550	4.88	3.55	3.06
0.567	4.31	1.567	18.81	2.567	4.88	3.57	3.06
0.583	4.31	1.583	18.81	2.583	4.88	3.58	3.06
0.600	4.75	1.600	14.67	2.600	4.63	3.60	2.97
0.617	4.75	1.617	14.67	2.617	4.63	3.62	2.97
0.633	4.75	1.633	14.67	2.633	4.63	3.63	2.97
0.650	4.75	1.650	14.67	2.650	4.63	3.65	2.97
0.667	4.75	1.667	14.67	2.667	4.63	3.67	2.97
0.683	5.31	1.683	12.12	2.683	4.41	3.68	2.89
0.700	5.31	1.700	12.12	2.700	4.41	3.70	2.89
0.717	5.31	1.717	12.12	2.717	4.41	3.72	2.89
0.733	5.31	1.733	12.12	2.733	4.41	3.73	2.89
0.750	5.31	1.750	12.12	2.750	4.41	3.75	2.89
0.767	6.05	1.767	10.38	2.767	4.21	3.77	2.82
0.783	6.05	1.783	10.38	2.783	4.21	3.78	2.82
0.800	6.05	1.800	10.38	2.800	4.21	3.80	2.82
0.817	6.05	1.817	10.38	2.817	4.21	3.82	2.82
0.833	6.05	1.833	10.38	2.833	4.21	3.83	2.82
0.850	7.08	1.850	9.11	2.850	4.04	3.85	2.75
0.867	7.08	1.867	9.11	2.867	4.04	3.87	2.75
0.883	7.08	1.883	9.11	2.883	4.04	3.88	2.75
0.900	7.08	1.900	9.11	2.900	4.04	3.90	2.75
0.917	7.08	1.917	9.11	2.917	4.04	3.92	2.75

Normal Operating Model Output (Chicago)

0.933	8.62	1.933	8.15	2.933	3.88	3.93	2.68
0.950	8.62	1.950	8.15	2.950	3.88	3.95	2.68
0.967	8.62	1.967	8.15	2.967	3.88	3.97	2.68
0.983	8.62	1.983	8.15	2.983	3.88	3.98	2.68
1.000	8.62	2.000	8.15	3.000	3.88	4.00	2.68

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.118 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 9.255
TOTAL RAINFALL (mm)= 41.271
RUNOFF COEFFICIENT = 0.224

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

CALIB STANDHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32 Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	16.74	28.78	
over	(min)	7.00	15.00	
Storage Coeff.	(min)=	7.17 (ii)	14.84 (ii)	
Unit Hyd. Tpeak	(min)=	7.00	15.00	
Unit Hyd. peak	(cms)=	0.21	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.07	0.071 (iii)
TIME TO PEAK	(hrs)=	1.75	1.70	1.70
RUNOFF VOLUME	(mm)=	14.27	8.28	8.28
TOTAL RAINFALL	(mm)=	41.27	41.27	41.27
RUNOFF COEFFICIENT	=	0.35	0.20	0.20

***** 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= 1.0 min	Area (ha)= 6.57 Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.83	1.74
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	209.28	10.00
Mannings n	=	0.013	0.250

Normal Operating Model Output (Chicago)

			TOTALS
Max.Eff.Inten.(mm/hr)=	125.51	10.84	
over (min)	5.00	6.00	
Storage Coeff. (min)=	3.63 (ii)	5.50 (ii)	
Unit Hyd. Tpeak (min)=	5.00	6.00	
Unit Hyd. peak (cms)=	0.28	0.20	
PEAK FLOW (cms)=	1.21	0.04	1.242 (iii)
TIME TO PEAK (hrs)=	1.37	1.42	1.37
RUNOFF VOLUME (mm)=	39.27	6.18	30.50
TOTAL RAINFALL (mm)=	41.27	41.27	41.27
RUNOFF COEFFICIENT =	0.95	0.15	0.74

(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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	6.57	1.242	1.37	30.50
	+ ID2= 2 (0002):	4.32	0.071	1.70	8.28
	ID = 3 (0009):	10.89	1.250	1.37	21.69

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0009):	10.89	1.250	1.37	21.69
	+ ID2= 2 (0007):	7.90	0.118	2.00	9.25
	ID = 1 (0009):	18.79	1.258	1.37	16.46

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008)				
ID= 1 DT= 1.0 min	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.090 (i)
TIME TO PEAK (hrs)= 2.517
RUNOFF VOLUME (mm)= 7.139
TOTAL RAINFALL (mm)= 41.271
RUNOFF COEFFICIENT = 0.173

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

Normal Operating Model Output (Chicago)

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min	Area (ha)= 3.20	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	17.04	28.78	
over	(min)	7.00	15.00	
Storage Coeff.	(min)=	6.51 (ii)	14.17 (ii)	
Unit Hyd. Tpeak	(min)=	7.00	15.00	
Unit Hyd. peak	(cms)=	0.24	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.05	0.054 (iii)
TIME TO PEAK	(hrs)=	1.72	1.68	1.68
RUNOFF VOLUME	(mm)=	14.27	8.28	8.28
TOTAL RAINFALL	(mm)=	41.27	41.27	41.27
RUNOFF COEFFICIENT	=	0.35	0.20	0.20

***** 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 (0004) ID= 1 DT= 1.0 min	Area (ha)= 2.70	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	125.51	10.84	
over	(min)	5.00	6.00	
Storage Coeff.	(min)=	2.78 (ii)	5.61 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	6.00	
Unit Hyd. peak	(cms)=	0.32	0.20	
				TOTALS
PEAK FLOW	(cms)=	0.54	0.02	0.549 (iii)
TIME TO PEAK	(hrs)=	1.37	1.42	1.37
RUNOFF VOLUME	(mm)=	39.27	6.18	30.50
TOTAL RAINFALL	(mm)=	41.27	41.27	41.27
RUNOFF COEFFICIENT	=	0.95	0.15	0.74

(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 (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):		3.20	0.054	1.68	8.28
+ ID2= 2 (0004):		2.70	0.549	1.37	30.50
ID = 3 (0010):		5.90	0.555	1.37	18.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0010):		5.90	0.555	1.37	18.45
+ ID2= 2 (0008):		11.10	0.090	2.52	7.14
ID = 1 (0010):		17.00	0.557	1.37	11.06

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0010):		17.00	0.557	1.37	11.06
+ ID2= 2 (0009):		18.79	1.258	1.37	16.46
ID = 3 (0011):		35.79	1.816	1.37	13.90

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013)	Area (ha)= 6.58		
ID= 1 DT= 1.0 min	Total Imp(%)= 44.40	Dir. Conn.(%)= 33.80	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		125.51	15.93	
over (min)		5.00	11.00	
Storage Coeff.	(min)=	3.63 (ii)	10.25 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	11.00	
Unit Hyd. peak	(cms)=	0.28	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.56	0.09	0.597 (iii)
TIME TO PEAK	(hrs)=	1.37	1.52	1.38
RUNOFF VOLUME	(mm)=	39.27	7.42	18.18

```
                    Normal Operating Model Output (Chicago)
 TOTAL RAINFALL   (mm)=        41.27          41.27          41.27
 RUNOFF COEFFICIENT   =         0.95           0.18           0.44

   (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  (  0012)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK      R.V.
--------------------          (ha)      (cms)      (hrs)       (mm)
       ID1= 1 (  0011):     35.79      1.816       1.37      13.90
     + ID2= 2 (  0013):      6.58      0.597       1.38      18.18
       ================================================================
       ID = 3 (  0012):     42.37      2.410       1.37      14.56

 NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW       STORAGE    |     OUTFLOW        STORAGE
--------------------         (cms)       (ha.m.)    |     (cms)         (ha.m.)
                             0.0000       0.0000    |       0.0001        5.0000

                                    AREA       QPEAK       TPEAK      R.V.
                                    (ha)       (cms)       (hrs)      (mm)
 INFLOW : ID= 2 (  0012)          42.370       2.410        1.37     14.56
 OUTFLOW: ID= 1 (  0014)          42.370       0.000        8.77      0.00

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                TIME SHIFT OF PEAK FLOW         (min)=444.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.6170

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================================================================================
======================

      V    V   I    SSSSS  U   U    A    L
      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)\VH Suite 4.0\VO2\voin.dat
```

Normal Operating Model Output (Chicago)

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\19161cf5-1436-4123-819d-0a166b790eff\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\19161cf5-1436-4123-819d-0a166b790eff\scen

DATE: 03/29/2018 TIME: 03:37:00

USER:

COMMENTS: Chicago 10 year

****
** Run 03 **
****

READ STORM | Filename: C:\Users\bpowers\AppData\Local\Temp\5cf8a784-b299-441e-9da3-8b3a9f40f925\95b78139
Ptotal= 49.17 mm | Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	3.66	1.08	13.43	2.08	9.05	3.08	4.72
0.17	3.85	1.17	19.54	2.17	8.34	3.17	4.56
0.25	4.08	1.25	42.04	2.25	7.74	3.25	4.41
0.33	4.34	1.33	147.26	2.33	7.24	3.33	4.27
0.42	4.64	1.42	53.64	2.42	6.81	3.42	4.14
0.50	4.99	1.50	30.50	2.50	6.43	3.50	4.02
0.58	5.42	1.58	21.85	2.58	6.10	3.58	3.91
0.67	5.95	1.67	17.28	2.67	5.81	3.67	3.81
0.75	6.61	1.75	14.43	2.75	5.55	3.75	3.71
0.83	7.48	1.83	12.47	2.83	5.31	3.83	3.61
0.92	8.69	1.92	11.03	2.92	5.10	3.92	3.53
1.00	10.47	2.00	9.93	3.00	4.90	4.00	3.44

CALIB NASHYD (0007) | Area (ha)= 7.90 Curve Number (CN)= 72.6
ID= 1 DT= 1.0 min | Ia (mm)= 6.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.46

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	3.66	1.017	13.43	2.017	9.05	3.02	4.72
0.033	3.66	1.033	13.43	2.033	9.05	3.03	4.72
0.050	3.66	1.050	13.43	2.050	9.05	3.05	4.72

Normal Operating Model Output (Chicago)

0.067	3.66	1.067	13.43	2.067	9.05	3.07	4.72
0.083	3.66	1.083	13.43	2.083	9.05	3.08	4.72
0.100	3.85	1.100	19.54	2.100	8.34	3.10	4.56
0.117	3.85	1.117	19.54	2.117	8.34	3.12	4.56
0.133	3.85	1.133	19.54	2.133	8.34	3.13	4.56
0.150	3.85	1.150	19.54	2.150	8.34	3.15	4.56
0.167	3.85	1.167	19.54	2.167	8.34	3.17	4.56
0.183	4.08	1.183	42.04	2.183	7.74	3.18	4.41
0.200	4.08	1.200	42.04	2.200	7.74	3.20	4.41
0.217	4.08	1.217	42.04	2.217	7.74	3.22	4.41
0.233	4.08	1.233	42.04	2.233	7.74	3.23	4.41
0.250	4.08	1.250	42.04	2.250	7.74	3.25	4.41
0.267	4.34	1.267	147.25	2.267	7.24	3.27	4.27
0.283	4.34	1.283	147.26	2.283	7.24	3.28	4.27
0.300	4.34	1.300	147.26	2.300	7.24	3.30	4.27
0.317	4.34	1.317	147.26	2.317	7.24	3.32	4.27
0.333	4.34	1.333	147.26	2.333	7.24	3.33	4.27
0.350	4.64	1.350	53.64	2.350	6.81	3.35	4.14
0.367	4.64	1.367	53.64	2.367	6.81	3.37	4.14
0.383	4.64	1.383	53.64	2.383	6.81	3.38	4.14
0.400	4.64	1.400	53.64	2.400	6.81	3.40	4.14
0.417	4.64	1.417	53.64	2.417	6.81	3.42	4.14
0.433	4.99	1.433	30.50	2.433	6.43	3.43	4.02
0.450	4.99	1.450	30.50	2.450	6.43	3.45	4.02
0.467	4.99	1.467	30.50	2.467	6.43	3.47	4.02
0.483	4.99	1.483	30.50	2.483	6.43	3.48	4.02
0.500	4.99	1.500	30.50	2.500	6.43	3.50	4.02
0.517	5.42	1.517	21.85	2.517	6.10	3.52	3.91
0.533	5.42	1.533	21.85	2.533	6.10	3.53	3.91
0.550	5.42	1.550	21.85	2.550	6.10	3.55	3.91
0.567	5.42	1.567	21.85	2.567	6.10	3.57	3.91
0.583	5.42	1.583	21.85	2.583	6.10	3.58	3.91
0.600	5.95	1.600	17.28	2.600	5.81	3.60	3.81
0.617	5.95	1.617	17.28	2.617	5.81	3.62	3.81
0.633	5.95	1.633	17.28	2.633	5.81	3.63	3.81
0.650	5.95	1.650	17.28	2.650	5.81	3.65	3.81
0.667	5.95	1.667	17.28	2.667	5.81	3.67	3.81
0.683	6.61	1.683	14.43	2.683	5.55	3.68	3.71
0.700	6.61	1.700	14.43	2.700	5.55	3.70	3.71
0.717	6.61	1.717	14.43	2.717	5.55	3.72	3.71
0.733	6.61	1.733	14.43	2.733	5.55	3.73	3.71
0.750	6.61	1.750	14.43	2.750	5.55	3.75	3.71
0.767	7.48	1.767	12.47	2.767	5.31	3.77	3.61
0.783	7.48	1.783	12.47	2.783	5.31	3.78	3.61
0.800	7.48	1.800	12.47	2.800	5.31	3.80	3.61
0.817	7.48	1.817	12.47	2.817	5.31	3.82	3.61
0.833	7.48	1.833	12.47	2.833	5.31	3.83	3.61
0.850	8.69	1.850	11.03	2.850	5.10	3.85	3.53
0.867	8.69	1.867	11.03	2.867	5.10	3.87	3.53
0.883	8.69	1.883	11.03	2.883	5.10	3.88	3.53
0.900	8.69	1.900	11.03	2.900	5.10	3.90	3.53
0.917	8.69	1.917	11.03	2.917	5.10	3.92	3.53
0.933	10.47	1.933	9.93	2.933	4.90	3.93	3.44
0.950	10.47	1.950	9.93	2.950	4.90	3.95	3.44
0.967	10.47	1.967	9.93	2.967	4.90	3.97	3.44
0.983	10.47	1.983	9.93	2.983	4.90	3.98	3.44
1.000	10.47	2.000	9.93	3.000	4.90	4.00	3.44

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.167 (i)
TIME TO PEAK (hrs)= 1.983
RUNOFF VOLUME (mm)= 13.145

Normal Operating Model Output (Chicago)

TOTAL RAINFALL (mm)= 49.175
RUNOFF COEFFICIENT = 0.267

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

CALIB STANDHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32 Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		38.21	46.57	
over (min)		5.00	12.00	
Storage Coeff. (min)=		5.16 (ii)	11.48 (ii)	
Unit Hyd. Tpeak (min)=		5.00	12.00	
Unit Hyd. peak (cms)=		0.25	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.13	0.127 (iii)
TIME TO PEAK	(hrs)=	1.55	1.58	1.58
RUNOFF VOLUME	(mm)=	22.17	12.45	12.45
TOTAL RAINFALL	(mm)=	49.17	49.17	49.17
RUNOFF COEFFICIENT	=	0.45	0.25	0.25

***** 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= 1.0 min	Area (ha)= 6.57 Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		147.26	15.37	
over (min)		5.00	6.00	
Storage Coeff. (min)=		3.41 (ii)	5.16 (ii)	
Unit Hyd. Tpeak (min)=		5.00	6.00	
Unit Hyd. peak (cms)=		0.29	0.21	
				TOTALS
PEAK FLOW	(cms)=	1.44	0.06	1.490 (iii)
TIME TO PEAK	(hrs)=	1.37	1.42	1.37
RUNOFF VOLUME	(mm)=	47.17	8.84	37.02
TOTAL RAINFALL	(mm)=	49.17	49.17	49.17
RUNOFF COEFFICIENT	=	0.96	0.18	0.75

Normal Operating Model Output (Chicago)

(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 (0009)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	6.57	1.490	1.37	37.02
+ ID2= 2 (0002):	4.32	0.127	1.58	12.45
ID = 3 (0009):	10.89	1.517	1.37	27.27

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0009):	10.89	1.517	1.37	27.27
+ ID2= 2 (0007):	7.90	0.167	1.98	13.15
ID = 1 (0009):	18.79	1.531	1.37	21.33

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min				
	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak	(cms)=	0.537
PEAK FLOW	(cms)=	0.129 (i)
TIME TO PEAK	(hrs)=	2.500
RUNOFF VOLUME	(mm)=	10.333
TOTAL RAINFALL	(mm)=	49.175
RUNOFF COEFFICIENT	=	0.210

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min				
	Area (ha)=	3.20		
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.89	1.31
Dep. Storage	(mm)=	27.00	30.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	146.06	20.00
Mannings n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=	39.76	46.57		
over (min)	5.00	11.00		
Storage Coeff. (min)=	4.64 (ii)	10.96 (ii)		
Unit Hyd. Tpeak (min)=	5.00	11.00		
Unit Hyd. peak (cms)=	0.28	0.10		
			TOTALS	
PEAK FLOW (cms)=	0.00	0.10	0.096 (iii)	
TIME TO PEAK (hrs)=	1.55	1.57	1.57	
RUNOFF VOLUME (mm)=	22.17	12.45	12.44	
TOTAL RAINFALL (mm)=	49.17	49.17	49.17	
RUNOFF COEFFICIENT =	0.45	0.25	0.25	

***** 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 (0004)	Area (ha)=	2.70			
ID= 1 DT= 1.0 min	Total Imp(%)=	73.50	Dir. Conn.(%)=	73.50	
		IMPERVIOUS	PERVIOUS (i)		
Surface Area (ha)=		1.98	0.72		
Dep. Storage (mm)=		2.00	5.00		
Average Slope (%)=		1.00	2.00		
Length (m)=		134.16	20.00		
Mannings n =		0.013	0.250		
Max.Eff.Inten.(mm/hr)=		147.26	15.37		
over (min)		5.00	6.00		
Storage Coeff. (min)=		2.61 (ii)	5.26 (ii)		
Unit Hyd. Tpeak (min)=		5.00	6.00		
Unit Hyd. peak (cms)=		0.33	0.21		
				TOTALS	
PEAK FLOW (cms)=		0.64	0.03	0.656 (iii)	
TIME TO PEAK (hrs)=		1.37	1.42	1.37	
RUNOFF VOLUME (mm)=		47.17	8.84	37.02	
TOTAL RAINFALL (mm)=		49.17	49.17	49.17	
RUNOFF COEFFICIENT =		0.96	0.18	0.75	

(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 (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):		3.20	0.096	1.57	12.44
+ ID2= 2 (0004):		2.70	0.656	1.37	37.02
		==========	==========	==========	==========

ID = 3 (0010):	5.90	0.679	1.37	23.69

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1	ID1= 3 (0010):	5.90	0.679	1.37	23.69
	+ ID2= 2 (0008):	11.10	0.129	2.50	10.33
	ID = 1 (0010):	17.00	0.683	1.37	14.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
1 + 2 = 3	ID1= 1 (0010):	17.00	0.683	1.37	14.97
	+ ID2= 2 (0009):	18.79	1.531	1.37	21.33
	ID = 3 (0011):	35.79	2.214	1.37	18.31

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013) ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	*TOTALS*
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		147.26	22.23	
over (min)		5.00	10.00	
Storage Coeff. (min)=		3.41 (ii)	9.62 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.29	0.12	
PEAK FLOW	(cms)=	0.66	0.14	0.730 (iii)
TIME TO PEAK	(hrs)=	1.37	1.48	1.38
RUNOFF VOLUME	(mm)=	47.17	10.47	22.87
TOTAL RAINFALL	(mm)=	49.17	49.17	49.17
RUNOFF COEFFICIENT	=	0.96	0.21	0.47

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

Normal Operating Model Output (Chicago)

```
--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK      R.V.
--------------------          (ha)      (cms)      (hrs)      (mm)
       ID1= 1 (  0011):      35.79      2.214       1.37     18.31
     + ID2= 2 (  0013):       6.58      0.730       1.38     22.87
       ================================================================
       ID = 3 (  0012):      42.37      2.942       1.37     19.02

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW      STORAGE   |    OUTFLOW      STORAGE
--------------------         (cms)      (ha.m.)   |     (cms)      (ha.m.)
                             0.0000       0.0000   |      0.0001      5.0000

                                    AREA      QPEAK      TPEAK      R.V.
                                    (ha)      (cms)      (hrs)      (mm)
  INFLOW : ID= 2 (  0012)         42.370      2.942       1.37     19.02
  OUTFLOW: ID= 1 (  0014)         42.370      0.000       8.87      0.00

                PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                TIME SHIFT OF PEAK FLOW          (min)=450.00
                MAXIMUM  STORAGE   USED       (ha.m.)=  0.8058

--------------------------------------------------------------------------------
================================================================================
========================

      V    V   I    SSSSS  U   U    A    L
      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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\eb39a
e76-c696-4a45-8cdf-e38ee1990512\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\eb39a
e76-c696-4a45-8cdf-e38ee1990512\scen

DATE: 03/29/2018                          TIME: 03:37:00
```

Normal Operating Model Output (Chicago)

USER:

COMMENTS: Chicago 25 year

****
** Run 04 **
****

READ STORM
Ptotal= 58.92 mm

Filename: C:\Users\bpowers\AppData\Local\Temp\5cf8a784-b299-441e-9da3-8b3a9f40f925\449891c1

Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	4.51	1.08	16.25	2.08	11.03	3.08	5.81
0.17	4.75	1.17	23.49	2.17	10.17	3.17	5.61
0.25	5.03	1.25	49.82	2.25	9.46	3.25	5.43
0.33	5.34	1.33	171.39	2.33	8.85	3.33	5.26
0.42	5.71	1.42	63.33	2.42	8.33	3.42	5.11
0.50	6.14	1.50	36.38	2.50	7.88	3.50	4.96
0.58	6.66	1.58	26.22	2.58	7.48	3.58	4.82
0.67	7.29	1.67	20.82	2.67	7.12	3.67	4.70
0.75	8.09	1.75	17.44	2.75	6.81	3.75	4.58
0.83	9.14	1.83	15.11	2.83	6.52	3.83	4.46
0.92	10.59	1.92	13.39	2.92	6.26	3.92	4.36
1.00	12.72	2.00	12.08	3.00	6.03	4.00	4.26

CALIB
NASHYD (0007)
ID= 1 DT= 1.0 min

Area (ha)= 7.90
Ia (mm)= 6.50
U.H. Tp(hrs)= 0.46

Curve Number (CN)= 72.6
# of Linear Res.(N)= 3.00

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	4.51	1.017	16.25	2.017	11.03	3.02	5.81
0.033	4.51	1.033	16.25	2.033	11.03	3.03	5.81
0.050	4.51	1.050	16.25	2.050	11.03	3.05	5.81
0.067	4.51	1.067	16.25	2.067	11.03	3.07	5.81
0.083	4.51	1.083	16.25	2.083	11.03	3.08	5.81
0.100	4.75	1.100	23.49	2.100	10.17	3.10	5.62
0.117	4.75	1.117	23.49	2.117	10.17	3.12	5.61
0.133	4.75	1.133	23.49	2.133	10.17	3.13	5.61
0.150	4.75	1.150	23.49	2.150	10.17	3.15	5.61
0.167	4.75	1.167	23.49	2.167	10.17	3.17	5.61
0.183	5.03	1.183	49.82	2.183	9.46	3.18	5.43
0.200	5.03	1.200	49.82	2.200	9.46	3.20	5.43
0.217	5.03	1.217	49.82	2.217	9.46	3.22	5.43
0.233	5.03	1.233	49.82	2.233	9.46	3.23	5.43

Normal Operating Model Output (Chicago)

0.250	5.03	1.250	49.82	2.250	9.46	3.25	5.43
0.267	5.34	1.267	171.39	2.267	8.85	3.27	5.26
0.283	5.34	1.283	171.39	2.283	8.85	3.28	5.26
0.300	5.34	1.300	171.39	2.300	8.85	3.30	5.26
0.317	5.34	1.317	171.39	2.317	8.85	3.32	5.26
0.333	5.34	1.333	171.39	2.333	8.85	3.33	5.26
0.350	5.71	1.350	63.33	2.350	8.33	3.35	5.11
0.367	5.71	1.367	63.33	2.367	8.33	3.37	5.11
0.383	5.71	1.383	63.33	2.383	8.33	3.38	5.11
0.400	5.71	1.400	63.33	2.400	8.33	3.40	5.11
0.417	5.71	1.417	63.33	2.417	8.33	3.42	5.11
0.433	6.14	1.433	36.38	2.433	7.88	3.43	4.96
0.450	6.14	1.450	36.38	2.450	7.88	3.45	4.96
0.467	6.14	1.467	36.38	2.467	7.88	3.47	4.96
0.483	6.14	1.483	36.38	2.483	7.88	3.48	4.96
0.500	6.14	1.500	36.38	2.500	7.88	3.50	4.96
0.517	6.66	1.517	26.22	2.517	7.48	3.52	4.82
0.533	6.66	1.533	26.22	2.533	7.48	3.53	4.82
0.550	6.66	1.550	26.22	2.550	7.48	3.55	4.82
0.567	6.66	1.567	26.22	2.567	7.48	3.57	4.82
0.583	6.66	1.583	26.22	2.583	7.48	3.58	4.82
0.600	7.29	1.600	20.82	2.600	7.12	3.60	4.70
0.617	7.29	1.617	20.82	2.617	7.12	3.62	4.70
0.633	7.29	1.633	20.82	2.633	7.12	3.63	4.70
0.650	7.29	1.650	20.82	2.650	7.12	3.65	4.70
0.667	7.29	1.667	20.82	2.667	7.12	3.67	4.70
0.683	8.09	1.683	17.44	2.683	6.81	3.68	4.58
0.700	8.09	1.700	17.44	2.700	6.81	3.70	4.58
0.717	8.09	1.717	17.44	2.717	6.81	3.72	4.58
0.733	8.09	1.733	17.44	2.733	6.81	3.73	4.58
0.750	8.09	1.750	17.44	2.750	6.81	3.75	4.58
0.767	9.14	1.767	15.11	2.767	6.52	3.77	4.46
0.783	9.14	1.783	15.11	2.783	6.52	3.78	4.46
0.800	9.14	1.800	15.11	2.800	6.52	3.80	4.46
0.817	9.14	1.817	15.11	2.817	6.52	3.82	4.46
0.833	9.14	1.833	15.11	2.833	6.52	3.83	4.46
0.850	10.59	1.850	13.39	2.850	6.26	3.85	4.36
0.867	10.59	1.867	13.39	2.867	6.26	3.87	4.36
0.883	10.59	1.883	13.39	2.883	6.26	3.88	4.36
0.900	10.59	1.900	13.39	2.900	6.26	3.90	4.36
0.917	10.59	1.917	13.39	2.917	6.26	3.92	4.36
0.933	12.72	1.933	12.08	2.933	6.03	3.93	4.26
0.950	12.72	1.950	12.08	2.950	6.03	3.95	4.26
0.967	12.72	1.967	12.08	2.967	6.03	3.97	4.26
0.983	12.72	1.983	12.08	2.983	6.03	3.98	4.26
1.000	12.72	2.000	12.08	3.000	6.03	4.00	4.26

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.237 (i)
TIME TO PEAK (hrs)= 1.967
RUNOFF VOLUME (mm)= 18.529
TOTAL RAINFALL (mm)= 58.916
RUNOFF COEFFICIENT = 0.314

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

CALIB STANDHYD (0002)	Area (ha)= 4.32		
ID= 1 DT= 1.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)=	0.00

Normal Operating Model Output (Chicago)

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		73.61	73.32	
over (min)		5.00	10.00	
Storage Coeff.	(min)=	3.97 (ii)	9.24 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	10.00	
Unit Hyd. peak	(cms)=	0.28	0.12	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.22	0.220 (iii)
TIME TO PEAK	(hrs)=	1.47	1.53	1.53
RUNOFF VOLUME	(mm)=	31.92	18.26	18.26
TOTAL RAINFALL	(mm)=	58.92	58.92	58.92
RUNOFF COEFFICIENT	=	0.54	0.31	0.31

***** 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)=	6.57		
ID= 1 DT= 1.0 min	Total Imp(%)=		73.50	Dir. Conn.(%)=	73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		171.39	21.86	
over (min)		5.00	5.00	
Storage Coeff.	(min)=	3.21 (ii)	4.85 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	5.00	
Unit Hyd. peak	(cms)=	0.30	0.23	
				TOTALS
PEAK FLOW	(cms)=	1.71	0.09	1.793 (iii)
TIME TO PEAK	(hrs)=	1.37	1.40	1.37
RUNOFF VOLUME	(mm)=	56.92	12.62	45.18
TOTAL RAINFALL	(mm)=	58.92	58.92	58.92
RUNOFF COEFFICIENT	=	0.97	0.21	0.77

(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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		6.57	1.793	1.37	45.18
+ ID2= 2 (0002):		4.32	0.220	1.53	18.26
ID = 3 (0009):		10.89	1.871	1.37	34.50

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0009):		10.89	1.871	1.37	34.50
+ ID2= 2 (0007):		7.90	0.237	1.97	18.53
ID = 1 (0009):		18.79	1.894	1.37	27.78

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min				
	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.186 (i)
TIME TO PEAK (hrs)= 2.483
RUNOFF VOLUME (mm)= 14.838
TOTAL RAINFALL (mm)= 58.916
RUNOFF COEFFICIENT = 0.252

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min				
	Area (ha)=	3.20		
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		73.61	73.32	
over (min)		5.00	9.00	
Storage Coeff. (min)=		3.62 (ii)	8.90 (ii)	
Unit Hyd. Tpeak (min)=		5.00	9.00	
Unit Hyd. peak (cms)=		0.31	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.17	0.167 (iii)
TIME TO PEAK	(hrs)=	1.45	1.52	1.52
RUNOFF VOLUME	(mm)=	31.92	18.26	18.26
TOTAL RAINFALL	(mm)=	58.92	58.92	58.92

```
     RUNOFF COEFFICIENT   =         0.54           0.31           0.31

***** 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 (  0004)|   Area    (ha)=      2.70
|ID= 1 DT= 1.0 min |   Total Imp(%)=     73.50   Dir. Conn.(%)=  73.50
--------------------

                                 IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          1.98            0.72
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        134.16           20.00
     Mannings n           =         0.013           0.250

     Max.Eff.Inten.(mm/hr)=        171.39           21.86
               over (min)            5.00            5.00
     Storage Coeff.  (min)=          2.46 (ii)       4.95 (ii)
     Unit Hyd. Tpeak (min)=          5.00            5.00
     Unit Hyd. peak  (cms)=          0.34            0.23

                                                     *TOTALS*
     PEAK FLOW       (cms)=          0.75            0.04          0.785 (iii)
     TIME TO PEAK    (hrs)=          1.37            1.40           1.37
     RUNOFF VOLUME    (mm)=         56.92           12.62          45.18
     TOTAL RAINFALL   (mm)=         58.92           58.92          58.92
     RUNOFF COEFFICIENT   =          0.97            0.21           0.77


       (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  (  0010)|
|   1 +  2 =  3    |                AREA      QPEAK      TPEAK      R.V.
--------------------                (ha)      (cms)      (hrs)      (mm)
       ID1= 1 (  0003):          3.20       0.167       1.52      18.26
     + ID2= 2 (  0004):          2.70       0.785       1.37      45.18
       ==========================================================
       ID = 3 (  0010):          5.90       0.853       1.37      30.58

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |                AREA      QPEAK      TPEAK      R.V.
--------------------                (ha)      (cms)      (hrs)      (mm)
       ID1= 3 (  0010):          5.90       0.853       1.37      30.58
```

+ ID2= 2 (0008):	11.10	0.186	2.48	14.84
ID = 1 (0010):	17.00	0.858	1.37	20.30

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	0.858	1.37	20.30
+ ID2= 2 (0009):	18.79	1.894	1.37	27.78
ID = 3 (0011):	35.79	2.753	1.37	24.23

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013) ID= 1 DT= 1.0 min	Area (ha)= 6.58	Total Imp(%)= 44.40	Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		171.39	31.15	
over (min)		5.00	10.00	
Storage Coeff. (min)=		3.21 (ii)	9.05 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.30	0.12	
				TOTALS
PEAK FLOW	(cms)=	0.79	0.20	0.889 (iii)
TIME TO PEAK	(hrs)=	1.37	1.48	1.38
RUNOFF VOLUME	(mm)=	56.92	14.75	29.00
TOTAL RAINFALL	(mm)=	58.92	58.92	58.92
RUNOFF COEFFICIENT	=	0.97	0.25	0.49

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

ADD HYD (0012)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	35.79	2.753	1.37	24.23
+ ID2= 2 (0013):	6.58	0.889	1.38	29.00
ID = 3 (0012):	42.37	3.640	1.37	24.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW        STORAGE    |     OUTFLOW         STORAGE
--------------------         (cms)         (ha.m.)    |     (cms)           (ha.m.)
                             0.0000         0.0000    |       0.0001          5.0000

                                    AREA        QPEAK        TPEAK        R.V.
                                    (ha)        (cms)        (hrs)        (mm)
  INFLOW : ID= 2 (  0012)         42.370        3.640         1.37       24.97
  OUTFLOW: ID= 1 (  0014)         42.370        0.000         8.78        0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                  TIME SHIFT OF PEAK FLOW          (min)=445.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  1.0580

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================================================================================
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       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\35ee9
046-a62a-4719-a58f-235a6ca30cd3\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\35ee9
046-a62a-4719-a58f-235a6ca30cd3\scen

DATE: 03/29/2018                          TIME: 03:37:00

USER:

COMMENTS: Chicago 50 year

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  **********************************
  ** Run 05                        **
```

Normal Operating Model Output (Chicago)
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\5cf8a784-b299-441e-9da3-8b3a9f40f925\6a3c80d2
Ptotal= 66.20 mm	Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	5.16	1.08	18.37	2.08	12.50	3.08	6.63
0.17	5.43	1.17	26.45	2.17	11.54	3.17	6.40
0.25	5.74	1.25	55.66	2.25	10.74	3.25	6.20
0.33	6.09	1.33	189.32	2.33	10.06	3.33	6.01
0.42	6.51	1.42	70.60	2.42	9.47	3.42	5.83
0.50	7.00	1.50	40.78	2.50	8.96	3.50	5.66
0.58	7.58	1.58	29.49	2.58	8.51	3.58	5.51
0.67	8.30	1.67	23.47	2.67	8.11	3.67	5.36
0.75	9.20	1.75	19.69	2.75	7.75	3.75	5.23
0.83	10.39	1.83	17.08	2.83	7.43	3.83	5.10
0.92	12.01	1.92	15.16	2.92	7.14	3.92	4.98
1.00	14.41	2.00	13.68	3.00	6.87	4.00	4.86

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.16	1.017	18.37	2.017	12.50	3.02	6.63
0.033	5.16	1.033	18.37	2.033	12.50	3.03	6.63
0.050	5.16	1.050	18.37	2.050	12.50	3.05	6.63
0.067	5.16	1.067	18.37	2.067	12.50	3.07	6.63
0.083	5.16	1.083	18.37	2.083	12.50	3.08	6.63
0.100	5.43	1.100	26.45	2.100	11.54	3.10	6.40
0.117	5.43	1.117	26.45	2.117	11.54	3.12	6.40
0.133	5.43	1.133	26.45	2.133	11.54	3.13	6.40
0.150	5.43	1.150	26.45	2.150	11.54	3.15	6.40
0.167	5.43	1.167	26.45	2.167	11.54	3.17	6.40
0.183	5.74	1.183	55.66	2.183	10.74	3.18	6.20
0.200	5.74	1.200	55.66	2.200	10.74	3.20	6.20
0.217	5.74	1.217	55.66	2.217	10.74	3.22	6.20
0.233	5.74	1.233	55.66	2.233	10.74	3.23	6.20
0.250	5.74	1.250	55.66	2.250	10.74	3.25	6.20
0.267	6.09	1.267	189.31	2.267	10.06	3.27	6.01
0.283	6.09	1.283	189.32	2.283	10.06	3.28	6.01
0.300	6.09	1.300	189.32	2.300	10.06	3.30	6.01
0.317	6.09	1.317	189.32	2.317	10.06	3.32	6.01
0.333	6.09	1.333	189.32	2.333	10.06	3.33	6.01
0.350	6.51	1.350	70.60	2.350	9.47	3.35	5.83
0.367	6.51	1.367	70.60	2.367	9.47	3.37	5.83
0.383	6.51	1.383	70.60	2.383	9.47	3.38	5.83
0.400	6.51	1.400	70.60	2.400	9.47	3.40	5.83
0.417	6.51	1.417	70.60	2.417	9.47	3.42	5.83

Normal Operating Model Output (Chicago)

0.433	7.00	1.433	40.78	2.433	8.96	3.43	5.66
0.450	7.00	1.450	40.78	2.450	8.96	3.45	5.66
0.467	7.00	1.467	40.78	2.467	8.96	3.47	5.66
0.483	7.00	1.483	40.78	2.483	8.96	3.48	5.66
0.500	7.00	1.500	40.78	2.500	8.96	3.50	5.66
0.517	7.58	1.517	29.49	2.517	8.51	3.52	5.51
0.533	7.58	1.533	29.49	2.533	8.51	3.53	5.51
0.550	7.58	1.550	29.49	2.550	8.51	3.55	5.51
0.567	7.58	1.567	29.49	2.567	8.51	3.57	5.51
0.583	7.58	1.583	29.49	2.583	8.51	3.58	5.51
0.600	8.30	1.600	23.47	2.600	8.11	3.60	5.36
0.617	8.30	1.617	23.47	2.617	8.11	3.62	5.36
0.633	8.30	1.633	23.47	2.633	8.11	3.63	5.36
0.650	8.30	1.650	23.47	2.650	8.11	3.65	5.36
0.667	8.30	1.667	23.47	2.667	8.11	3.67	5.36
0.683	9.20	1.683	19.69	2.683	7.75	3.68	5.23
0.700	9.20	1.700	19.69	2.700	7.75	3.70	5.23
0.717	9.20	1.717	19.69	2.717	7.75	3.72	5.23
0.733	9.20	1.733	19.69	2.733	7.75	3.73	5.23
0.750	9.20	1.750	19.69	2.750	7.75	3.75	5.23
0.767	10.39	1.767	17.08	2.767	7.43	3.77	5.10
0.783	10.39	1.783	17.08	2.783	7.43	3.78	5.10
0.800	10.39	1.800	17.08	2.800	7.43	3.80	5.10
0.817	10.39	1.817	17.08	2.817	7.43	3.82	5.10
0.833	10.39	1.833	17.08	2.833	7.43	3.83	5.10
0.850	12.01	1.850	15.16	2.850	7.14	3.85	4.98
0.867	12.01	1.867	15.16	2.867	7.14	3.87	4.98
0.883	12.01	1.883	15.16	2.883	7.14	3.88	4.98
0.900	12.01	1.900	15.16	2.900	7.14	3.90	4.98
0.917	12.01	1.917	15.16	2.917	7.14	3.92	4.98
0.933	14.41	1.933	13.68	2.933	6.87	3.93	4.86
0.950	14.41	1.950	13.68	2.950	6.87	3.95	4.86
0.967	14.41	1.967	13.68	2.967	6.87	3.97	4.86
0.983	14.41	1.983	13.68	2.983	6.87	3.98	4.86
1.000	14.41	2.000	13.68	3.000	6.87	4.00	4.86

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.295 (i)
TIME TO PEAK (hrs)= 1.967
RUNOFF VOLUME (mm)= 22.910
TOTAL RAINFALL (mm)= 66.198
RUNOFF COEFFICIENT = 0.346

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

CALIB STANDHYD (0002)	Area (ha)= 4.32		
ID= 1 DT= 1.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.55	1.77
Dep. Storage	(mm)=	27.00	30.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	169.71	20.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		105.96	96.37
over (min)		5.00	9.00
Storage Coeff. (min)=		3.43 (ii)	8.15 (ii)
Unit Hyd. Tpeak (min)=		5.00	9.00

Normal Operating Model Output (Chicago)

Unit Hyd. peak	(cms)=	0.31	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.31	0.307 (iii)
TIME TO PEAK	(hrs)=	1.40	1.48	1.48
RUNOFF VOLUME	(mm)=	39.20	23.01	23.01
TOTAL RAINFALL	(mm)=	66.20	66.20	66.20
RUNOFF COEFFICIENT	=	0.59	0.35	0.35

***** 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)=	6.57		
ID= 1 DT= 1.0 min	Total Imp(%)=		73.50	Dir. Conn.(%)=	73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	189.32	27.27	
over	(min)	5.00	5.00	
Storage Coeff.	(min)=	3.08 (ii)	4.66 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	5.00	
Unit Hyd. peak	(cms)=	0.30	0.24	
				TOTALS
PEAK FLOW	(cms)=	1.91	0.12	2.020 (iii)
TIME TO PEAK	(hrs)=	1.37	1.40	1.37
RUNOFF VOLUME	(mm)=	64.20	15.76	51.36
TOTAL RAINFALL	(mm)=	66.20	66.20	66.20
RUNOFF COEFFICIENT	=	0.97	0.24	0.78

(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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		6.57	2.020	1.37	51.36
+ ID2= 2 (0002):		4.32	0.307	1.48	23.01
ID = 3 (0009):		10.89	2.159	1.37	40.11

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
3 + 2 = 1	ID1= 3 (0009):	10.89	2.159	1.37	40.11
	+ ID2= 2 (0007):	7.90	0.295	1.97	22.91
	ID = 1 (0009):	18.79	2.199	1.38	32.88

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min				
	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.234 (i)
TIME TO PEAK (hrs)= 2.467
RUNOFF VOLUME (mm)= 18.561
TOTAL RAINFALL (mm)= 66.198
RUNOFF COEFFICIENT = 0.280

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min				
	Area (ha)=	3.20		
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		105.96	96.37	
over (min)		5.00	8.00	
Storage Coeff. (min)=		3.13 (ii)	7.86 (ii)	
Unit Hyd. Tpeak (min)=		5.00	8.00	
Unit Hyd. peak (cms)=		0.32	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.23	0.232 (iii)
TIME TO PEAK	(hrs)=	1.40	1.47	1.47
RUNOFF VOLUME	(mm)=	39.20	23.01	23.01
TOTAL RAINFALL	(mm)=	66.20	66.20	66.20
RUNOFF COEFFICIENT	=	0.59	0.35	0.35

***** 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 (  0004)|   Area    (ha)=      2.70
|ID= 1 DT= 1.0 min |   Total Imp(%)=     73.50   Dir. Conn.(%)=  73.50
--------------------
                                  IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          1.98            0.72
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        134.16           20.00
     Mannings n             =       0.013           0.250

     Max.Eff.Inten.(mm/hr)=        189.32           27.27
               over (min)             5.00            5.00
     Storage Coeff.  (min)=          2.36 (ii)       4.76 (ii)
     Unit Hyd. Tpeak (min)=          5.00            5.00
     Unit Hyd. peak  (cms)=          0.35            0.23
                                                              *TOTALS*
     PEAK FLOW       (cms)=          0.84            0.05      0.881 (iii)
     TIME TO PEAK    (hrs)=          1.37            1.40       1.37
     RUNOFF VOLUME    (mm)=         64.20           15.76      51.36
     TOTAL RAINFALL   (mm)=         66.20           66.20      66.20
     RUNOFF COEFFICIENT   =          0.97            0.24       0.78

       (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  (  0010)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
--------------------           (ha)      (cms)      (hrs)       (mm)
       ID1= 1 (  0003):       3.20      0.232       1.47      23.01
     + ID2= 2 (  0004):       2.70      0.881       1.37      51.36
       ==========================================================
       ID = 3 (  0010):       5.90      1.004       1.37      35.98

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

```
--------------------
| ADD HYD  (  0010)|
|   3 +  2 =  1    |          AREA      QPEAK      TPEAK       R.V.
--------------------           (ha)      (cms)      (hrs)       (mm)
       ID1= 3 (  0010):       5.90      1.004       1.37      35.98
     + ID2= 2 (  0008):      11.10      0.234       2.47      18.56
       ==========================================================
       ID = 1 (  0010):      17.00      1.012       1.37      24.61

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

```
--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
```

Normal Operating Model Output (Chicago)

	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0010):	17.00	1.012	1.37	24.61
+ ID2= 2 (0009):	18.79	2.199	1.38	32.88
ID = 3 (0011):	35.79	3.209	1.38	28.95

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0013)
ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		189.32	38.52	
over (min)		5.00	9.00	
Storage Coeff. (min)=		3.08 (ii)	8.70 (ii)	
Unit Hyd. Tpeak (min)=		5.00	9.00	
Unit Hyd. peak (cms)=		0.30	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.88	0.26	1.030 (iii)
TIME TO PEAK	(hrs)=	1.37	1.47	1.38
RUNOFF VOLUME	(mm)=	64.20	18.28	33.80
TOTAL RAINFALL	(mm)=	66.20	66.20	66.20
RUNOFF COEFFICIENT	=	0.97	0.28	0.51

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

ADD HYD (0012)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	35.79	3.209	1.38	28.95
+ ID2= 2 (0013):	6.58	1.030	1.38	33.80
ID = 3 (0012):	42.37	4.239	1.38	29.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)
IN= 2---> OUT= 1
DT= 1.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0001	5.0000

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

Normal Operating Model Output (Chicago)

INFLOW : ID= 2 (0012)	42.370	4.239	1.38	29.70
OUTFLOW: ID= 1 (0014)	42.370	0.000	8.88	0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=450.00
MAXIMUM STORAGE USED (ha.m.)= 1.2585

```
V    V   I    SSSSS  U   U    A    L
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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\1b2f5fff-c301-4ba0-994f-12ab7babc583\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\1b2f5fff-c301-4ba0-994f-12ab7babc583\scen

DATE: 03/29/2018 TIME: 03:37:00

USER:

COMMENTS: Chicago 100 year

****
** Run 06 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\5cf8a784-b299-441e-9da3-8b3a9f40f925\37ad9543
Ptotal= 73.59 mm	Comments:

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

Normal Operating Model Output (Chicago)

0.08	5.81	1.08	20.51	2.08	14.00	3.08	7.45
0.17	6.11	1.17	29.46	2.17	12.93	3.17	7.20
0.25	6.46	1.25	61.60	2.25	12.04	3.25	6.97
0.33	6.86	1.33	207.54	2.33	11.28	3.33	6.76
0.42	7.32	1.42	78.00	2.42	10.62	3.42	6.56
0.50	7.86	1.50	45.26	2.50	10.05	3.50	6.37
0.58	8.52	1.58	32.81	2.58	9.55	3.58	6.20
0.67	9.32	1.67	26.16	2.67	9.10	3.67	6.04
0.75	10.33	1.75	21.98	2.75	8.71	3.75	5.89
0.83	11.65	1.83	19.09	2.83	8.35	3.83	5.74
0.92	13.45	1.92	16.95	2.92	8.02	3.92	5.61
1.00	16.12	2.00	15.31	3.00	7.72	4.00	5.48

CALIB NASHYD (0007) ID= 1 DT= 1.0 min					
	Area (ha)=	7.90	Curve Number (CN)=	72.6	
	Ia (mm)=	6.50	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.46			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.81	1.017	20.51	2.017	14.00	3.02	7.45
0.033	5.81	1.033	20.51	2.033	14.00	3.03	7.45
0.050	5.81	1.050	20.51	2.050	14.00	3.05	7.45
0.067	5.81	1.067	20.51	2.067	14.00	3.07	7.45
0.083	5.81	1.083	20.51	2.083	14.00	3.08	7.45
0.100	6.11	1.100	29.46	2.100	12.93	3.10	7.20
0.117	6.11	1.117	29.46	2.117	12.93	3.12	7.20
0.133	6.11	1.133	29.46	2.133	12.93	3.13	7.20
0.150	6.11	1.150	29.46	2.150	12.93	3.15	7.20
0.167	6.11	1.167	29.46	2.167	12.93	3.17	7.20
0.183	6.46	1.183	61.59	2.183	12.04	3.18	6.97
0.200	6.46	1.200	61.60	2.200	12.04	3.20	6.97
0.217	6.46	1.217	61.60	2.217	12.04	3.22	6.97
0.233	6.46	1.233	61.60	2.233	12.04	3.23	6.97
0.250	6.46	1.250	61.60	2.250	12.04	3.25	6.97
0.267	6.86	1.267	207.53	2.267	11.28	3.27	6.76
0.283	6.86	1.283	207.54	2.283	11.28	3.28	6.76
0.300	6.86	1.300	207.54	2.300	11.28	3.30	6.76
0.317	6.86	1.317	207.54	2.317	11.28	3.32	6.76
0.333	6.86	1.333	207.54	2.333	11.28	3.33	6.76
0.350	7.32	1.350	78.01	2.350	10.62	3.35	6.56
0.367	7.32	1.367	78.00	2.367	10.62	3.37	6.56
0.383	7.32	1.383	78.00	2.383	10.62	3.38	6.56
0.400	7.32	1.400	78.00	2.400	10.62	3.40	6.56
0.417	7.32	1.417	78.00	2.417	10.62	3.42	6.56
0.433	7.86	1.433	45.26	2.433	10.05	3.43	6.37
0.450	7.86	1.450	45.26	2.450	10.05	3.45	6.37
0.467	7.86	1.467	45.26	2.467	10.05	3.47	6.37
0.483	7.86	1.483	45.26	2.483	10.05	3.48	6.37
0.500	7.86	1.500	45.26	2.500	10.05	3.50	6.37
0.517	8.52	1.517	32.81	2.517	9.55	3.52	6.20
0.533	8.52	1.533	32.81	2.533	9.55	3.53	6.20
0.550	8.52	1.550	32.81	2.550	9.55	3.55	6.20
0.567	8.52	1.567	32.81	2.567	9.55	3.57	6.20
0.583	8.52	1.583	32.81	2.583	9.55	3.58	6.20
0.600	9.32	1.600	26.16	2.600	9.11	3.60	6.04

0.617	9.32	1.617	26.16	2.617	9.10	3.62	6.04
0.633	9.32	1.633	26.16	2.633	9.10	3.63	6.04
0.650	9.32	1.650	26.16	2.650	9.10	3.65	6.04
0.667	9.32	1.667	26.16	2.667	9.10	3.67	6.04
0.683	10.33	1.683	21.98	2.683	8.71	3.68	5.89
0.700	10.33	1.700	21.98	2.700	8.71	3.70	5.89
0.717	10.33	1.717	21.98	2.717	8.71	3.72	5.89
0.733	10.33	1.733	21.98	2.733	8.71	3.73	5.89
0.750	10.33	1.750	21.98	2.750	8.71	3.75	5.89
0.767	11.65	1.767	19.09	2.767	8.35	3.77	5.74
0.783	11.65	1.783	19.09	2.783	8.35	3.78	5.74
0.800	11.65	1.800	19.09	2.800	8.35	3.80	5.74
0.817	11.65	1.817	19.09	2.817	8.35	3.82	5.74
0.833	11.65	1.833	19.09	2.833	8.35	3.83	5.74
0.850	13.45	1.850	16.95	2.850	8.02	3.85	5.61
0.867	13.45	1.867	16.95	2.867	8.02	3.87	5.61
0.883	13.45	1.883	16.95	2.883	8.02	3.88	5.61
0.900	13.45	1.900	16.95	2.900	8.02	3.90	5.61
0.917	13.45	1.917	16.95	2.917	8.02	3.92	5.61
0.933	16.12	1.933	15.31	2.933	7.72	3.93	5.48
0.950	16.12	1.950	15.31	2.950	7.72	3.95	5.48
0.967	16.12	1.967	15.31	2.967	7.72	3.97	5.48
0.983	16.12	1.983	15.31	2.983	7.72	3.98	5.48
1.000	16.12	2.000	15.31	3.000	7.72	4.00	5.48

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.358 (i)
TIME TO PEAK (hrs)= 1.950
RUNOFF VOLUME (mm)= 27.623
TOTAL RAINFALL (mm)= 73.591
RUNOFF COEFFICIENT = 0.375

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

CALIB STANDHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32 Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	136.09	121.18	
over	(min)	5.00	8.00	
Storage Coeff.	(min)=	3.10 (ii)	7.41 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	8.00	
Unit Hyd. peak	(cms)=	0.32	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.41	0.409 (iii)
TIME TO PEAK	(hrs)=	1.40	1.45	1.45
RUNOFF VOLUME	(mm)=	46.59	28.10	28.10
TOTAL RAINFALL	(mm)=	73.59	73.59	73.59
RUNOFF COEFFICIENT	=	0.63	0.38	0.38

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

Normal Operating Model Output (Chicago)

(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= 1.0 min	Area (ha)= 6.57 Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		207.54	33.22	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.97 (ii)	4.50 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.31	0.24	
				TOTALS
PEAK FLOW	(cms)=	2.12	0.14	2.254 (iii)
TIME TO PEAK	(hrs)=	1.37	1.40	1.37
RUNOFF VOLUME	(mm)=	71.59	19.20	57.71
TOTAL RAINFALL	(mm)=	73.59	73.59	73.59
RUNOFF COEFFICIENT	=	0.97	0.26	0.78

(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 (0009) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	6.57	2.254	1.37	57.71
+ ID2= 2 (0002):	4.32	0.409	1.45	28.10
ID = 3 (0009):	10.89	2.491	1.38	45.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009) 3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0009):	10.89	2.491	1.38	45.96
+ ID2= 2 (0007):	7.90	0.358	1.95	27.62
ID = 1 (0009):	18.79	2.545	1.38	38.25

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0008)|   Area    (ha)=     11.10   Curve Number   (CN)= 66.4
|ID= 1 DT= 1.0 min |   Ia      (mm)=      7.20   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=      0.79

     Unit Hyd Qpeak  (cms)=     0.537

     PEAK FLOW       (cms)=     0.286 (i)
     TIME TO PEAK    (hrs)=     2.467
     RUNOFF VOLUME    (mm)=    22.613
     TOTAL RAINFALL   (mm)=    73.591
     RUNOFF COEFFICIENT   =     0.307

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=      3.20
|ID= 1 DT= 1.0 min |   Total Imp(%)=     59.00   Dir. Conn.(%)=   0.00
--------------------

                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          1.89            1.31
     Dep. Storage     (mm)=         27.00           30.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        146.06           20.00
     Mannings n           =         0.013           0.250

     Max.Eff.Inten.(mm/hr)=        136.09          121.18
               over (min)            5.00            8.00
     Storage Coeff.  (min)=          2.83 (ii)       7.15 (ii)
     Unit Hyd. Tpeak (min)=          5.00            8.00
     Unit Hyd. peak  (cms)=          0.33            0.15

                                                     *TOTALS*
     PEAK FLOW       (cms)=          0.00            0.31          0.309 (iii)
     TIME TO PEAK    (hrs)=          1.40            1.45           1.45
     RUNOFF VOLUME    (mm)=         46.59           28.10          28.10
     TOTAL RAINFALL   (mm)=         73.59           73.59          73.59
     RUNOFF COEFFICIENT   =          0.63            0.38           0.38

***** 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 (  0004)|   Area    (ha)=      2.70
|ID= 1 DT= 1.0 min |   Total Imp(%)=     73.50   Dir. Conn.(%)=  73.50
--------------------

                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          1.98            0.72
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        134.16           20.00
```

Normal Operating Model Output (Chicago)

Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)	=	207.54	33.22	
over (min)		5.00	5.00	
Storage Coeff. (min)	=	2.28 (ii)	4.59 (ii)	
Unit Hyd. Tpeak (min)	=	5.00	5.00	
Unit Hyd. peak (cms)	=	0.35	0.24	
				TOTALS
PEAK FLOW (cms)	=	0.93	0.06	0.980 (iii)
TIME TO PEAK (hrs)	=	1.37	1.40	1.37
RUNOFF VOLUME (mm)	=	71.59	19.19	57.71
TOTAL RAINFALL (mm)	=	73.59	73.59	73.59
RUNOFF COEFFICIENT	=	0.97	0.26	0.78

(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 (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):		3.20	0.309	1.45	28.10
+ ID2= 2 (0004):		2.70	0.980	1.37	57.71
ID = 3 (0010):		5.90	1.155	1.37	41.65

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0010):		5.90	1.155	1.37	41.65
+ ID2= 2 (0008):		11.10	0.286	2.47	22.61
ID = 1 (0010):		17.00	1.169	1.38	29.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0010):		17.00	1.169	1.38	29.22
+ ID2= 2 (0009):		18.79	2.545	1.38	38.25
ID = 3 (0011):		35.79	3.714	1.38	33.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB

```
                        Normal Operating Model Output (Chicago)
| STANDHYD (  0013)|   Area    (ha)=      6.58
|ID= 1 DT= 1.0 min |   Total Imp(%)=     44.40   Dir. Conn.(%)=  33.80
--------------------

                                    IMPERVIOUS       PERVIOUS (i)
     Surface Area      (ha)=            2.92             3.66
     Dep. Storage      (mm)=            2.00             5.00
     Average Slope      (%)=            1.00             2.00
     Length             (m)=          209.44            30.00
     Mannings n            =           0.013            0.250

     Max.Eff.Inten.(mm/hr)=          207.54            46.57
               over (min)                5.00             9.00
     Storage Coeff.  (min)=            2.97 (ii)        8.38 (ii)
     Unit Hyd. Tpeak (min)=            5.00             9.00
     Unit Hyd. peak  (cms)=            0.31             0.13
                                                                *TOTALS*
     PEAK FLOW         (cms)=          0.98             0.32      1.164 (iii)
     TIME TO PEAK      (hrs)=          1.37             1.47       1.38
     RUNOFF VOLUME      (mm)=         71.59            22.12      38.84
     TOTAL RAINFALL     (mm)=         73.59            73.59      73.59
     RUNOFF COEFFICIENT    =           0.97             0.30       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  (  0012)|
|   1 +  2 =  3    |                AREA      QPEAK      TPEAK       R.V.
--------------------                (ha)      (cms)      (hrs)       (mm)
       ID1= 1 (  0011):          35.79      3.714       1.38       33.96
     + ID2= 2 (  0013):           6.58      1.164       1.38       38.84
       ==========================================================
       ID = 3 (  0012):          42.37      4.878       1.38       34.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW      STORAGE   |    OUTFLOW       STORAGE
--------------------          (cms)      (ha.m.)   |     (cms)       (ha.m.)
                            0.0000       0.0000   |      0.0001       5.0000

                                    AREA      QPEAK      TPEAK       R.V.
                                    (ha)      (cms)      (hrs)       (mm)
   INFLOW : ID= 2 (  0012)        42.370      4.878       1.38       34.72
   OUTFLOW: ID= 1 (  0014)        42.370      0.000       8.88        0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                  TIME SHIFT OF PEAK FLOW          (min)=450.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  1.4710

--------------------------------------------------------------------------------
================================================================================
======================
```

Normal Operating Model Output (Chicago)

```
V    V   I    SSSSS  U   U    A    L
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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ec53f352-3f9b-4085-a13c-ddc482b25d3a\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ec53f352-3f9b-4085-a13c-ddc482b25d3a\scen

DATE: 03/29/2018 TIME: 03:37:01

USER:

COMMENTS: Timmins Regional Event

****
** Run 07 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\5cf8a784-b299-441e-9da3-8b3a9f40f925\d1773588
Ptotal=193.00 mm	Comments: Timmins Storm Event

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

Normal Operating Model Output (Chicago)

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	15.00	3.017	3.00	6.017	43.00	9.02	13.00
0.033	15.00	3.033	3.00	6.033	43.00	9.03	13.00
0.050	15.00	3.050	3.00	6.050	43.00	9.05	13.00
0.067	15.00	3.067	3.00	6.067	43.00	9.07	13.00
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.100	15.00	3.100	3.00	6.100	43.00	9.10	13.00
0.117	15.00	3.117	3.00	6.117	43.00	9.12	13.00
0.133	15.00	3.133	3.00	6.133	43.00	9.13	13.00
0.150	15.00	3.150	3.00	6.150	43.00	9.15	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.183	15.00	3.183	3.00	6.183	43.00	9.18	13.00
0.200	15.00	3.200	3.00	6.200	43.00	9.20	13.00
0.217	15.00	3.217	3.00	6.217	43.00	9.22	13.00
0.233	15.00	3.233	3.00	6.233	43.00	9.23	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.267	15.00	3.267	3.00	6.267	43.00	9.27	13.00
0.283	15.00	3.283	3.00	6.283	43.00	9.28	13.00
0.300	15.00	3.300	3.00	6.300	43.00	9.30	13.00
0.317	15.00	3.317	3.00	6.317	43.00	9.32	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.350	15.00	3.350	3.00	6.350	43.00	9.35	13.00
0.367	15.00	3.367	3.00	6.367	43.00	9.37	13.00
0.383	15.00	3.383	3.00	6.383	43.00	9.38	13.00
0.400	15.00	3.400	3.00	6.400	43.00	9.40	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.433	15.00	3.433	3.00	6.433	43.00	9.43	13.00
0.450	15.00	3.450	3.00	6.450	43.00	9.45	13.00
0.467	15.00	3.467	3.00	6.467	43.00	9.47	13.00
0.483	15.00	3.483	3.00	6.483	43.00	9.48	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.517	15.00	3.517	3.00	6.517	43.00	9.52	13.00
0.533	15.00	3.533	3.00	6.533	43.00	9.53	13.00
0.550	15.00	3.550	3.00	6.550	43.00	9.55	13.00
0.567	15.00	3.567	3.00	6.567	43.00	9.57	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.600	15.00	3.600	3.00	6.600	43.00	9.60	13.00
0.617	15.00	3.617	3.00	6.617	43.00	9.62	13.00
0.633	15.00	3.633	3.00	6.633	43.00	9.63	13.00
0.650	15.00	3.650	3.00	6.650	43.00	9.65	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.683	15.00	3.683	3.00	6.683	43.00	9.68	13.00
0.700	15.00	3.700	3.00	6.700	43.00	9.70	13.00
0.717	15.00	3.717	3.00	6.717	43.00	9.72	13.00
0.733	15.00	3.733	3.00	6.733	43.00	9.73	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.767	15.00	3.767	3.00	6.767	43.00	9.77	13.00
0.783	15.00	3.783	3.00	6.783	43.00	9.78	13.00
0.800	15.00	3.800	3.00	6.800	43.00	9.80	13.00
0.817	15.00	3.817	3.00	6.817	43.00	9.82	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.850	15.00	3.850	3.00	6.850	43.00	9.85	13.00
0.867	15.00	3.867	3.00	6.867	43.00	9.87	13.00
0.883	15.00	3.883	3.00	6.883	43.00	9.88	13.00
0.900	15.00	3.900	3.00	6.900	43.00	9.90	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
0.933	15.00	3.933	3.00	6.933	43.00	9.93	13.00

Normal Operating Model Output (Chicago)

0.950	15.00	3.950	3.00	6.950	43.00	9.95	13.00
0.967	15.00	3.967	3.00	6.967	43.00	9.97	13.00
0.983	15.00	3.983	3.00	6.983	43.00	9.98	13.00
1.000	15.00	4.000	3.00	7.000	42.95	10.00	13.00
1.017	20.00	4.017	5.00	7.017	20.00	10.02	13.00
1.033	20.00	4.033	5.00	7.033	20.00	10.03	13.00
1.050	20.00	4.050	5.00	7.050	20.00	10.05	13.00
1.067	20.00	4.067	5.00	7.067	20.00	10.07	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.100	20.00	4.100	5.00	7.100	20.00	10.10	13.00
1.117	20.00	4.117	5.00	7.117	20.00	10.12	13.00
1.133	20.00	4.133	5.00	7.133	20.00	10.13	13.00
1.150	20.00	4.150	5.00	7.150	20.00	10.15	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.183	20.00	4.183	5.00	7.183	20.00	10.18	13.00
1.200	20.00	4.200	5.00	7.200	20.00	10.20	13.00
1.217	20.00	4.217	5.00	7.217	20.00	10.22	13.00
1.233	20.00	4.233	5.00	7.233	20.00	10.23	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.267	20.00	4.267	5.00	7.267	20.00	10.27	13.00
1.283	20.00	4.283	5.00	7.283	20.00	10.28	13.00
1.300	20.00	4.300	5.00	7.300	20.00	10.30	13.00
1.317	20.00	4.317	5.00	7.317	20.00	10.32	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.350	20.00	4.350	5.00	7.350	20.00	10.35	13.00
1.367	20.00	4.367	5.00	7.367	20.00	10.37	13.00
1.383	20.00	4.383	5.00	7.383	20.00	10.38	13.00
1.400	20.00	4.400	5.00	7.400	20.00	10.40	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.433	20.00	4.433	5.00	7.433	20.00	10.43	13.00
1.450	20.00	4.450	5.00	7.450	20.00	10.45	13.00
1.467	20.00	4.467	5.00	7.467	20.00	10.47	13.00
1.483	20.00	4.483	5.00	7.483	20.00	10.48	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.517	20.00	4.517	5.00	7.517	20.00	10.52	13.00
1.533	20.00	4.533	5.00	7.533	20.00	10.53	13.00
1.550	20.00	4.550	5.00	7.550	20.00	10.55	13.00
1.567	20.00	4.567	5.00	7.567	20.00	10.57	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.600	20.00	4.600	5.00	7.600	20.00	10.60	13.00
1.617	20.00	4.617	5.00	7.617	20.00	10.62	13.00
1.633	20.00	4.633	5.00	7.633	20.00	10.63	13.00
1.650	20.00	4.650	5.00	7.650	20.00	10.65	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.683	20.00	4.683	5.00	7.683	20.00	10.68	13.00
1.700	20.00	4.700	5.00	7.700	20.00	10.70	13.00
1.717	20.00	4.717	5.00	7.717	20.00	10.72	13.00
1.733	20.00	4.733	5.00	7.733	20.00	10.73	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.767	20.00	4.767	5.00	7.767	20.00	10.77	13.00
1.783	20.00	4.783	5.00	7.783	20.00	10.78	13.00
1.800	20.00	4.800	5.00	7.800	20.00	10.80	13.00
1.817	20.00	4.817	5.00	7.817	20.00	10.82	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.850	20.00	4.850	5.00	7.850	20.00	10.85	13.00
1.867	20.00	4.867	5.00	7.867	20.00	10.87	13.00
1.883	20.00	4.883	5.00	7.883	20.00	10.88	13.00
1.900	20.00	4.900	5.00	7.900	20.00	10.90	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
1.933	20.00	4.933	5.00	7.933	20.00	10.93	13.00
1.950	20.00	4.950	5.00	7.950	20.00	10.95	13.00
1.967	20.00	4.967	5.00	7.967	20.00	10.97	13.00
1.983	20.00	4.983	5.00	7.983	20.00	10.98	13.00

Normal Operating Model Output (Chicago)

2.000	20.00	5.000	5.01	8.000	20.01	11.00	13.00
2.017	10.00	5.017	20.00	8.017	23.00	11.02	8.00
2.033	10.00	5.033	20.00	8.033	23.00	11.03	8.00
2.050	10.00	5.050	20.00	8.050	23.00	11.05	8.00
2.067	10.00	5.067	20.00	8.067	23.00	11.07	8.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.100	10.00	5.100	20.00	8.100	23.00	11.10	8.00
2.117	10.00	5.117	20.00	8.117	23.00	11.12	8.00
2.133	10.00	5.133	20.00	8.133	23.00	11.13	8.00
2.150	10.00	5.150	20.00	8.150	23.00	11.15	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.183	10.00	5.183	20.00	8.183	23.00	11.18	8.00
2.200	10.00	5.200	20.00	8.200	23.00	11.20	8.00
2.217	10.00	5.217	20.00	8.217	23.00	11.22	8.00
2.233	10.00	5.233	20.00	8.233	23.00	11.23	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.267	10.00	5.267	20.00	8.267	23.00	11.27	8.00
2.283	10.00	5.283	20.00	8.283	23.00	11.28	8.00
2.300	10.00	5.300	20.00	8.300	23.00	11.30	8.00
2.317	10.00	5.317	20.00	8.317	23.00	11.32	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.350	10.00	5.350	20.00	8.350	23.00	11.35	8.00
2.367	10.00	5.367	20.00	8.367	23.00	11.37	8.00
2.383	10.00	5.383	20.00	8.383	23.00	11.38	8.00
2.400	10.00	5.400	20.00	8.400	23.00	11.40	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.433	10.00	5.433	20.00	8.433	23.00	11.43	8.00
2.450	10.00	5.450	20.00	8.450	23.00	11.45	8.00
2.467	10.00	5.467	20.00	8.467	23.00	11.47	8.00
2.483	10.00	5.483	20.00	8.483	23.00	11.48	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.517	10.00	5.517	20.00	8.517	23.00	11.52	8.00
2.533	10.00	5.533	20.00	8.533	23.00	11.53	8.00
2.550	10.00	5.550	20.00	8.550	23.00	11.55	8.00
2.567	10.00	5.567	20.00	8.567	23.00	11.57	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.600	10.00	5.600	20.00	8.600	23.00	11.60	8.00
2.617	10.00	5.617	20.00	8.617	23.00	11.62	8.00
2.633	10.00	5.633	20.00	8.633	23.00	11.63	8.00
2.650	10.00	5.650	20.00	8.650	23.00	11.65	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.683	10.00	5.683	20.00	8.683	23.00	11.68	8.00
2.700	10.00	5.700	20.00	8.700	23.00	11.70	8.00
2.717	10.00	5.717	20.00	8.717	23.00	11.72	8.00
2.733	10.00	5.733	20.00	8.733	23.00	11.73	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.767	10.00	5.767	20.00	8.767	23.00	11.77	8.00
2.783	10.00	5.783	20.00	8.783	23.00	11.78	8.00
2.800	10.00	5.800	20.00	8.800	23.00	11.80	8.00
2.817	10.00	5.817	20.00	8.817	23.00	11.82	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.850	10.00	5.850	20.00	8.850	23.00	11.85	8.00
2.867	10.00	5.867	20.00	8.867	23.00	11.87	8.00
2.883	10.00	5.883	20.00	8.883	23.00	11.88	8.00
2.900	10.00	5.900	20.00	8.900	23.00	11.90	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
2.933	10.00	5.933	20.00	8.933	23.00	11.93	8.00
2.950	10.00	5.950	20.00	8.950	23.00	11.95	8.00
2.967	10.00	5.967	20.00	8.967	23.00	11.97	8.00
2.983	10.00	5.983	20.00	8.983	23.00	11.98	8.00
3.000	10.00	6.000	20.03	9.000	22.98	12.00	8.00

Unit Hyd Qpeak (cms)= 0.656

Normal Operating Model Output (Chicago)

```
     PEAK FLOW        (cms)=     0.628 (i)
     TIME TO PEAK     (hrs)=     7.167
     RUNOFF VOLUME     (mm)=   123.183
     TOTAL RAINFALL    (mm)=   193.000
     RUNOFF COEFFICIENT   =     0.638

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

CALIB STANDHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	43.00	86.40	
over	(min)	5.00	10.00	
Storage Coeff.	(min)=	4.92 (ii)	9.85 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	10.00	
Unit Hyd. peak	(cms)=	0.24	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.42	0.416 (iii)
TIME TO PEAK	(hrs)=	6.33	7.00	7.00
RUNOFF VOLUME	(mm)=	166.00	129.02	129.03
TOTAL RAINFALL	(mm)=	193.00	193.00	193.00
RUNOFF COEFFICIENT	=	0.86	0.67	0.67

```
***** 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= 1.0 min	Area (ha)= 6.57	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	43.00	26.38	
over	(min)	6.00	9.00	
Storage Coeff.	(min)=	5.58 (ii)	8.44 (ii)	
Unit Hyd. Tpeak	(min)=	6.00	9.00	
Unit Hyd. peak	(cms)=	0.20	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.58	0.12	0.701 (iii)

```
                    Normal Operating Model Output (Chicago)
     TIME TO PEAK     (hrs)=         6.98          7.00          7.00
     RUNOFF VOLUME     (mm)=       190.99         96.96        166.08
     TOTAL RAINFALL    (mm)=       193.00        193.00        193.00
     RUNOFF COEFFICIENT   =         0.99          0.50          0.86

       (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  (  0009)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)      (cms)      (hrs)       (mm)
        ID1= 1 (  0001):      6.57      0.701       7.00     166.08
      + ID2= 2 (  0002):      4.32      0.416       7.00     129.03
        ==========================================================
        ID = 3 (  0009):     10.89      1.117       7.00     151.38

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)      (cms)      (hrs)       (mm)
        ID1= 3 (  0009):     10.89      1.117       7.00     151.38
      + ID2= 2 (  0007):      7.90      0.628       7.17     123.18
        ==========================================================
        ID = 1 (  0009):     18.79      1.720       7.00     139.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0008)|   Area    (ha)=     11.10   Curve Number   (CN)= 66.4
|ID= 1 DT= 1.0 min |   Ia      (mm)=      7.20   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=      0.79

     Unit Hyd Qpeak  (cms)=      0.537

     PEAK FLOW       (cms)=      0.645 (i)
     TIME TO PEAK    (hrs)=      7.533
     RUNOFF VOLUME    (mm)=    109.824
     TOTAL RAINFALL   (mm)=    193.000
     RUNOFF COEFFICIENT   =      0.569

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=      3.20
|ID= 1 DT= 1.0 min |   Total Imp(%)=     59.00   Dir. Conn.(%)=   0.00
--------------------

                          IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=      1.89            1.31
```

Normal Operating Model Output (Chicago)

Dep. Storage	(mm)=	27.00		30.00		
Average Slope	(%)=	1.00		2.00		
Length	(m)=	146.06		20.00		
Mannings n	=	0.013		0.250		
Max.Eff.Inten.	(mm/hr)=	43.00		86.40		
over	(min)	5.00		10.00		
Storage Coeff.	(min)=	4.49	(ii)	9.43	(ii)	
Unit Hyd. Tpeak	(min)=	5.00		10.00		
Unit Hyd. peak	(cms)=	0.25		0.12		
						TOTALS
PEAK FLOW	(cms)=	0.00		0.31		0.308 (iii)
TIME TO PEAK	(hrs)=	6.28		7.00		7.00
RUNOFF VOLUME	(mm)=	166.00		129.02		129.02
TOTAL RAINFALL	(mm)=	193.00		193.00		193.00
RUNOFF COEFFICIENT	=	0.86		0.67		0.67

***** 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 (0004)	Area	(ha)=	2.70			
ID= 1 DT= 1.0 min	Total Imp	(%)=	73.50	Dir. Conn.(%)=	73.50	

		IMPERVIOUS		PERVIOUS (i)		
Surface Area	(ha)=	1.98		0.72		
Dep. Storage	(mm)=	2.00		5.00		
Average Slope	(%)=	1.00		2.00		
Length	(m)=	134.16		20.00		
Mannings n	=	0.013		0.250		
Max.Eff.Inten.	(mm/hr)=	43.00		26.38		
over	(min)	5.00		9.00		
Storage Coeff.	(min)=	4.27	(ii)	8.61	(ii)	
Unit Hyd. Tpeak	(min)=	5.00		9.00		
Unit Hyd. peak	(cms)=	0.25		0.13		
						TOTALS
PEAK FLOW	(cms)=	0.24		0.05		0.288 (iii)
TIME TO PEAK	(hrs)=	6.98		7.00		7.00
RUNOFF VOLUME	(mm)=	190.99		96.96		166.08
TOTAL RAINFALL	(mm)=	193.00		193.00		193.00
RUNOFF COEFFICIENT	=	0.99		0.50		0.86

(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 (0010)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.

Normal Operating Model Output (Chicago)

	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):	3.20	0.308	7.00	129.02
+ ID2= 2 (0004):	2.70	0.288	7.00	166.08
ID = 3 (0010):	5.90	0.596	7.00	145.98

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	0.596	7.00	145.98
+ ID2= 2 (0008):	11.10	0.645	7.53	109.82
ID = 1 (0010):	17.00	1.128	7.02	122.37

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	1.128	7.02	122.37
+ ID2= 2 (0009):	18.79	1.720	7.00	139.52
ID = 3 (0011):	35.79	2.845	7.02	131.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0013)
ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		43.00	34.08	
over (min)		6.00	15.00	
Storage Coeff. (min)=		5.58 (ii)	14.71 (ii)	
Unit Hyd. Tpeak (min)=		6.00	15.00	
Unit Hyd. peak (cms)=		0.20	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.27	0.32	0.589 (iii)
TIME TO PEAK	(hrs)=	6.98	7.03	7.00
RUNOFF VOLUME	(mm)=	190.99	105.75	134.57
TOTAL RAINFALL	(mm)=	193.00	193.00	193.00
RUNOFF COEFFICIENT	=	0.99	0.55	0.70

(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 (0012)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		35.79	2.845	7.02	131.38
+ ID2= 2 (0013):		6.58	0.589	7.00	134.57
ID = 3 (0012):		42.37	3.433	7.00	131.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)					
IN= 2---> OUT= 1					
DT= 1.0 min		OUTFLOW	STORAGE	OUTFLOW	STORAGE
		(cms)	(ha.m.)	(cms)	(ha.m.)
		0.0000	0.0000	0.0001	5.0000

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0012)	42.370	3.433	7.00	131.87
OUTFLOW: ID= 1 (0014)	42.370	0.000	16.55	0.01

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=573.00
MAXIMUM STORAGE USED (ha.m.)= 5.5872

FINISH

Normal Operating Model Output (SCS)

```
V    V   I    SSSSS  U   U    A    L
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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ac8855c6-d05a-48af-b984-b7776778b9f4\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ac8855c6-d05a-48af-b984-b7776778b9f4\scen

DATE: 03/29/2018 TIME: 03:40:25

USER:

COMMENTS: SCS 2 year

****
** Run 01 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\a8a29570-55aa-42fd-8717-83625671f7d2\0015c6a4
Ptotal= 44.20 mm	Comments: 5yrSCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	0.88	12.75	6.36	19.00	0.80
0.50	0.49	6.75	0.88	13.00	3.27	19.25	0.80
0.75	0.49	7.00	0.88	13.25	3.27	19.50	0.80
1.00	0.49	7.25	0.88	13.50	0.62	19.75	0.80
1.25	0.49	7.50	0.88	13.75	0.62	20.00	0.80
1.50	0.49	7.75	0.88	14.00	3.62	20.25	0.80
1.75	0.49	8.00	0.88	14.25	3.62	20.50	0.53
2.00	0.49	8.25	0.88	14.50	1.33	20.75	0.53

Normal Operating Model Output (SCS)

2.25	0.49	8.50	1.19	14.75	1.33	21.00	0.53
2.50	0.57	8.75	1.19	15.00	1.33	21.25	0.53
2.75	0.57	9.00	1.19	15.25	1.33	21.50	0.53
3.00	0.57	9.25	1.19	15.50	1.33	21.75	0.53
3.25	0.57	9.50	1.41	15.75	1.33	22.00	0.53
3.50	0.57	9.75	1.41	16.00	1.33	22.25	0.53
3.75	0.57	10.00	1.59	16.25	1.33	22.50	0.53
4.00	0.57	10.25	1.59	16.50	0.80	22.75	0.53
4.25	0.57	10.50	2.03	16.75	0.80	23.00	0.53
4.50	0.71	10.75	2.03	17.00	0.80	23.25	0.53
4.75	0.71	11.00	2.74	17.25	0.80	23.50	0.53
5.00	0.71	11.25	2.74	17.50	0.80	23.75	0.53
5.25	0.71	11.50	4.24	17.75	0.80	24.00	0.53
5.50	0.71	11.75	4.24	18.00	0.80	24.25	0.53
5.75	0.71	12.00	18.39	18.25	0.80		
6.00	0.71	12.25	48.80	18.50	0.80		
6.25	0.71	12.50	6.36	18.75	0.80		

CALIB NASHYD (0007) ID= 1 DT= 1.0 min					
	Area (ha)=	7.90	Curve Number (CN)=	72.6
	Ia (mm)=	6.50	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.46		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	0.71	12.150	48.80	18.22	0.80
0.033	0.00	6.100	0.71	12.167	48.80	18.23	0.80
0.050	0.00	6.117	0.71	12.183	48.80	18.25	0.80
0.067	0.00	6.133	0.71	12.200	48.80	18.27	0.80
0.083	0.00	6.150	0.71	12.217	48.80	18.28	0.80
0.100	0.00	6.167	0.71	12.233	48.80	18.30	0.80
0.117	0.00	6.183	0.71	12.250	48.80	18.32	0.80
0.133	0.00	6.200	0.71	12.267	6.40	18.33	0.80
0.150	0.00	6.217	0.71	12.283	6.36	18.35	0.80
0.167	0.00	6.233	0.71	12.300	6.36	18.37	0.80
0.183	0.00	6.250	0.71	12.317	6.36	18.38	0.80
0.200	0.00	6.267	0.88	12.333	6.36	18.40	0.80
0.217	0.00	6.283	0.88	12.350	6.36	18.42	0.80
0.233	0.00	6.300	0.88	12.367	6.36	18.43	0.80
0.250	0.00	6.317	0.88	12.383	6.36	18.45	0.80
0.267	0.49	6.333	0.88	12.400	6.36	18.47	0.80
0.283	0.49	6.350	0.88	12.417	6.36	18.48	0.80
0.300	0.49	6.367	0.88	12.433	6.36	18.50	0.80
0.317	0.49	6.383	0.88	12.450	6.36	18.52	0.80
0.333	0.49	6.400	0.88	12.467	6.36	18.53	0.80
0.350	0.49	6.417	0.88	12.483	6.36	18.55	0.80
0.367	0.49	6.433	0.88	12.500	6.36	18.57	0.80
0.383	0.49	6.450	0.88	12.517	6.36	18.58	0.80
0.400	0.49	6.467	0.88	12.533	6.36	18.60	0.80
0.417	0.49	6.483	0.88	12.550	6.36	18.62	0.80
0.433	0.49	6.500	0.88	12.567	6.36	18.63	0.80
0.450	0.49	6.517	0.88	12.583	6.36	18.65	0.80
0.467	0.49	6.533	0.88	12.600	6.36	18.67	0.80
0.483	0.49	6.550	0.88	12.617	6.36	18.68	0.80
0.500	0.49	6.567	0.88	12.633	6.36	18.70	0.80
0.517	0.49	6.583	0.88	12.650	6.36	18.72	0.80

Normal Operating Model Output (SCS)

0.533	0.49	6.600	0.88	12.667	6.36	18.73	0.80
0.550	0.49	6.617	0.88	12.683	6.36	18.75	0.80
0.567	0.49	6.633	0.88	12.700	6.36	18.77	0.80
0.583	0.49	6.650	0.88	12.717	6.36	18.78	0.80
0.600	0.49	6.667	0.88	12.733	6.36	18.80	0.80
0.617	0.49	6.683	0.88	12.750	6.36	18.82	0.80
0.633	0.49	6.700	0.88	12.767	3.28	18.83	0.80
0.650	0.49	6.717	0.88	12.783	3.27	18.85	0.80
0.667	0.49	6.733	0.88	12.800	3.27	18.87	0.80
0.683	0.49	6.750	0.88	12.817	3.27	18.88	0.80
0.700	0.49	6.767	0.88	12.833	3.27	18.90	0.80
0.717	0.49	6.783	0.88	12.850	3.27	18.92	0.80
0.733	0.49	6.800	0.88	12.867	3.27	18.93	0.80
0.750	0.49	6.817	0.88	12.883	3.27	18.95	0.80
0.767	0.49	6.833	0.88	12.900	3.27	18.97	0.80
0.783	0.49	6.850	0.88	12.917	3.27	18.98	0.80
0.800	0.49	6.867	0.88	12.933	3.27	19.00	0.80
0.817	0.49	6.883	0.88	12.950	3.27	19.02	0.80
0.833	0.49	6.900	0.88	12.967	3.27	19.03	0.80
0.850	0.49	6.917	0.88	12.983	3.27	19.05	0.80
0.867	0.49	6.933	0.88	13.000	3.27	19.07	0.80
0.883	0.49	6.950	0.88	13.017	3.27	19.08	0.80
0.900	0.49	6.967	0.88	13.033	3.27	19.10	0.80
0.917	0.49	6.983	0.88	13.050	3.27	19.12	0.80
0.933	0.49	7.000	0.88	13.067	3.27	19.13	0.80
0.950	0.49	7.017	0.88	13.083	3.27	19.15	0.80
0.967	0.49	7.033	0.88	13.100	3.27	19.17	0.80
0.983	0.49	7.050	0.88	13.117	3.27	19.18	0.80
1.000	0.49	7.067	0.88	13.133	3.27	19.20	0.80
1.017	0.49	7.083	0.88	13.150	3.27	19.22	0.80
1.033	0.49	7.100	0.88	13.167	3.27	19.23	0.80
1.050	0.49	7.117	0.88	13.183	3.27	19.25	0.80
1.067	0.49	7.133	0.88	13.200	3.27	19.27	0.80
1.083	0.49	7.150	0.88	13.217	3.27	19.28	0.80
1.100	0.49	7.167	0.88	13.233	3.27	19.30	0.80
1.117	0.49	7.183	0.88	13.250	3.27	19.32	0.80
1.133	0.49	7.200	0.88	13.267	0.62	19.33	0.80
1.150	0.49	7.217	0.88	13.283	0.62	19.35	0.80
1.167	0.49	7.233	0.88	13.300	0.62	19.37	0.80
1.183	0.49	7.250	0.88	13.317	0.62	19.38	0.80
1.200	0.49	7.267	0.88	13.333	0.62	19.40	0.80
1.217	0.49	7.283	0.88	13.350	0.62	19.42	0.80
1.233	0.49	7.300	0.88	13.367	0.62	19.43	0.80
1.250	0.49	7.317	0.88	13.383	0.62	19.45	0.80
1.267	0.49	7.333	0.88	13.400	0.62	19.47	0.80
1.283	0.49	7.350	0.88	13.417	0.62	19.48	0.80
1.300	0.49	7.367	0.88	13.433	0.62	19.50	0.80
1.317	0.49	7.383	0.88	13.450	0.62	19.52	0.80
1.333	0.49	7.400	0.88	13.467	0.62	19.53	0.80
1.350	0.49	7.417	0.88	13.483	0.62	19.55	0.80
1.367	0.49	7.433	0.88	13.500	0.62	19.57	0.80
1.383	0.49	7.450	0.88	13.517	0.62	19.58	0.80
1.400	0.49	7.467	0.88	13.533	0.62	19.60	0.80
1.417	0.49	7.483	0.88	13.550	0.62	19.62	0.80
1.433	0.49	7.500	0.88	13.567	0.62	19.63	0.80
1.450	0.49	7.517	0.88	13.583	0.62	19.65	0.80
1.467	0.49	7.533	0.88	13.600	0.62	19.67	0.80
1.483	0.49	7.550	0.88	13.617	0.62	19.68	0.80
1.500	0.49	7.567	0.88	13.633	0.62	19.70	0.80
1.517	0.49	7.583	0.88	13.650	0.62	19.72	0.80
1.533	0.49	7.600	0.88	13.667	0.62	19.73	0.80
1.550	0.49	7.617	0.88	13.683	0.62	19.75	0.80
1.567	0.49	7.633	0.88	13.700	0.62	19.77	0.80

Normal Operating Model Output (SCS)

1.583	0.49	7.650	0.88	13.717	0.62	19.78	0.80
1.600	0.49	7.667	0.88	13.733	0.62	19.80	0.80
1.617	0.49	7.683	0.88	13.750	0.62	19.82	0.80
1.633	0.49	7.700	0.88	13.767	3.62	19.83	0.80
1.650	0.49	7.717	0.88	13.783	3.62	19.85	0.80
1.667	0.49	7.733	0.88	13.800	3.62	19.87	0.80
1.683	0.49	7.750	0.88	13.817	3.62	19.88	0.80
1.700	0.49	7.767	0.88	13.833	3.62	19.90	0.80
1.717	0.49	7.783	0.88	13.850	3.62	19.92	0.80
1.733	0.49	7.800	0.88	13.867	3.62	19.93	0.80
1.750	0.49	7.817	0.88	13.883	3.62	19.95	0.80
1.767	0.49	7.833	0.88	13.900	3.62	19.97	0.80
1.783	0.49	7.850	0.88	13.917	3.62	19.98	0.80
1.800	0.49	7.867	0.88	13.933	3.62	20.00	0.80
1.817	0.49	7.883	0.88	13.950	3.62	20.02	0.80
1.833	0.49	7.900	0.88	13.967	3.62	20.03	0.80
1.850	0.49	7.917	0.88	13.983	3.62	20.05	0.80
1.867	0.49	7.933	0.88	14.000	3.62	20.07	0.80
1.883	0.49	7.950	0.88	14.017	3.62	20.08	0.80
1.900	0.49	7.967	0.88	14.033	3.62	20.10	0.80
1.917	0.49	7.983	0.88	14.050	3.62	20.12	0.80
1.933	0.49	8.000	0.88	14.067	3.62	20.13	0.80
1.950	0.49	8.017	0.88	14.083	3.62	20.15	0.80
1.967	0.49	8.033	0.88	14.100	3.62	20.17	0.80
1.983	0.49	8.050	0.88	14.117	3.62	20.18	0.80
2.000	0.49	8.067	0.88	14.133	3.62	20.20	0.80
2.017	0.49	8.083	0.88	14.150	3.62	20.22	0.80
2.033	0.49	8.100	0.88	14.167	3.62	20.23	0.80
2.050	0.49	8.117	0.88	14.183	3.62	20.25	0.80
2.067	0.49	8.133	0.88	14.200	3.62	20.27	0.53
2.083	0.49	8.150	0.88	14.217	3.62	20.28	0.53
2.100	0.49	8.167	0.88	14.233	3.62	20.30	0.53
2.117	0.49	8.183	0.88	14.250	3.62	20.32	0.53
2.133	0.49	8.200	0.88	14.267	1.33	20.33	0.53
2.150	0.49	8.217	0.88	14.283	1.33	20.35	0.53
2.167	0.49	8.233	0.88	14.300	1.33	20.37	0.53
2.183	0.49	8.250	0.88	14.317	1.33	20.38	0.53
2.200	0.49	8.267	1.19	14.333	1.33	20.40	0.53
2.217	0.49	8.283	1.19	14.350	1.33	20.42	0.53
2.233	0.49	8.300	1.19	14.367	1.33	20.43	0.53
2.250	0.49	8.317	1.19	14.383	1.33	20.45	0.53
2.267	0.57	8.333	1.19	14.400	1.33	20.47	0.53
2.283	0.57	8.350	1.19	14.417	1.33	20.48	0.53
2.300	0.57	8.367	1.19	14.433	1.33	20.50	0.53
2.317	0.57	8.383	1.19	14.450	1.33	20.52	0.53
2.333	0.57	8.400	1.19	14.467	1.33	20.53	0.53
2.350	0.57	8.417	1.19	14.483	1.33	20.55	0.53
2.367	0.57	8.433	1.19	14.500	1.33	20.57	0.53
2.383	0.57	8.450	1.19	14.517	1.33	20.58	0.53
2.400	0.57	8.467	1.19	14.533	1.33	20.60	0.53
2.417	0.57	8.483	1.19	14.550	1.33	20.62	0.53
2.433	0.57	8.500	1.19	14.567	1.33	20.63	0.53
2.450	0.57	8.517	1.19	14.583	1.33	20.65	0.53
2.467	0.57	8.533	1.19	14.600	1.33	20.67	0.53
2.483	0.57	8.550	1.19	14.617	1.33	20.68	0.53
2.500	0.57	8.567	1.19	14.633	1.33	20.70	0.53
2.517	0.57	8.583	1.19	14.650	1.33	20.72	0.53
2.533	0.57	8.600	1.19	14.667	1.33	20.73	0.53
2.550	0.57	8.617	1.19	14.683	1.33	20.75	0.53
2.567	0.57	8.633	1.19	14.700	1.33	20.77	0.53
2.583	0.57	8.650	1.19	14.717	1.33	20.78	0.53
2.600	0.57	8.667	1.19	14.733	1.33	20.80	0.53
2.617	0.57	8.683	1.19	14.750	1.33	20.82	0.53

Normal Operating Model Output (SCS)

2.633	0.57	8.700	1.19	14.767	1.33	20.83	0.53
2.650	0.57	8.717	1.19	14.783	1.33	20.85	0.53
2.667	0.57	8.733	1.19	14.800	1.33	20.87	0.53
2.683	0.57	8.750	1.19	14.817	1.33	20.88	0.53
2.700	0.57	8.767	1.19	14.833	1.33	20.90	0.53
2.717	0.57	8.783	1.19	14.850	1.33	20.92	0.53
2.733	0.57	8.800	1.19	14.867	1.33	20.93	0.53
2.750	0.57	8.817	1.19	14.883	1.33	20.95	0.53
2.767	0.57	8.833	1.19	14.900	1.33	20.97	0.53
2.783	0.57	8.850	1.19	14.917	1.33	20.98	0.53
2.800	0.57	8.867	1.19	14.933	1.33	21.00	0.53
2.817	0.57	8.883	1.19	14.950	1.33	21.02	0.53
2.833	0.57	8.900	1.19	14.967	1.33	21.03	0.53
2.850	0.57	8.917	1.19	14.983	1.33	21.05	0.53
2.867	0.57	8.933	1.19	15.000	1.33	21.07	0.53
2.883	0.57	8.950	1.19	15.017	1.33	21.08	0.53
2.900	0.57	8.967	1.19	15.033	1.33	21.10	0.53
2.917	0.57	8.983	1.19	15.050	1.33	21.12	0.53
2.933	0.57	9.000	1.19	15.067	1.33	21.13	0.53
2.950	0.57	9.017	1.19	15.083	1.33	21.15	0.53
2.967	0.57	9.033	1.19	15.100	1.33	21.17	0.53
2.983	0.57	9.050	1.19	15.117	1.33	21.18	0.53
3.000	0.57	9.067	1.19	15.133	1.33	21.20	0.53
3.017	0.57	9.083	1.19	15.150	1.33	21.22	0.53
3.033	0.57	9.100	1.19	15.167	1.33	21.23	0.53
3.050	0.57	9.117	1.19	15.183	1.33	21.25	0.53
3.067	0.57	9.133	1.19	15.200	1.33	21.27	0.53
3.083	0.57	9.150	1.19	15.217	1.33	21.28	0.53
3.100	0.57	9.167	1.19	15.233	1.33	21.30	0.53
3.117	0.57	9.183	1.19	15.250	1.33	21.32	0.53
3.133	0.57	9.200	1.19	15.267	1.33	21.33	0.53
3.150	0.57	9.217	1.19	15.283	1.33	21.35	0.53
3.167	0.57	9.233	1.19	15.300	1.33	21.37	0.53
3.183	0.57	9.250	1.19	15.317	1.33	21.38	0.53
3.200	0.57	9.267	1.41	15.333	1.33	21.40	0.53
3.217	0.57	9.283	1.41	15.350	1.33	21.42	0.53
3.233	0.57	9.300	1.41	15.367	1.33	21.43	0.53
3.250	0.57	9.317	1.41	15.383	1.33	21.45	0.53
3.267	0.57	9.333	1.41	15.400	1.33	21.47	0.53
3.283	0.57	9.350	1.41	15.417	1.33	21.48	0.53
3.300	0.57	9.367	1.41	15.433	1.33	21.50	0.53
3.317	0.57	9.383	1.41	15.450	1.33	21.52	0.53
3.333	0.57	9.400	1.41	15.467	1.33	21.53	0.53
3.350	0.57	9.417	1.41	15.483	1.33	21.55	0.53
3.367	0.57	9.433	1.41	15.500	1.33	21.57	0.53
3.383	0.57	9.450	1.41	15.517	1.33	21.58	0.53
3.400	0.57	9.467	1.41	15.533	1.33	21.60	0.53
3.417	0.57	9.483	1.41	15.550	1.33	21.62	0.53
3.433	0.57	9.500	1.41	15.567	1.33	21.63	0.53
3.450	0.57	9.517	1.41	15.583	1.33	21.65	0.53
3.467	0.57	9.533	1.41	15.600	1.33	21.67	0.53
3.483	0.57	9.550	1.41	15.617	1.33	21.68	0.53
3.500	0.57	9.567	1.41	15.633	1.33	21.70	0.53
3.517	0.57	9.583	1.41	15.650	1.33	21.72	0.53
3.533	0.57	9.600	1.41	15.667	1.33	21.73	0.53
3.550	0.57	9.617	1.41	15.683	1.33	21.75	0.53
3.567	0.57	9.633	1.41	15.700	1.33	21.77	0.53
3.583	0.57	9.650	1.41	15.717	1.33	21.78	0.53
3.600	0.57	9.667	1.41	15.733	1.33	21.80	0.53
3.617	0.57	9.683	1.41	15.750	1.33	21.82	0.53
3.633	0.57	9.700	1.41	15.767	1.33	21.83	0.53
3.650	0.57	9.717	1.41	15.783	1.33	21.85	0.53
3.667	0.57	9.733	1.41	15.800	1.33	21.87	0.53

Normal Operating Model Output (SCS)

3.683	0.57	9.750	1.41	15.817	1.33	21.88	0.53
3.700	0.57	9.767	1.59	15.833	1.33	21.90	0.53
3.717	0.57	9.783	1.59	15.850	1.33	21.92	0.53
3.733	0.57	9.800	1.59	15.867	1.33	21.93	0.53
3.750	0.57	9.817	1.59	15.883	1.33	21.95	0.53
3.767	0.57	9.833	1.59	15.900	1.33	21.97	0.53
3.783	0.57	9.850	1.59	15.917	1.33	21.98	0.53
3.800	0.57	9.867	1.59	15.933	1.33	22.00	0.53
3.817	0.57	9.883	1.59	15.950	1.33	22.02	0.53
3.833	0.57	9.900	1.59	15.967	1.33	22.03	0.53
3.850	0.57	9.917	1.59	15.983	1.33	22.05	0.53
3.867	0.57	9.933	1.59	16.000	1.33	22.07	0.53
3.883	0.57	9.950	1.59	16.017	1.33	22.08	0.53
3.900	0.57	9.967	1.59	16.033	1.33	22.10	0.53
3.917	0.57	9.983	1.59	16.050	1.33	22.12	0.53
3.933	0.57	10.000	1.59	16.067	1.33	22.13	0.53
3.950	0.57	10.017	1.59	16.083	1.33	22.15	0.53
3.967	0.57	10.033	1.59	16.100	1.33	22.17	0.53
3.983	0.57	10.050	1.59	16.117	1.33	22.18	0.53
4.000	0.57	10.067	1.59	16.133	1.33	22.20	0.53
4.017	0.57	10.083	1.59	16.150	1.33	22.22	0.53
4.033	0.57	10.100	1.59	16.167	1.33	22.23	0.53
4.050	0.57	10.117	1.59	16.183	1.33	22.25	0.53
4.067	0.57	10.133	1.59	16.200	1.33	22.27	0.53
4.083	0.57	10.150	1.59	16.217	1.33	22.28	0.53
4.100	0.57	10.167	1.59	16.233	1.33	22.30	0.53
4.117	0.57	10.183	1.59	16.250	1.33	22.32	0.53
4.133	0.57	10.200	1.59	16.267	0.80	22.33	0.53
4.150	0.57	10.217	1.59	16.283	0.80	22.35	0.53
4.167	0.57	10.233	1.59	16.300	0.80	22.37	0.53
4.183	0.57	10.250	1.59	16.317	0.80	22.38	0.53
4.200	0.57	10.267	2.03	16.333	0.80	22.40	0.53
4.217	0.57	10.283	2.03	16.350	0.80	22.42	0.53
4.233	0.57	10.300	2.03	16.367	0.80	22.43	0.53
4.250	0.57	10.317	2.03	16.383	0.80	22.45	0.53
4.267	0.71	10.333	2.03	16.400	0.80	22.47	0.53
4.283	0.71	10.350	2.03	16.417	0.80	22.48	0.53
4.300	0.71	10.367	2.03	16.433	0.80	22.50	0.53
4.317	0.71	10.383	2.03	16.450	0.80	22.52	0.53
4.333	0.71	10.400	2.03	16.467	0.80	22.53	0.53
4.350	0.71	10.417	2.03	16.483	0.80	22.55	0.53
4.367	0.71	10.433	2.03	16.500	0.80	22.57	0.53
4.383	0.71	10.450	2.03	16.517	0.80	22.58	0.53
4.400	0.71	10.467	2.03	16.533	0.80	22.60	0.53
4.417	0.71	10.483	2.03	16.550	0.80	22.62	0.53
4.433	0.71	10.500	2.03	16.567	0.80	22.63	0.53
4.450	0.71	10.517	2.03	16.583	0.80	22.65	0.53
4.467	0.71	10.533	2.03	16.600	0.80	22.67	0.53
4.483	0.71	10.550	2.03	16.617	0.80	22.68	0.53
4.500	0.71	10.567	2.03	16.633	0.80	22.70	0.53
4.517	0.71	10.583	2.03	16.650	0.80	22.72	0.53
4.533	0.71	10.600	2.03	16.667	0.80	22.73	0.53
4.550	0.71	10.617	2.03	16.683	0.80	22.75	0.53
4.567	0.71	10.633	2.03	16.700	0.80	22.77	0.53
4.583	0.71	10.650	2.03	16.717	0.80	22.78	0.53
4.600	0.71	10.667	2.03	16.733	0.80	22.80	0.53
4.617	0.71	10.683	2.03	16.750	0.80	22.82	0.53
4.633	0.71	10.700	2.03	16.767	0.80	22.83	0.53
4.650	0.71	10.717	2.03	16.783	0.80	22.85	0.53
4.667	0.71	10.733	2.03	16.800	0.80	22.87	0.53
4.683	0.71	10.750	2.03	16.817	0.80	22.88	0.53
4.700	0.71	10.767	2.74	16.833	0.80	22.90	0.53
4.717	0.71	10.783	2.74	16.850	0.80	22.92	0.53

Normal Operating Model Output (SCS)

4.733	0.71	10.800	2.74	16.867	0.80	22.93	0.53
4.750	0.71	10.817	2.74	16.883	0.80	22.95	0.53
4.767	0.71	10.833	2.74	16.900	0.80	22.97	0.53
4.783	0.71	10.850	2.74	16.917	0.80	22.98	0.53
4.800	0.71	10.867	2.74	16.933	0.80	23.00	0.53
4.817	0.71	10.883	2.74	16.950	0.80	23.02	0.53
4.833	0.71	10.900	2.74	16.967	0.80	23.03	0.53
4.850	0.71	10.917	2.74	16.983	0.80	23.05	0.53
4.867	0.71	10.933	2.74	17.000	0.80	23.07	0.53
4.883	0.71	10.950	2.74	17.017	0.80	23.08	0.53
4.900	0.71	10.967	2.74	17.033	0.80	23.10	0.53
4.917	0.71	10.983	2.74	17.050	0.80	23.12	0.53
4.933	0.71	11.000	2.74	17.067	0.80	23.13	0.53
4.950	0.71	11.017	2.74	17.083	0.80	23.15	0.53
4.967	0.71	11.033	2.74	17.100	0.80	23.17	0.53
4.983	0.71	11.050	2.74	17.117	0.80	23.18	0.53
5.000	0.71	11.067	2.74	17.133	0.80	23.20	0.53
5.017	0.71	11.083	2.74	17.150	0.80	23.22	0.53
5.033	0.71	11.100	2.74	17.167	0.80	23.23	0.53
5.050	0.71	11.117	2.74	17.183	0.80	23.25	0.53
5.067	0.71	11.133	2.74	17.200	0.80	23.27	0.53
5.083	0.71	11.150	2.74	17.217	0.80	23.28	0.53
5.100	0.71	11.167	2.74	17.233	0.80	23.30	0.53
5.117	0.71	11.183	2.74	17.250	0.80	23.32	0.53
5.133	0.71	11.200	2.74	17.267	0.80	23.33	0.53
5.150	0.71	11.217	2.74	17.283	0.80	23.35	0.53
5.167	0.71	11.233	2.74	17.300	0.80	23.37	0.53
5.183	0.71	11.250	2.74	17.317	0.80	23.38	0.53
5.200	0.71	11.267	4.24	17.333	0.80	23.40	0.53
5.217	0.71	11.283	4.24	17.350	0.80	23.42	0.53
5.233	0.71	11.300	4.24	17.367	0.80	23.43	0.53
5.250	0.71	11.317	4.24	17.383	0.80	23.45	0.53
5.267	0.71	11.333	4.24	17.400	0.80	23.47	0.53
5.283	0.71	11.350	4.24	17.417	0.80	23.48	0.53
5.300	0.71	11.367	4.24	17.433	0.80	23.50	0.53
5.317	0.71	11.383	4.24	17.450	0.80	23.52	0.53
5.333	0.71	11.400	4.24	17.467	0.80	23.53	0.53
5.350	0.71	11.417	4.24	17.483	0.80	23.55	0.53
5.367	0.71	11.433	4.24	17.500	0.80	23.57	0.53
5.383	0.71	11.450	4.24	17.517	0.80	23.58	0.53
5.400	0.71	11.467	4.24	17.533	0.80	23.60	0.53
5.417	0.71	11.483	4.24	17.550	0.80	23.62	0.53
5.433	0.71	11.500	4.24	17.567	0.80	23.63	0.53
5.450	0.71	11.517	4.24	17.583	0.80	23.65	0.53
5.467	0.71	11.533	4.24	17.600	0.80	23.67	0.53
5.483	0.71	11.550	4.24	17.617	0.80	23.68	0.53
5.500	0.71	11.567	4.24	17.633	0.80	23.70	0.53
5.517	0.71	11.583	4.24	17.650	0.80	23.72	0.53
5.533	0.71	11.600	4.24	17.667	0.80	23.73	0.53
5.550	0.71	11.617	4.24	17.683	0.80	23.75	0.53
5.567	0.71	11.633	4.24	17.700	0.80	23.77	0.53
5.583	0.71	11.650	4.24	17.717	0.80	23.78	0.53
5.600	0.71	11.667	4.24	17.733	0.80	23.80	0.53
5.617	0.71	11.683	4.24	17.750	0.80	23.82	0.53
5.633	0.71	11.700	4.24	17.767	0.80	23.83	0.53
5.650	0.71	11.717	4.24	17.783	0.80	23.85	0.53
5.667	0.71	11.733	4.24	17.800	0.80	23.87	0.53
5.683	0.71	11.750	4.24	17.817	0.80	23.88	0.53
5.700	0.71	11.767	18.38	17.833	0.80	23.90	0.53
5.717	0.71	11.783	18.39	17.850	0.80	23.92	0.53
5.733	0.71	11.800	18.39	17.867	0.80	23.93	0.53
5.750	0.71	11.817	18.39	17.883	0.80	23.95	0.53
5.767	0.71	11.833	18.39	17.900	0.80	23.97	0.53

Normal Operating Model Output (SCS)

5.783	0.71	11.850	18.39	17.917	0.80	23.98	0.53
5.800	0.71	11.867	18.39	17.933	0.80	24.00	0.53
5.817	0.71	11.883	18.39	17.950	0.80	24.02	0.53
5.833	0.71	11.900	18.39	17.967	0.80	24.03	0.53
5.850	0.71	11.917	18.39	17.983	0.80	24.05	0.53
5.867	0.71	11.933	18.39	18.000	0.80	24.07	0.53
5.883	0.71	11.950	18.39	18.017	0.80	24.08	0.53
5.900	0.71	11.967	18.39	18.033	0.80	24.10	0.53
5.917	0.71	11.983	18.39	18.050	0.80	24.12	0.53
5.933	0.71	12.000	18.39	18.067	0.80	24.13	0.53
5.950	0.71	12.017	48.78	18.083	0.80	24.15	0.53
5.967	0.71	12.033	48.80	18.100	0.80	24.17	0.53
5.983	0.71	12.050	48.80	18.117	0.80	24.18	0.53
6.000	0.71	12.067	48.80	18.133	0.80	24.20	0.53
6.017	0.71	12.083	48.80	18.150	0.80	24.22	0.53
6.033	0.71	12.100	48.80	18.167	0.80	24.23	0.53
6.050	0.71	12.117	48.80	18.183	0.80	24.25	0.53
6.067	0.71	12.133	48.80	18.200	0.80		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.111 (i)
TIME TO PEAK (hrs)= 12.650
RUNOFF VOLUME (mm)= 8.007
TOTAL RAINFALL (mm)= 44.200
RUNOFF COEFFICIENT = 0.181

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

CALIB STANDHYD (0001)	Area (ha)= 6.57
ID= 1 DT= 1.0 min	Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	48.80	9.51	
over	(min)	5.00	9.00	
Storage Coeff.	(min)=	5.30 (ii)	8.02 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	9.00	
Unit Hyd. peak	(cms)=	0.22	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.62	0.03	0.647 (iii)
TIME TO PEAK	(hrs)=	12.25	12.32	12.25
RUNOFF VOLUME	(mm)=	42.06	7.08	32.79
TOTAL RAINFALL	(mm)=	44.20	44.20	44.20
RUNOFF COEFFICIENT	=	0.95	0.16	0.74

(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.

Normal Operating Model Output (SCS)

CALIB STANDHYD (0002)	Area (ha)= 4.32		
ID= 1 DT= 1.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		26.22	33.17	
over (min)		6.00	14.00	
Storage Coeff. (min)=		5.99 (ii)	13.23 (ii)	
Unit Hyd. Tpeak (min)=		6.00	14.00	
Unit Hyd. peak (cms)=		0.22	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.09	0.088 (iii)
TIME TO PEAK	(hrs)=	12.33	12.40	12.40
RUNOFF VOLUME	(mm)=	17.07	9.69	9.69
TOTAL RAINFALL	(mm)=	44.20	44.20	44.20
RUNOFF COEFFICIENT	=	0.39	0.22	0.22

***** 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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		6.57	0.647	12.25	32.79
+ ID2= 2 (0002):		4.32	0.088	12.40	9.69
ID = 3 (0009):		10.89	0.704	12.25	23.63

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0009):		10.89	0.704	12.25	23.63
+ ID2= 2 (0007):		7.90	0.111	12.65	8.01
ID = 1 (0009):		18.79	0.756	12.27	18.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008)	Area (ha)= 11.10	Curve Number (CN)= 66.4
ID= 1 DT= 1.0 min	Ia (mm)= 7.20	# of Linear Res.(N)= 3.00

---------- U.H. Tp(hrs)= 0.79

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.080 (i)
TIME TO PEAK (hrs)= 13.067
RUNOFF VOLUME (mm)= 5.887
TOTAL RAINFALL (mm)= 44.200
RUNOFF COEFFICIENT = 0.133

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

CALIB	STANDHYD (0003)	ID= 1 DT= 1.0 min	Area (ha)= 3.20	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		26.22	33.17	
over (min)		5.00	13.00	
Storage Coeff. (min)=		5.48 (ii)	12.72 (ii)	
Unit Hyd. Tpeak (min)=		5.00	13.00	
Unit Hyd. peak (cms)=		0.27	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.07	0.067 (iii)
TIME TO PEAK	(hrs)=	12.32	12.38	12.38
RUNOFF VOLUME	(mm)=	17.07	9.69	9.69
TOTAL RAINFALL	(mm)=	44.20	44.20	44.20
RUNOFF COEFFICIENT	=	0.39	0.22	0.22

***** 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 (0004)	ID= 1 DT= 1.0 min	Area (ha)= 2.70	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.98	0.72
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	134.16	20.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		48.80	9.51
over (min)		5.00	9.00
Storage Coeff. (min)=		4.06 (ii)	8.19 (ii)
Unit Hyd. Tpeak (min)=		5.00	9.00

Normal Operating Model Output (SCS)

Unit Hyd. peak	(cms)=	0.26	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.26	0.01	0.274 (iii)
TIME TO PEAK	(hrs)=	12.25	12.32	12.25
RUNOFF VOLUME	(mm)=	42.06	7.08	32.79
TOTAL RAINFALL	(mm)=	44.20	44.20	44.20
RUNOFF COEFFICIENT	=	0.95	0.16	0.74

(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 (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.067	12.38	9.69
+ ID2= 2 (0004):	2.70	0.274	12.25	32.79
ID = 3 (0010):	5.90	0.320	12.25	20.26

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	0.320	12.25	20.26
+ ID2= 2 (0008):	11.10	0.080	13.07	5.89
ID = 1 (0010):	17.00	0.340	12.27	12.40

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	0.340	12.27	12.40
+ ID2= 2 (0009):	18.79	0.756	12.27	18.17
ID = 3 (0011):	35.79	1.096	12.27	15.43

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0013)
ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.92	3.66
Dep. Storage	(mm)=	2.00	5.00

Normal Operating Model Output (SCS)

Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	48.80	12.62	
over	(min)	5.00	19.00	
Storage Coeff.	(min)=	5.30 (ii)	18.90 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	19.00	
Unit Hyd. peak	(cms)=	0.22	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.28	0.07	0.323 (iii)
TIME TO PEAK	(hrs)=	12.25	12.47	12.25
RUNOFF VOLUME	(mm)=	42.06	8.45	19.81
TOTAL RAINFALL	(mm)=	44.20	44.20	44.20
RUNOFF COEFFICIENT	=	0.95	0.19	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 (0012)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		35.79	1.096	12.27	15.43
+ ID2= 2 (0013):		6.58	0.323	12.25	19.81
ID = 3 (0012):		42.37	1.419	12.27	16.11

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)		OUTFLOW	STORAGE		OUTFLOW	STORAGE
IN= 2---> OUT= 1		(cms)	(ha.m.)		(cms)	(ha.m.)
DT= 1.0 min		0.0000	0.0000		0.0001	5.0000

		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0012)		42.370	1.419	12.27	16.11
OUTFLOW: ID= 1 (0014)		42.370	0.000	27.97	0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=942.00
MAXIMUM STORAGE USED (ha.m.)= 0.6824

```
V    V   I    SSSSS  U   U    A    L
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
```

Normal Operating Model Output (SCS)

```
 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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\71b9e384-43b7-4adb-925c-9c9b99c8bcb1\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\71b9e384-43b7-4adb-925c-9c9b99c8bcb1\scen

DATE: 03/29/2018 TIME: 03:40:24

USER:

COMMENTS: SCS 5 year

****
** Run 02 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\a8a29570-55aa-42fd-8717-83625671f7d2\9fcaaa85
Ptotal= 64.60 mm	Comments: 10yrSCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	1.29	12.75	9.30	19.00	1.16
0.50	0.71	6.75	1.29	13.00	4.78	19.25	1.16
0.75	0.71	7.00	1.29	13.25	4.78	19.50	1.16
1.00	0.71	7.25	1.29	13.50	0.90	19.75	1.16
1.25	0.71	7.50	1.29	13.75	0.90	20.00	1.16
1.50	0.71	7.75	1.29	14.00	5.30	20.25	1.16
1.75	0.71	8.00	1.29	14.25	5.30	20.50	0.77
2.00	0.71	8.25	1.29	14.50	1.94	20.75	0.77
2.25	0.71	8.50	1.74	14.75	1.94	21.00	0.77
2.50	0.84	8.75	1.74	15.00	1.94	21.25	0.77
2.75	0.84	9.00	1.74	15.25	1.94	21.50	0.77
3.00	0.84	9.25	1.74	15.50	1.94	21.75	0.77
3.25	0.84	9.50	2.07	15.75	1.94	22.00	0.77
3.50	0.84	9.75	2.07	16.00	1.94	22.25	0.77
3.75	0.84	10.00	2.33	16.25	1.94	22.50	0.77
4.00	0.84	10.25	2.33	16.50	1.16	22.75	0.77
4.25	0.84	10.50	2.97	16.75	1.16	23.00	0.77

Normal Operating Model Output (SCS)

4.50	1.03	10.75	2.97	17.00	1.16	23.25	0.77
4.75	1.03	11.00	4.01	17.25	1.16	23.50	0.77
5.00	1.03	11.25	4.01	17.50	1.16	23.75	0.77
5.25	1.03	11.50	6.20	17.75	1.16	24.00	0.77
5.50	1.03	11.75	6.20	18.00	1.16	24.25	0.77
5.75	1.03	12.00	26.87	18.25	1.16		
6.00	1.03	12.25	71.32	18.50	1.16		
6.25	1.03	12.50	9.30	18.75	1.16		

CALIB NASHYD (0007)	ID= 1 DT= 1.0 min

Area (ha)= 7.90 Curve Number (CN)= 72.6
Ia (mm)= 6.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.46

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	1.03	12.150	71.32	18.22	1.16
0.033	0.00	6.100	1.03	12.167	71.32	18.23	1.16
0.050	0.00	6.117	1.03	12.183	71.32	18.25	1.16
0.067	0.00	6.133	1.03	12.200	71.32	18.27	1.16
0.083	0.00	6.150	1.03	12.217	71.32	18.28	1.16
0.100	0.00	6.167	1.03	12.233	71.32	18.30	1.16
0.117	0.00	6.183	1.03	12.250	71.32	18.32	1.16
0.133	0.00	6.200	1.03	12.267	9.36	18.33	1.16
0.150	0.00	6.217	1.03	12.283	9.30	18.35	1.16
0.167	0.00	6.233	1.03	12.300	9.30	18.37	1.16
0.183	0.00	6.250	1.03	12.317	9.30	18.38	1.16
0.200	0.00	6.267	1.29	12.333	9.30	18.40	1.16
0.217	0.00	6.283	1.29	12.350	9.30	18.42	1.16
0.233	0.00	6.300	1.29	12.367	9.30	18.43	1.16
0.250	0.00	6.317	1.29	12.383	9.30	18.45	1.16
0.267	0.71	6.333	1.29	12.400	9.30	18.47	1.16
0.283	0.71	6.350	1.29	12.417	9.30	18.48	1.16
0.300	0.71	6.367	1.29	12.433	9.30	18.50	1.16
0.317	0.71	6.383	1.29	12.450	9.30	18.52	1.16
0.333	0.71	6.400	1.29	12.467	9.30	18.53	1.16
0.350	0.71	6.417	1.29	12.483	9.30	18.55	1.16
0.367	0.71	6.433	1.29	12.500	9.30	18.57	1.16
0.383	0.71	6.450	1.29	12.517	9.30	18.58	1.16
0.400	0.71	6.467	1.29	12.533	9.30	18.60	1.16
0.417	0.71	6.483	1.29	12.550	9.30	18.62	1.16
0.433	0.71	6.500	1.29	12.567	9.30	18.63	1.16
0.450	0.71	6.517	1.29	12.583	9.30	18.65	1.16
0.467	0.71	6.533	1.29	12.600	9.30	18.67	1.16
0.483	0.71	6.550	1.29	12.617	9.30	18.68	1.16
0.500	0.71	6.567	1.29	12.633	9.30	18.70	1.16
0.517	0.71	6.583	1.29	12.650	9.30	18.72	1.16
0.533	0.71	6.600	1.29	12.667	9.30	18.73	1.16
0.550	0.71	6.617	1.29	12.683	9.30	18.75	1.16
0.567	0.71	6.633	1.29	12.700	9.30	18.77	1.16
0.583	0.71	6.650	1.29	12.717	9.30	18.78	1.16
0.600	0.71	6.667	1.29	12.733	9.30	18.80	1.16
0.617	0.71	6.683	1.29	12.750	9.30	18.82	1.16
0.633	0.71	6.700	1.29	12.767	4.79	18.83	1.16
0.650	0.71	6.717	1.29	12.783	4.78	18.85	1.16
0.667	0.71	6.733	1.29	12.800	4.78	18.87	1.16

Normal Operating Model Output (SCS)

0.683	0.71	6.750	1.29	12.817	4.78	18.88	1.16
0.700	0.71	6.767	1.29	12.833	4.78	18.90	1.16
0.717	0.71	6.783	1.29	12.850	4.78	18.92	1.16
0.733	0.71	6.800	1.29	12.867	4.78	18.93	1.16
0.750	0.71	6.817	1.29	12.883	4.78	18.95	1.16
0.767	0.71	6.833	1.29	12.900	4.78	18.97	1.16
0.783	0.71	6.850	1.29	12.917	4.78	18.98	1.16
0.800	0.71	6.867	1.29	12.933	4.78	19.00	1.16
0.817	0.71	6.883	1.29	12.950	4.78	19.02	1.16
0.833	0.71	6.900	1.29	12.967	4.78	19.03	1.16
0.850	0.71	6.917	1.29	12.983	4.78	19.05	1.16
0.867	0.71	6.933	1.29	13.000	4.78	19.07	1.16
0.883	0.71	6.950	1.29	13.017	4.78	19.08	1.16
0.900	0.71	6.967	1.29	13.033	4.78	19.10	1.16
0.917	0.71	6.983	1.29	13.050	4.78	19.12	1.16
0.933	0.71	7.000	1.29	13.067	4.78	19.13	1.16
0.950	0.71	7.017	1.29	13.083	4.78	19.15	1.16
0.967	0.71	7.033	1.29	13.100	4.78	19.17	1.16
0.983	0.71	7.050	1.29	13.117	4.78	19.18	1.16
1.000	0.71	7.067	1.29	13.133	4.78	19.20	1.16
1.017	0.71	7.083	1.29	13.150	4.78	19.22	1.16
1.033	0.71	7.100	1.29	13.167	4.78	19.23	1.16
1.050	0.71	7.117	1.29	13.183	4.78	19.25	1.16
1.067	0.71	7.133	1.29	13.200	4.78	19.27	1.16
1.083	0.71	7.150	1.29	13.217	4.78	19.28	1.16
1.100	0.71	7.167	1.29	13.233	4.78	19.30	1.16
1.117	0.71	7.183	1.29	13.250	4.78	19.32	1.16
1.133	0.71	7.200	1.29	13.267	0.91	19.33	1.16
1.150	0.71	7.217	1.29	13.283	0.90	19.35	1.16
1.167	0.71	7.233	1.29	13.300	0.90	19.37	1.16
1.183	0.71	7.250	1.29	13.317	0.90	19.38	1.16
1.200	0.71	7.267	1.29	13.333	0.90	19.40	1.16
1.217	0.71	7.283	1.29	13.350	0.90	19.42	1.16
1.233	0.71	7.300	1.29	13.367	0.90	19.43	1.16
1.250	0.71	7.317	1.29	13.383	0.90	19.45	1.16
1.267	0.71	7.333	1.29	13.400	0.90	19.47	1.16
1.283	0.71	7.350	1.29	13.417	0.90	19.48	1.16
1.300	0.71	7.367	1.29	13.433	0.90	19.50	1.16
1.317	0.71	7.383	1.29	13.450	0.90	19.52	1.16
1.333	0.71	7.400	1.29	13.467	0.90	19.53	1.16
1.350	0.71	7.417	1.29	13.483	0.90	19.55	1.16
1.367	0.71	7.433	1.29	13.500	0.90	19.57	1.16
1.383	0.71	7.450	1.29	13.517	0.90	19.58	1.16
1.400	0.71	7.467	1.29	13.533	0.90	19.60	1.16
1.417	0.71	7.483	1.29	13.550	0.90	19.62	1.16
1.433	0.71	7.500	1.29	13.567	0.90	19.63	1.16
1.450	0.71	7.517	1.29	13.583	0.90	19.65	1.16
1.467	0.71	7.533	1.29	13.600	0.90	19.67	1.16
1.483	0.71	7.550	1.29	13.617	0.90	19.68	1.16
1.500	0.71	7.567	1.29	13.633	0.90	19.70	1.16
1.517	0.71	7.583	1.29	13.650	0.90	19.72	1.16
1.533	0.71	7.600	1.29	13.667	0.90	19.73	1.16
1.550	0.71	7.617	1.29	13.683	0.90	19.75	1.16
1.567	0.71	7.633	1.29	13.700	0.90	19.77	1.16
1.583	0.71	7.650	1.29	13.717	0.90	19.78	1.16
1.600	0.71	7.667	1.29	13.733	0.90	19.80	1.16
1.617	0.71	7.683	1.29	13.750	0.90	19.82	1.16
1.633	0.71	7.700	1.29	13.767	5.29	19.83	1.16
1.650	0.71	7.717	1.29	13.783	5.30	19.85	1.16
1.667	0.71	7.733	1.29	13.800	5.30	19.87	1.16
1.683	0.71	7.750	1.29	13.817	5.30	19.88	1.16
1.700	0.71	7.767	1.29	13.833	5.30	19.90	1.16
1.717	0.71	7.783	1.29	13.850	5.30	19.92	1.16

Normal Operating Model Output (SCS)

1.733	0.71	7.800	1.29	13.867	5.30	19.93	1.16
1.750	0.71	7.817	1.29	13.883	5.30	19.95	1.16
1.767	0.71	7.833	1.29	13.900	5.30	19.97	1.16
1.783	0.71	7.850	1.29	13.917	5.30	19.98	1.16
1.800	0.71	7.867	1.29	13.933	5.30	20.00	1.16
1.817	0.71	7.883	1.29	13.950	5.30	20.02	1.16
1.833	0.71	7.900	1.29	13.967	5.30	20.03	1.16
1.850	0.71	7.917	1.29	13.983	5.30	20.05	1.16
1.867	0.71	7.933	1.29	14.000	5.30	20.07	1.16
1.883	0.71	7.950	1.29	14.017	5.30	20.08	1.16
1.900	0.71	7.967	1.29	14.033	5.30	20.10	1.16
1.917	0.71	7.983	1.29	14.050	5.30	20.12	1.16
1.933	0.71	8.000	1.29	14.067	5.30	20.13	1.16
1.950	0.71	8.017	1.29	14.083	5.30	20.15	1.16
1.967	0.71	8.033	1.29	14.100	5.30	20.17	1.16
1.983	0.71	8.050	1.29	14.117	5.30	20.18	1.16
2.000	0.71	8.067	1.29	14.133	5.30	20.20	1.16
2.017	0.71	8.083	1.29	14.150	5.30	20.22	1.16
2.033	0.71	8.100	1.29	14.167	5.30	20.23	1.16
2.050	0.71	8.117	1.29	14.183	5.30	20.25	1.16
2.067	0.71	8.133	1.29	14.200	5.30	20.27	0.78
2.083	0.71	8.150	1.29	14.217	5.30	20.28	0.78
2.100	0.71	8.167	1.29	14.233	5.30	20.30	0.78
2.117	0.71	8.183	1.29	14.250	5.30	20.32	0.78
2.133	0.71	8.200	1.29	14.267	1.95	20.33	0.78
2.150	0.71	8.217	1.29	14.283	1.94	20.35	0.78
2.167	0.71	8.233	1.29	14.300	1.94	20.37	0.78
2.183	0.71	8.250	1.29	14.317	1.94	20.38	0.78
2.200	0.71	8.267	1.74	14.333	1.94	20.40	0.78
2.217	0.71	8.283	1.74	14.350	1.94	20.42	0.78
2.233	0.71	8.300	1.74	14.367	1.94	20.43	0.78
2.250	0.71	8.317	1.74	14.383	1.94	20.45	0.78
2.267	0.84	8.333	1.74	14.400	1.94	20.47	0.78
2.283	0.84	8.350	1.74	14.417	1.94	20.48	0.78
2.300	0.84	8.367	1.74	14.433	1.94	20.50	0.78
2.317	0.84	8.383	1.74	14.450	1.94	20.52	0.78
2.333	0.84	8.400	1.74	14.467	1.94	20.53	0.78
2.350	0.84	8.417	1.74	14.483	1.94	20.55	0.78
2.367	0.84	8.433	1.74	14.500	1.94	20.57	0.78
2.383	0.84	8.450	1.74	14.517	1.94	20.58	0.78
2.400	0.84	8.467	1.74	14.533	1.94	20.60	0.78
2.417	0.84	8.483	1.74	14.550	1.94	20.62	0.78
2.433	0.84	8.500	1.74	14.567	1.94	20.63	0.78
2.450	0.84	8.517	1.74	14.583	1.94	20.65	0.78
2.467	0.84	8.533	1.74	14.600	1.94	20.67	0.78
2.483	0.84	8.550	1.74	14.617	1.94	20.68	0.78
2.500	0.84	8.567	1.74	14.633	1.94	20.70	0.78
2.517	0.84	8.583	1.74	14.650	1.94	20.72	0.78
2.533	0.84	8.600	1.74	14.667	1.94	20.73	0.78
2.550	0.84	8.617	1.74	14.683	1.94	20.75	0.78
2.567	0.84	8.633	1.74	14.700	1.94	20.77	0.78
2.583	0.84	8.650	1.74	14.717	1.94	20.78	0.78
2.600	0.84	8.667	1.74	14.733	1.94	20.80	0.78
2.617	0.84	8.683	1.74	14.750	1.94	20.82	0.78
2.633	0.84	8.700	1.74	14.767	1.94	20.83	0.78
2.650	0.84	8.717	1.74	14.783	1.94	20.85	0.78
2.667	0.84	8.733	1.74	14.800	1.94	20.87	0.78
2.683	0.84	8.750	1.74	14.817	1.94	20.88	0.78
2.700	0.84	8.767	1.74	14.833	1.94	20.90	0.78
2.717	0.84	8.783	1.74	14.850	1.94	20.92	0.78
2.733	0.84	8.800	1.74	14.867	1.94	20.93	0.78
2.750	0.84	8.817	1.74	14.883	1.94	20.95	0.78
2.767	0.84	8.833	1.74	14.900	1.94	20.97	0.78

Normal Operating Model Output (SCS)

2.783	0.84	8.850	1.74	14.917	1.94	20.98	0.78
2.800	0.84	8.867	1.74	14.933	1.94	21.00	0.78
2.817	0.84	8.883	1.74	14.950	1.94	21.02	0.78
2.833	0.84	8.900	1.74	14.967	1.94	21.03	0.78
2.850	0.84	8.917	1.74	14.983	1.94	21.05	0.78
2.867	0.84	8.933	1.74	15.000	1.94	21.07	0.78
2.883	0.84	8.950	1.74	15.017	1.94	21.08	0.78
2.900	0.84	8.967	1.74	15.033	1.94	21.10	0.78
2.917	0.84	8.983	1.74	15.050	1.94	21.12	0.78
2.933	0.84	9.000	1.74	15.067	1.94	21.13	0.78
2.950	0.84	9.017	1.74	15.083	1.94	21.15	0.78
2.967	0.84	9.033	1.74	15.100	1.94	21.17	0.78
2.983	0.84	9.050	1.74	15.117	1.94	21.18	0.78
3.000	0.84	9.067	1.74	15.133	1.94	21.20	0.78
3.017	0.84	9.083	1.74	15.150	1.94	21.22	0.78
3.033	0.84	9.100	1.74	15.167	1.94	21.23	0.78
3.050	0.84	9.117	1.74	15.183	1.94	21.25	0.78
3.067	0.84	9.133	1.74	15.200	1.94	21.27	0.78
3.083	0.84	9.150	1.74	15.217	1.94	21.28	0.78
3.100	0.84	9.167	1.74	15.233	1.94	21.30	0.78
3.117	0.84	9.183	1.74	15.250	1.94	21.32	0.78
3.133	0.84	9.200	1.74	15.267	1.94	21.33	0.78
3.150	0.84	9.217	1.74	15.283	1.94	21.35	0.78
3.167	0.84	9.233	1.74	15.300	1.94	21.37	0.78
3.183	0.84	9.250	1.74	15.317	1.94	21.38	0.78
3.200	0.84	9.267	2.07	15.333	1.94	21.40	0.78
3.217	0.84	9.283	2.07	15.350	1.94	21.42	0.78
3.233	0.84	9.300	2.07	15.367	1.94	21.43	0.78
3.250	0.84	9.317	2.07	15.383	1.94	21.45	0.78
3.267	0.84	9.333	2.07	15.400	1.94	21.47	0.78
3.283	0.84	9.350	2.07	15.417	1.94	21.48	0.78
3.300	0.84	9.367	2.07	15.433	1.94	21.50	0.78
3.317	0.84	9.383	2.07	15.450	1.94	21.52	0.78
3.333	0.84	9.400	2.07	15.467	1.94	21.53	0.78
3.350	0.84	9.417	2.07	15.483	1.94	21.55	0.78
3.367	0.84	9.433	2.07	15.500	1.94	21.57	0.78
3.383	0.84	9.450	2.07	15.517	1.94	21.58	0.78
3.400	0.84	9.467	2.07	15.533	1.94	21.60	0.78
3.417	0.84	9.483	2.07	15.550	1.94	21.62	0.78
3.433	0.84	9.500	2.07	15.567	1.94	21.63	0.78
3.450	0.84	9.517	2.07	15.583	1.94	21.65	0.78
3.467	0.84	9.533	2.07	15.600	1.94	21.67	0.78
3.483	0.84	9.550	2.07	15.617	1.94	21.68	0.78
3.500	0.84	9.567	2.07	15.633	1.94	21.70	0.78
3.517	0.84	9.583	2.07	15.650	1.94	21.72	0.78
3.533	0.84	9.600	2.07	15.667	1.94	21.73	0.78
3.550	0.84	9.617	2.07	15.683	1.94	21.75	0.78
3.567	0.84	9.633	2.07	15.700	1.94	21.77	0.78
3.583	0.84	9.650	2.07	15.717	1.94	21.78	0.78
3.600	0.84	9.667	2.07	15.733	1.94	21.80	0.78
3.617	0.84	9.683	2.07	15.750	1.94	21.82	0.78
3.633	0.84	9.700	2.07	15.767	1.94	21.83	0.78
3.650	0.84	9.717	2.07	15.783	1.94	21.85	0.78
3.667	0.84	9.733	2.07	15.800	1.94	21.87	0.78
3.683	0.84	9.750	2.07	15.817	1.94	21.88	0.78
3.700	0.84	9.767	2.33	15.833	1.94	21.90	0.78
3.717	0.84	9.783	2.33	15.850	1.94	21.92	0.78
3.733	0.84	9.800	2.33	15.867	1.94	21.93	0.78
3.750	0.84	9.817	2.33	15.883	1.94	21.95	0.78
3.767	0.84	9.833	2.33	15.900	1.94	21.97	0.78
3.783	0.84	9.850	2.33	15.917	1.94	21.98	0.78
3.800	0.84	9.867	2.33	15.933	1.94	22.00	0.78
3.817	0.84	9.883	2.33	15.950	1.94	22.02	0.78

Normal Operating Model Output (SCS)

3.833	0.84	9.900	2.33	15.967	1.94	22.03	0.78
3.850	0.84	9.917	2.33	15.983	1.94	22.05	0.78
3.867	0.84	9.933	2.33	16.000	1.94	22.07	0.78
3.883	0.84	9.950	2.33	16.017	1.94	22.08	0.78
3.900	0.84	9.967	2.33	16.033	1.94	22.10	0.78
3.917	0.84	9.983	2.33	16.050	1.94	22.12	0.78
3.933	0.84	10.000	2.33	16.067	1.94	22.13	0.78
3.950	0.84	10.017	2.33	16.083	1.94	22.15	0.78
3.967	0.84	10.033	2.33	16.100	1.94	22.17	0.78
3.983	0.84	10.050	2.33	16.117	1.94	22.18	0.78
4.000	0.84	10.067	2.33	16.133	1.94	22.20	0.78
4.017	0.84	10.083	2.33	16.150	1.94	22.22	0.78
4.033	0.84	10.100	2.33	16.167	1.94	22.23	0.78
4.050	0.84	10.117	2.33	16.183	1.94	22.25	0.78
4.067	0.84	10.133	2.33	16.200	1.94	22.27	0.78
4.083	0.84	10.150	2.33	16.217	1.94	22.28	0.78
4.100	0.84	10.167	2.33	16.233	1.94	22.30	0.78
4.117	0.84	10.183	2.33	16.250	1.94	22.32	0.78
4.133	0.84	10.200	2.33	16.267	1.17	22.33	0.78
4.150	0.84	10.217	2.33	16.283	1.16	22.35	0.78
4.167	0.84	10.233	2.33	16.300	1.16	22.37	0.78
4.183	0.84	10.250	2.33	16.317	1.16	22.38	0.78
4.200	0.84	10.267	2.97	16.333	1.16	22.40	0.78
4.217	0.84	10.283	2.97	16.350	1.16	22.42	0.78
4.233	0.84	10.300	2.97	16.367	1.16	22.43	0.78
4.250	0.84	10.317	2.97	16.383	1.16	22.45	0.78
4.267	1.03	10.333	2.97	16.400	1.16	22.47	0.78
4.283	1.03	10.350	2.97	16.417	1.16	22.48	0.78
4.300	1.03	10.367	2.97	16.433	1.16	22.50	0.78
4.317	1.03	10.383	2.97	16.450	1.16	22.52	0.78
4.333	1.03	10.400	2.97	16.467	1.16	22.53	0.78
4.350	1.03	10.417	2.97	16.483	1.16	22.55	0.78
4.367	1.03	10.433	2.97	16.500	1.16	22.57	0.78
4.383	1.03	10.450	2.97	16.517	1.16	22.58	0.78
4.400	1.03	10.467	2.97	16.533	1.16	22.60	0.78
4.417	1.03	10.483	2.97	16.550	1.16	22.62	0.78
4.433	1.03	10.500	2.97	16.567	1.16	22.63	0.78
4.450	1.03	10.517	2.97	16.583	1.16	22.65	0.78
4.467	1.03	10.533	2.97	16.600	1.16	22.67	0.78
4.483	1.03	10.550	2.97	16.617	1.16	22.68	0.78
4.500	1.03	10.567	2.97	16.633	1.16	22.70	0.78
4.517	1.03	10.583	2.97	16.650	1.16	22.72	0.78
4.533	1.03	10.600	2.97	16.667	1.16	22.73	0.78
4.550	1.03	10.617	2.97	16.683	1.16	22.75	0.78
4.567	1.03	10.633	2.97	16.700	1.16	22.77	0.78
4.583	1.03	10.650	2.97	16.717	1.16	22.78	0.78
4.600	1.03	10.667	2.97	16.733	1.16	22.80	0.78
4.617	1.03	10.683	2.97	16.750	1.16	22.82	0.78
4.633	1.03	10.700	2.97	16.767	1.16	22.83	0.78
4.650	1.03	10.717	2.97	16.783	1.16	22.85	0.78
4.667	1.03	10.733	2.97	16.800	1.16	22.87	0.78
4.683	1.03	10.750	2.97	16.817	1.16	22.88	0.78
4.700	1.03	10.767	4.01	16.833	1.16	22.90	0.78
4.717	1.03	10.783	4.01	16.850	1.16	22.92	0.78
4.733	1.03	10.800	4.01	16.867	1.16	22.93	0.78
4.750	1.03	10.817	4.01	16.883	1.16	22.95	0.78
4.767	1.03	10.833	4.01	16.900	1.16	22.97	0.78
4.783	1.03	10.850	4.01	16.917	1.16	22.98	0.78
4.800	1.03	10.867	4.01	16.933	1.16	23.00	0.78
4.817	1.03	10.883	4.01	16.950	1.16	23.02	0.78
4.833	1.03	10.900	4.01	16.967	1.16	23.03	0.78
4.850	1.03	10.917	4.01	16.983	1.16	23.05	0.78
4.867	1.03	10.933	4.01	17.000	1.16	23.07	0.78

Normal Operating Model Output (SCS)

4.883	1.03	10.950	4.01	17.017	1.16	23.08	0.78
4.900	1.03	10.967	4.01	17.033	1.16	23.10	0.78
4.917	1.03	10.983	4.01	17.050	1.16	23.12	0.78
4.933	1.03	11.000	4.01	17.067	1.16	23.13	0.78
4.950	1.03	11.017	4.01	17.083	1.16	23.15	0.78
4.967	1.03	11.033	4.01	17.100	1.16	23.17	0.78
4.983	1.03	11.050	4.01	17.117	1.16	23.18	0.78
5.000	1.03	11.067	4.01	17.133	1.16	23.20	0.78
5.017	1.03	11.083	4.01	17.150	1.16	23.22	0.78
5.033	1.03	11.100	4.01	17.167	1.16	23.23	0.78
5.050	1.03	11.117	4.01	17.183	1.16	23.25	0.78
5.067	1.03	11.133	4.01	17.200	1.16	23.27	0.78
5.083	1.03	11.150	4.01	17.217	1.16	23.28	0.78
5.100	1.03	11.167	4.01	17.233	1.16	23.30	0.78
5.117	1.03	11.183	4.01	17.250	1.16	23.32	0.78
5.133	1.03	11.200	4.01	17.267	1.16	23.33	0.78
5.150	1.03	11.217	4.01	17.283	1.16	23.35	0.78
5.167	1.03	11.233	4.01	17.300	1.16	23.37	0.78
5.183	1.03	11.250	4.01	17.317	1.16	23.38	0.78
5.200	1.03	11.267	6.20	17.333	1.16	23.40	0.78
5.217	1.03	11.283	6.20	17.350	1.16	23.42	0.78
5.233	1.03	11.300	6.20	17.367	1.16	23.43	0.78
5.250	1.03	11.317	6.20	17.383	1.16	23.45	0.78
5.267	1.03	11.333	6.20	17.400	1.16	23.47	0.78
5.283	1.03	11.350	6.20	17.417	1.16	23.48	0.78
5.300	1.03	11.367	6.20	17.433	1.16	23.50	0.78
5.317	1.03	11.383	6.20	17.450	1.16	23.52	0.78
5.333	1.03	11.400	6.20	17.467	1.16	23.53	0.78
5.350	1.03	11.417	6.20	17.483	1.16	23.55	0.78
5.367	1.03	11.433	6.20	17.500	1.16	23.57	0.78
5.383	1.03	11.450	6.20	17.517	1.16	23.58	0.78
5.400	1.03	11.467	6.20	17.533	1.16	23.60	0.78
5.417	1.03	11.483	6.20	17.550	1.16	23.62	0.78
5.433	1.03	11.500	6.20	17.567	1.16	23.63	0.78
5.450	1.03	11.517	6.20	17.583	1.16	23.65	0.78
5.467	1.03	11.533	6.20	17.600	1.16	23.67	0.78
5.483	1.03	11.550	6.20	17.617	1.16	23.68	0.78
5.500	1.03	11.567	6.20	17.633	1.16	23.70	0.78
5.517	1.03	11.583	6.20	17.650	1.16	23.72	0.78
5.533	1.03	11.600	6.20	17.667	1.16	23.73	0.78
5.550	1.03	11.617	6.20	17.683	1.16	23.75	0.78
5.567	1.03	11.633	6.20	17.700	1.16	23.77	0.78
5.583	1.03	11.650	6.20	17.717	1.16	23.78	0.78
5.600	1.03	11.667	6.20	17.733	1.16	23.80	0.78
5.617	1.03	11.683	6.20	17.750	1.16	23.82	0.78
5.633	1.03	11.700	6.20	17.767	1.16	23.83	0.78
5.650	1.03	11.717	6.20	17.783	1.16	23.85	0.78
5.667	1.03	11.733	6.20	17.800	1.16	23.87	0.78
5.683	1.03	11.750	6.20	17.817	1.16	23.88	0.78
5.700	1.03	11.767	26.86	17.833	1.16	23.90	0.78
5.717	1.03	11.783	26.87	17.850	1.16	23.92	0.78
5.733	1.03	11.800	26.87	17.867	1.16	23.93	0.78
5.750	1.03	11.817	26.87	17.883	1.16	23.95	0.78
5.767	1.03	11.833	26.87	17.900	1.16	23.97	0.78
5.783	1.03	11.850	26.87	17.917	1.16	23.98	0.78
5.800	1.03	11.867	26.87	17.933	1.16	24.00	0.78
5.817	1.03	11.883	26.87	17.950	1.16	24.02	0.78
5.833	1.03	11.900	26.87	17.967	1.16	24.03	0.78
5.850	1.03	11.917	26.87	17.983	1.16	24.05	0.78
5.867	1.03	11.933	26.87	18.000	1.16	24.07	0.78
5.883	1.03	11.950	26.87	18.017	1.16	24.08	0.78
5.900	1.03	11.967	26.87	18.033	1.16	24.10	0.78
5.917	1.03	11.983	26.87	18.050	1.16	24.12	0.78

Normal Operating Model Output (SCS)

5.933	1.03	12.000	26.87	18.067	1.16	24.13	0.78
5.950	1.03	12.017	71.29	18.083	1.16	24.15	0.78
5.967	1.03	12.033	71.32	18.100	1.16	24.17	0.78
5.983	1.03	12.050	71.32	18.117	1.16	24.18	0.78
6.000	1.03	12.067	71.32	18.133	1.16	24.20	0.78
6.017	1.03	12.083	71.32	18.150	1.16	24.22	0.78
6.033	1.03	12.100	71.32	18.167	1.16	24.23	0.78
6.050	1.03	12.117	71.32	18.183	1.16	24.25	0.78
6.067	1.03	12.133	71.32	18.200	1.16		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.238 (i)
TIME TO PEAK (hrs)= 12.633
RUNOFF VOLUME (mm)= 17.006
TOTAL RAINFALL (mm)= 64.603
RUNOFF COEFFICIENT = 0.263

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

CALIB STANDHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 6.57	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		71.32	20.11	
over (min)		5.00	7.00	
Storage Coeff. (min)=		4.56 (ii)	6.89 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.24	0.16	
				TOTALS
PEAK FLOW	(cms)=	0.92	0.08	0.994 (iii)
TIME TO PEAK	(hrs)=	12.25	12.28	12.25
RUNOFF VOLUME	(mm)=	62.40	14.96	49.83
TOTAL RAINFALL	(mm)=	64.60	64.60	64.60
RUNOFF COEFFICIENT	=	0.97	0.23	0.77

(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 (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.55	1.77
Dep. Storage	(mm)=	27.00	30.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	169.71	20.00

```
                        Normal Operating Model Output (SCS)
     Mannings n            =        0.013          0.250

     Max.Eff.Inten.(mm/hr)=        71.32          76.67
               over (min)          5.00          10.00
     Storage Coeff.  (min)=        4.02 (ii)      9.20 (ii)
     Unit Hyd. Tpeak (min)=        5.00          10.00
     Unit Hyd. peak  (cms)=        0.28           0.12
                                                              *TOTALS*
     PEAK FLOW       (cms)=        0.00           0.26          0.265 (iii)
     TIME TO PEAK    (hrs)=       12.25          12.32          12.32
     RUNOFF VOLUME    (mm)=       37.41          21.81          21.81
     TOTAL RAINFALL   (mm)=       64.60          64.60          64.60
     RUNOFF COEFFICIENT   =        0.58           0.34           0.34

***** 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  (  0009)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)       (cms)      (hrs)       (mm)
        ID1= 1 (  0001):      6.57       0.994      12.25      49.83
      + ID2= 2 (  0002):      4.32       0.265      12.32      21.81
        ==========================================================
        ID = 3 (  0009):     10.89       1.228      12.25      38.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)       (cms)      (hrs)       (mm)
        ID1= 3 (  0009):     10.89       1.228      12.25      38.72
      + ID2= 2 (  0007):      7.90       0.238      12.63      17.01
        ==========================================================
        ID = 1 (  0009):     18.79       1.349      12.27      31.66

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0008)|   Area    (ha)=     11.10   Curve Number   (CN)= 66.4
|ID= 1 DT= 1.0 min |   Ia      (mm)=      7.20   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=      0.79

     Unit Hyd Qpeak  (cms)=     0.537

     PEAK FLOW       (cms)=     0.180 (i)
     TIME TO PEAK    (hrs)=    13.033
     RUNOFF VOLUME    (mm)=    13.078
     TOTAL RAINFALL   (mm)=    64.603
     RUNOFF COEFFICIENT   =     0.202
```

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min	Area (ha)= 3.20	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		71.32	76.67	
over	(min)	5.00	9.00	
Storage Coeff.	(min)=	3.67 (ii)	8.85 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	9.00	
Unit Hyd. peak	(cms)=	0.30	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.20	0.202 (iii)
TIME TO PEAK	(hrs)=	12.23	12.32	12.32
RUNOFF VOLUME	(mm)=	37.41	21.81	21.81
TOTAL RAINFALL	(mm)=	64.60	64.60	64.60
RUNOFF COEFFICIENT	=	0.58	0.34	0.34

***** 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 (0004) ID= 1 DT= 1.0 min	Area (ha)= 2.70	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		71.32	20.11	
over	(min)	5.00	8.00	
Storage Coeff.	(min)=	3.49 (ii)	7.03 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	8.00	
Unit Hyd. peak	(cms)=	0.28	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.39	0.03	0.416 (iii)
TIME TO PEAK	(hrs)=	12.25	12.30	12.25
RUNOFF VOLUME	(mm)=	62.40	14.96	49.83
TOTAL RAINFALL	(mm)=	64.60	64.60	64.60
RUNOFF COEFFICIENT	=	0.97	0.23	0.77

Normal Operating Model Output (SCS)

(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 (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):		3.20	0.202	12.32	21.81
+ ID2= 2 (0004):		2.70	0.416	12.25	49.83
ID = 3 (0010):		5.90	0.600	12.27	34.64

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0010):		5.90	0.600	12.27	34.64
+ ID2= 2 (0008):		11.10	0.180	13.03	13.08
ID = 1 (0010):		17.00	0.652	12.27	23.53

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0010):		17.00	0.652	12.27	23.53
+ ID2= 2 (0009):		18.79	1.349	12.27	31.66
ID = 3 (0011):		35.79	2.000	12.27	27.80

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013)	Area (ha)= 6.58	
ID= 1 DT= 1.0 min	Total Imp(%)= 44.40	Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.92	3.66
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	209.44	30.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		71.32	27.85
over (min)		5.00	13.00
Storage Coeff. (min)=		4.56 (ii)	12.85 (ii)
Unit Hyd. Tpeak (min)=		5.00	13.00
Unit Hyd. peak (cms)=		0.24	0.09

Normal Operating Model Output (SCS)

				TOTALS
PEAK FLOW	(cms)=	0.42	0.17	0.563 (iii)
TIME TO PEAK	(hrs)=	12.25	12.37	12.27
RUNOFF VOLUME	(mm)=	62.41	17.39	32.61
TOTAL RAINFALL	(mm)=	64.60	64.60	64.60
RUNOFF COEFFICIENT	=	0.97	0.27	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 (0012)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	35.79	2.000	12.27	27.80
+ ID2= 2 (0013):	6.58	0.563	12.27	32.61
ID = 3 (0012):	42.37	2.563	12.27	28.54

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)
IN= 2---> OUT= 1
DT= 1.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0001	5.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0012)	42.370	2.563	12.27	28.54
OUTFLOW: ID= 1 (0014)	42.370	0.000	27.93	0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=940.00
MAXIMUM STORAGE USED (ha.m.)= 1.2092

```
V    V   I    SSSSS  U   U    A    L
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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Normal Operating Model Output (SCS)
***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\556d3ab3-57db-49bf-856c-2e5fa0af2e80\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\556d3ab3-57db-49bf-856c-2e5fa0af2e80\scen

DATE: 03/29/2018 TIME: 03:40:24

USER:

COMMENTS: SCS 10 year

****
** Run 03 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\a8a29570-55aa-42fd-8717-83625671f7d2\79767444
Ptotal= 78.10 mm	Comments: 25yrSCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	1.56	12.75	11.25	19.00	1.41
0.50	0.86	6.75	1.56	13.00	5.78	19.25	1.41
0.75	0.86	7.00	1.56	13.25	5.78	19.50	1.41
1.00	0.86	7.25	1.56	13.50	1.09	19.75	1.41
1.25	0.86	7.50	1.56	13.75	1.09	20.00	1.41
1.50	0.86	7.75	1.56	14.00	6.40	20.25	1.41
1.75	0.86	8.00	1.56	14.25	6.40	20.50	0.94
2.00	0.86	8.25	1.56	14.50	2.34	20.75	0.94
2.25	0.86	8.50	2.11	14.75	2.34	21.00	0.94
2.50	1.01	8.75	2.11	15.00	2.34	21.25	0.94
2.75	1.01	9.00	2.11	15.25	2.34	21.50	0.94
3.00	1.01	9.25	2.11	15.50	2.34	21.75	0.94
3.25	1.01	9.50	2.50	15.75	2.34	22.00	0.94
3.50	1.01	9.75	2.50	16.00	2.34	22.25	0.94
3.75	1.01	10.00	2.81	16.25	2.34	22.50	0.94
4.00	1.01	10.25	2.81	16.50	1.41	22.75	0.94
4.25	1.01	10.50	3.59	16.75	1.41	23.00	0.94
4.50	1.25	10.75	3.59	17.00	1.41	23.25	0.94
4.75	1.25	11.00	4.84	17.25	1.41	23.50	0.94
5.00	1.25	11.25	4.84	17.50	1.41	23.75	0.94
5.25	1.25	11.50	7.50	17.75	1.41	24.00	0.94
5.50	1.25	11.75	7.50	18.00	1.41	24.25	0.94
5.75	1.25	12.00	32.49	18.25	1.41		
6.00	1.25	12.25	86.22	18.50	1.41		
6.25	1.25	12.50	11.25	18.75	1.41		

Normal Operating Model Output (SCS)

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	1.25	12.150	86.22	18.22	1.41
0.033	0.00	6.100	1.25	12.167	86.22	18.23	1.41
0.050	0.00	6.117	1.25	12.183	86.22	18.25	1.41
0.067	0.00	6.133	1.25	12.200	86.22	18.27	1.41
0.083	0.00	6.150	1.25	12.217	86.22	18.28	1.41
0.100	0.00	6.167	1.25	12.233	86.22	18.30	1.41
0.117	0.00	6.183	1.25	12.250	86.22	18.32	1.41
0.133	0.00	6.200	1.25	12.267	11.32	18.33	1.41
0.150	0.00	6.217	1.25	12.283	11.25	18.35	1.41
0.167	0.00	6.233	1.25	12.300	11.25	18.37	1.41
0.183	0.00	6.250	1.25	12.317	11.25	18.38	1.41
0.200	0.00	6.267	1.56	12.333	11.25	18.40	1.41
0.217	0.00	6.283	1.56	12.350	11.25	18.42	1.41
0.233	0.00	6.300	1.56	12.367	11.25	18.43	1.41
0.250	0.00	6.317	1.56	12.383	11.25	18.45	1.41
0.267	0.86	6.333	1.56	12.400	11.25	18.47	1.41
0.283	0.86	6.350	1.56	12.417	11.25	18.48	1.41
0.300	0.86	6.367	1.56	12.433	11.25	18.50	1.41
0.317	0.86	6.383	1.56	12.450	11.25	18.52	1.41
0.333	0.86	6.400	1.56	12.467	11.25	18.53	1.41
0.350	0.86	6.417	1.56	12.483	11.25	18.55	1.41
0.367	0.86	6.433	1.56	12.500	11.25	18.57	1.41
0.383	0.86	6.450	1.56	12.517	11.25	18.58	1.41
0.400	0.86	6.467	1.56	12.533	11.25	18.60	1.41
0.417	0.86	6.483	1.56	12.550	11.25	18.62	1.41
0.433	0.86	6.500	1.56	12.567	11.25	18.63	1.41
0.450	0.86	6.517	1.56	12.583	11.25	18.65	1.41
0.467	0.86	6.533	1.56	12.600	11.25	18.67	1.41
0.483	0.86	6.550	1.56	12.617	11.25	18.68	1.41
0.500	0.86	6.567	1.56	12.633	11.25	18.70	1.41
0.517	0.86	6.583	1.56	12.650	11.25	18.72	1.41
0.533	0.86	6.600	1.56	12.667	11.25	18.73	1.41
0.550	0.86	6.617	1.56	12.683	11.25	18.75	1.41
0.567	0.86	6.633	1.56	12.700	11.25	18.77	1.41
0.583	0.86	6.650	1.56	12.717	11.25	18.78	1.41
0.600	0.86	6.667	1.56	12.733	11.25	18.80	1.41
0.617	0.86	6.683	1.56	12.750	11.25	18.82	1.41
0.633	0.86	6.700	1.56	12.767	5.79	18.83	1.41
0.650	0.86	6.717	1.56	12.783	5.78	18.85	1.41
0.667	0.86	6.733	1.56	12.800	5.78	18.87	1.41
0.683	0.86	6.750	1.56	12.817	5.78	18.88	1.41
0.700	0.86	6.767	1.56	12.833	5.78	18.90	1.41
0.717	0.86	6.783	1.56	12.850	5.78	18.92	1.41
0.733	0.86	6.800	1.56	12.867	5.78	18.93	1.41
0.750	0.86	6.817	1.56	12.883	5.78	18.95	1.41
0.767	0.86	6.833	1.56	12.900	5.78	18.97	1.41
0.783	0.86	6.850	1.56	12.917	5.78	18.98	1.41
0.800	0.86	6.867	1.56	12.933	5.78	19.00	1.41
0.817	0.86	6.883	1.56	12.950	5.78	19.02	1.41

	Normal Operating Model Output (SCS)						
0.833	0.86	6.900	1.56	12.967	5.78	19.03	1.41
0.850	0.86	6.917	1.56	12.983	5.78	19.05	1.41
0.867	0.86	6.933	1.56	13.000	5.78	19.07	1.41
0.883	0.86	6.950	1.56	13.017	5.78	19.08	1.41
0.900	0.86	6.967	1.56	13.033	5.78	19.10	1.41
0.917	0.86	6.983	1.56	13.050	5.78	19.12	1.41
0.933	0.86	7.000	1.56	13.067	5.78	19.13	1.41
0.950	0.86	7.017	1.56	13.083	5.78	19.15	1.41
0.967	0.86	7.033	1.56	13.100	5.78	19.17	1.41
0.983	0.86	7.050	1.56	13.117	5.78	19.18	1.41
1.000	0.86	7.067	1.56	13.133	5.78	19.20	1.41
1.017	0.86	7.083	1.56	13.150	5.78	19.22	1.41
1.033	0.86	7.100	1.56	13.167	5.78	19.23	1.41
1.050	0.86	7.117	1.56	13.183	5.78	19.25	1.41
1.067	0.86	7.133	1.56	13.200	5.78	19.27	1.41
1.083	0.86	7.150	1.56	13.217	5.78	19.28	1.41
1.100	0.86	7.167	1.56	13.233	5.78	19.30	1.41
1.117	0.86	7.183	1.56	13.250	5.78	19.32	1.41
1.133	0.86	7.200	1.56	13.267	1.10	19.33	1.41
1.150	0.86	7.217	1.56	13.283	1.09	19.35	1.41
1.167	0.86	7.233	1.56	13.300	1.09	19.37	1.41
1.183	0.86	7.250	1.56	13.317	1.09	19.38	1.41
1.200	0.86	7.267	1.56	13.333	1.09	19.40	1.41
1.217	0.86	7.283	1.56	13.350	1.09	19.42	1.41
1.233	0.86	7.300	1.56	13.367	1.09	19.43	1.41
1.250	0.86	7.317	1.56	13.383	1.09	19.45	1.41
1.267	0.86	7.333	1.56	13.400	1.09	19.47	1.41
1.283	0.86	7.350	1.56	13.417	1.09	19.48	1.41
1.300	0.86	7.367	1.56	13.433	1.09	19.50	1.41
1.317	0.86	7.383	1.56	13.450	1.09	19.52	1.41
1.333	0.86	7.400	1.56	13.467	1.09	19.53	1.41
1.350	0.86	7.417	1.56	13.483	1.09	19.55	1.41
1.367	0.86	7.433	1.56	13.500	1.09	19.57	1.41
1.383	0.86	7.450	1.56	13.517	1.09	19.58	1.41
1.400	0.86	7.467	1.56	13.533	1.09	19.60	1.41
1.417	0.86	7.483	1.56	13.550	1.09	19.62	1.41
1.433	0.86	7.500	1.56	13.567	1.09	19.63	1.41
1.450	0.86	7.517	1.56	13.583	1.09	19.65	1.41
1.467	0.86	7.533	1.56	13.600	1.09	19.67	1.41
1.483	0.86	7.550	1.56	13.617	1.09	19.68	1.41
1.500	0.86	7.567	1.56	13.633	1.09	19.70	1.41
1.517	0.86	7.583	1.56	13.650	1.09	19.72	1.41
1.533	0.86	7.600	1.56	13.667	1.09	19.73	1.41
1.550	0.86	7.617	1.56	13.683	1.09	19.75	1.41
1.567	0.86	7.633	1.56	13.700	1.09	19.77	1.41
1.583	0.86	7.650	1.56	13.717	1.09	19.78	1.41
1.600	0.86	7.667	1.56	13.733	1.09	19.80	1.41
1.617	0.86	7.683	1.56	13.750	1.09	19.82	1.41
1.633	0.86	7.700	1.56	13.767	6.39	19.83	1.41
1.650	0.86	7.717	1.56	13.783	6.40	19.85	1.41
1.667	0.86	7.733	1.56	13.800	6.40	19.87	1.41
1.683	0.86	7.750	1.56	13.817	6.40	19.88	1.41
1.700	0.86	7.767	1.56	13.833	6.40	19.90	1.41
1.717	0.86	7.783	1.56	13.850	6.40	19.92	1.41
1.733	0.86	7.800	1.56	13.867	6.40	19.93	1.41
1.750	0.86	7.817	1.56	13.883	6.40	19.95	1.41
1.767	0.86	7.833	1.56	13.900	6.40	19.97	1.41
1.783	0.86	7.850	1.56	13.917	6.40	19.98	1.41
1.800	0.86	7.867	1.56	13.933	6.40	20.00	1.41
1.817	0.86	7.883	1.56	13.950	6.40	20.02	1.41
1.833	0.86	7.900	1.56	13.967	6.40	20.03	1.41
1.850	0.86	7.917	1.56	13.983	6.40	20.05	1.41
1.867	0.86	7.933	1.56	14.000	6.40	20.07	1.41

Normal Operating Model Output (SCS)

1.883	0.86	7.950	1.56	14.017	6.40	20.08	1.41
1.900	0.86	7.967	1.56	14.033	6.40	20.10	1.41
1.917	0.86	7.983	1.56	14.050	6.40	20.12	1.41
1.933	0.86	8.000	1.56	14.067	6.40	20.13	1.41
1.950	0.86	8.017	1.56	14.083	6.40	20.15	1.41
1.967	0.86	8.033	1.56	14.100	6.40	20.17	1.41
1.983	0.86	8.050	1.56	14.117	6.40	20.18	1.41
2.000	0.86	8.067	1.56	14.133	6.40	20.20	1.41
2.017	0.86	8.083	1.56	14.150	6.40	20.22	1.41
2.033	0.86	8.100	1.56	14.167	6.40	20.23	1.41
2.050	0.86	8.117	1.56	14.183	6.40	20.25	1.41
2.067	0.86	8.133	1.56	14.200	6.40	20.27	0.94
2.083	0.86	8.150	1.56	14.217	6.40	20.28	0.94
2.100	0.86	8.167	1.56	14.233	6.40	20.30	0.94
2.117	0.86	8.183	1.56	14.250	6.40	20.32	0.94
2.133	0.86	8.200	1.56	14.267	2.35	20.33	0.94
2.150	0.86	8.217	1.56	14.283	2.34	20.35	0.94
2.167	0.86	8.233	1.56	14.300	2.34	20.37	0.94
2.183	0.86	8.250	1.56	14.317	2.34	20.38	0.94
2.200	0.86	8.267	2.11	14.333	2.34	20.40	0.94
2.217	0.86	8.283	2.11	14.350	2.34	20.42	0.94
2.233	0.86	8.300	2.11	14.367	2.34	20.43	0.94
2.250	0.86	8.317	2.11	14.383	2.34	20.45	0.94
2.267	1.01	8.333	2.11	14.400	2.34	20.47	0.94
2.283	1.01	8.350	2.11	14.417	2.34	20.48	0.94
2.300	1.01	8.367	2.11	14.433	2.34	20.50	0.94
2.317	1.01	8.383	2.11	14.450	2.34	20.52	0.94
2.333	1.01	8.400	2.11	14.467	2.34	20.53	0.94
2.350	1.01	8.417	2.11	14.483	2.34	20.55	0.94
2.367	1.01	8.433	2.11	14.500	2.34	20.57	0.94
2.383	1.01	8.450	2.11	14.517	2.34	20.58	0.94
2.400	1.01	8.467	2.11	14.533	2.34	20.60	0.94
2.417	1.01	8.483	2.11	14.550	2.34	20.62	0.94
2.433	1.01	8.500	2.11	14.567	2.34	20.63	0.94
2.450	1.01	8.517	2.11	14.583	2.34	20.65	0.94
2.467	1.01	8.533	2.11	14.600	2.34	20.67	0.94
2.483	1.01	8.550	2.11	14.617	2.34	20.68	0.94
2.500	1.01	8.567	2.11	14.633	2.34	20.70	0.94
2.517	1.01	8.583	2.11	14.650	2.34	20.72	0.94
2.533	1.01	8.600	2.11	14.667	2.34	20.73	0.94
2.550	1.01	8.617	2.11	14.683	2.34	20.75	0.94
2.567	1.01	8.633	2.11	14.700	2.34	20.77	0.94
2.583	1.01	8.650	2.11	14.717	2.34	20.78	0.94
2.600	1.01	8.667	2.11	14.733	2.34	20.80	0.94
2.617	1.01	8.683	2.11	14.750	2.34	20.82	0.94
2.633	1.01	8.700	2.11	14.767	2.34	20.83	0.94
2.650	1.01	8.717	2.11	14.783	2.34	20.85	0.94
2.667	1.01	8.733	2.11	14.800	2.34	20.87	0.94
2.683	1.01	8.750	2.11	14.817	2.34	20.88	0.94
2.700	1.01	8.767	2.11	14.833	2.34	20.90	0.94
2.717	1.01	8.783	2.11	14.850	2.34	20.92	0.94
2.733	1.01	8.800	2.11	14.867	2.34	20.93	0.94
2.750	1.01	8.817	2.11	14.883	2.34	20.95	0.94
2.767	1.01	8.833	2.11	14.900	2.34	20.97	0.94
2.783	1.01	8.850	2.11	14.917	2.34	20.98	0.94
2.800	1.01	8.867	2.11	14.933	2.34	21.00	0.94
2.817	1.01	8.883	2.11	14.950	2.34	21.02	0.94
2.833	1.01	8.900	2.11	14.967	2.34	21.03	0.94
2.850	1.01	8.917	2.11	14.983	2.34	21.05	0.94
2.867	1.01	8.933	2.11	15.000	2.34	21.07	0.94
2.883	1.01	8.950	2.11	15.017	2.34	21.08	0.94
2.900	1.01	8.967	2.11	15.033	2.34	21.10	0.94
2.917	1.01	8.983	2.11	15.050	2.34	21.12	0.94

Normal Operating Model Output (SCS)

2.933	1.01	9.000	2.11	15.067	2.34	21.13	0.94
2.950	1.01	9.017	2.11	15.083	2.34	21.15	0.94
2.967	1.01	9.033	2.11	15.100	2.34	21.17	0.94
2.983	1.01	9.050	2.11	15.117	2.34	21.18	0.94
3.000	1.01	9.067	2.11	15.133	2.34	21.20	0.94
3.017	1.01	9.083	2.11	15.150	2.34	21.22	0.94
3.033	1.01	9.100	2.11	15.167	2.34	21.23	0.94
3.050	1.01	9.117	2.11	15.183	2.34	21.25	0.94
3.067	1.01	9.133	2.11	15.200	2.34	21.27	0.94
3.083	1.01	9.150	2.11	15.217	2.34	21.28	0.94
3.100	1.01	9.167	2.11	15.233	2.34	21.30	0.94
3.117	1.01	9.183	2.11	15.250	2.34	21.32	0.94
3.133	1.01	9.200	2.11	15.267	2.34	21.33	0.94
3.150	1.01	9.217	2.11	15.283	2.34	21.35	0.94
3.167	1.01	9.233	2.11	15.300	2.34	21.37	0.94
3.183	1.01	9.250	2.11	15.317	2.34	21.38	0.94
3.200	1.01	9.267	2.50	15.333	2.34	21.40	0.94
3.217	1.01	9.283	2.50	15.350	2.34	21.42	0.94
3.233	1.01	9.300	2.50	15.367	2.34	21.43	0.94
3.250	1.01	9.317	2.50	15.383	2.34	21.45	0.94
3.267	1.01	9.333	2.50	15.400	2.34	21.47	0.94
3.283	1.01	9.350	2.50	15.417	2.34	21.48	0.94
3.300	1.01	9.367	2.50	15.433	2.34	21.50	0.94
3.317	1.01	9.383	2.50	15.450	2.34	21.52	0.94
3.333	1.01	9.400	2.50	15.467	2.34	21.53	0.94
3.350	1.01	9.417	2.50	15.483	2.34	21.55	0.94
3.367	1.01	9.433	2.50	15.500	2.34	21.57	0.94
3.383	1.01	9.450	2.50	15.517	2.34	21.58	0.94
3.400	1.01	9.467	2.50	15.533	2.34	21.60	0.94
3.417	1.01	9.483	2.50	15.550	2.34	21.62	0.94
3.433	1.01	9.500	2.50	15.567	2.34	21.63	0.94
3.450	1.01	9.517	2.50	15.583	2.34	21.65	0.94
3.467	1.01	9.533	2.50	15.600	2.34	21.67	0.94
3.483	1.01	9.550	2.50	15.617	2.34	21.68	0.94
3.500	1.01	9.567	2.50	15.633	2.34	21.70	0.94
3.517	1.01	9.583	2.50	15.650	2.34	21.72	0.94
3.533	1.01	9.600	2.50	15.667	2.34	21.73	0.94
3.550	1.01	9.617	2.50	15.683	2.34	21.75	0.94
3.567	1.01	9.633	2.50	15.700	2.34	21.77	0.94
3.583	1.01	9.650	2.50	15.717	2.34	21.78	0.94
3.600	1.01	9.667	2.50	15.733	2.34	21.80	0.94
3.617	1.01	9.683	2.50	15.750	2.34	21.82	0.94
3.633	1.01	9.700	2.50	15.767	2.34	21.83	0.94
3.650	1.01	9.717	2.50	15.783	2.34	21.85	0.94
3.667	1.01	9.733	2.50	15.800	2.34	21.87	0.94
3.683	1.01	9.750	2.50	15.817	2.34	21.88	0.94
3.700	1.01	9.767	2.81	15.833	2.34	21.90	0.94
3.717	1.01	9.783	2.81	15.850	2.34	21.92	0.94
3.733	1.01	9.800	2.81	15.867	2.34	21.93	0.94
3.750	1.01	9.817	2.81	15.883	2.34	21.95	0.94
3.767	1.01	9.833	2.81	15.900	2.34	21.97	0.94
3.783	1.01	9.850	2.81	15.917	2.34	21.98	0.94
3.800	1.01	9.867	2.81	15.933	2.34	22.00	0.94
3.817	1.01	9.883	2.81	15.950	2.34	22.02	0.94
3.833	1.01	9.900	2.81	15.967	2.34	22.03	0.94
3.850	1.01	9.917	2.81	15.983	2.34	22.05	0.94
3.867	1.01	9.933	2.81	16.000	2.34	22.07	0.94
3.883	1.01	9.950	2.81	16.017	2.34	22.08	0.94
3.900	1.01	9.967	2.81	16.033	2.34	22.10	0.94
3.917	1.01	9.983	2.81	16.050	2.34	22.12	0.94
3.933	1.01	10.000	2.81	16.067	2.34	22.13	0.94
3.950	1.01	10.017	2.81	16.083	2.34	22.15	0.94
3.967	1.01	10.033	2.81	16.100	2.34	22.17	0.94

Normal Operating Model Output (SCS)

3.983	1.01	10.050	2.81	16.117	2.34	22.18	0.94
4.000	1.01	10.067	2.81	16.133	2.34	22.20	0.94
4.017	1.01	10.083	2.81	16.150	2.34	22.22	0.94
4.033	1.01	10.100	2.81	16.167	2.34	22.23	0.94
4.050	1.01	10.117	2.81	16.183	2.34	22.25	0.94
4.067	1.01	10.133	2.81	16.200	2.34	22.27	0.94
4.083	1.01	10.150	2.81	16.217	2.34	22.28	0.94
4.100	1.01	10.167	2.81	16.233	2.34	22.30	0.94
4.117	1.01	10.183	2.81	16.250	2.34	22.32	0.94
4.133	1.01	10.200	2.81	16.267	1.41	22.33	0.94
4.150	1.01	10.217	2.81	16.283	1.41	22.35	0.94
4.167	1.01	10.233	2.81	16.300	1.41	22.37	0.94
4.183	1.01	10.250	2.81	16.317	1.41	22.38	0.94
4.200	1.01	10.267	3.59	16.333	1.41	22.40	0.94
4.217	1.01	10.283	3.59	16.350	1.41	22.42	0.94
4.233	1.01	10.300	3.59	16.367	1.41	22.43	0.94
4.250	1.01	10.317	3.59	16.383	1.41	22.45	0.94
4.267	1.25	10.333	3.59	16.400	1.41	22.47	0.94
4.283	1.25	10.350	3.59	16.417	1.41	22.48	0.94
4.300	1.25	10.367	3.59	16.433	1.41	22.50	0.94
4.317	1.25	10.383	3.59	16.450	1.41	22.52	0.94
4.333	1.25	10.400	3.59	16.467	1.41	22.53	0.94
4.350	1.25	10.417	3.59	16.483	1.41	22.55	0.94
4.367	1.25	10.433	3.59	16.500	1.41	22.57	0.94
4.383	1.25	10.450	3.59	16.517	1.41	22.58	0.94
4.400	1.25	10.467	3.59	16.533	1.41	22.60	0.94
4.417	1.25	10.483	3.59	16.550	1.41	22.62	0.94
4.433	1.25	10.500	3.59	16.567	1.41	22.63	0.94
4.450	1.25	10.517	3.59	16.583	1.41	22.65	0.94
4.467	1.25	10.533	3.59	16.600	1.41	22.67	0.94
4.483	1.25	10.550	3.59	16.617	1.41	22.68	0.94
4.500	1.25	10.567	3.59	16.633	1.41	22.70	0.94
4.517	1.25	10.583	3.59	16.650	1.41	22.72	0.94
4.533	1.25	10.600	3.59	16.667	1.41	22.73	0.94
4.550	1.25	10.617	3.59	16.683	1.41	22.75	0.94
4.567	1.25	10.633	3.59	16.700	1.41	22.77	0.94
4.583	1.25	10.650	3.59	16.717	1.41	22.78	0.94
4.600	1.25	10.667	3.59	16.733	1.41	22.80	0.94
4.617	1.25	10.683	3.59	16.750	1.41	22.82	0.94
4.633	1.25	10.700	3.59	16.767	1.41	22.83	0.94
4.650	1.25	10.717	3.59	16.783	1.41	22.85	0.94
4.667	1.25	10.733	3.59	16.800	1.41	22.87	0.94
4.683	1.25	10.750	3.59	16.817	1.41	22.88	0.94
4.700	1.25	10.767	4.84	16.833	1.41	22.90	0.94
4.717	1.25	10.783	4.84	16.850	1.41	22.92	0.94
4.733	1.25	10.800	4.84	16.867	1.41	22.93	0.94
4.750	1.25	10.817	4.84	16.883	1.41	22.95	0.94
4.767	1.25	10.833	4.84	16.900	1.41	22.97	0.94
4.783	1.25	10.850	4.84	16.917	1.41	22.98	0.94
4.800	1.25	10.867	4.84	16.933	1.41	23.00	0.94
4.817	1.25	10.883	4.84	16.950	1.41	23.02	0.94
4.833	1.25	10.900	4.84	16.967	1.41	23.03	0.94
4.850	1.25	10.917	4.84	16.983	1.41	23.05	0.94
4.867	1.25	10.933	4.84	17.000	1.41	23.07	0.94
4.883	1.25	10.950	4.84	17.017	1.41	23.08	0.94
4.900	1.25	10.967	4.84	17.033	1.41	23.10	0.94
4.917	1.25	10.983	4.84	17.050	1.41	23.12	0.94
4.933	1.25	11.000	4.84	17.067	1.41	23.13	0.94
4.950	1.25	11.017	4.84	17.083	1.41	23.15	0.94
4.967	1.25	11.033	4.84	17.100	1.41	23.17	0.94
4.983	1.25	11.050	4.84	17.117	1.41	23.18	0.94
5.000	1.25	11.067	4.84	17.133	1.41	23.20	0.94
5.017	1.25	11.083	4.84	17.150	1.41	23.22	0.94

Normal Operating Model Output (SCS)

5.033	1.25	11.100	4.84	17.167	1.41	23.23	0.94
5.050	1.25	11.117	4.84	17.183	1.41	23.25	0.94
5.067	1.25	11.133	4.84	17.200	1.41	23.27	0.94
5.083	1.25	11.150	4.84	17.217	1.41	23.28	0.94
5.100	1.25	11.167	4.84	17.233	1.41	23.30	0.94
5.117	1.25	11.183	4.84	17.250	1.41	23.32	0.94
5.133	1.25	11.200	4.84	17.267	1.41	23.33	0.94
5.150	1.25	11.217	4.84	17.283	1.41	23.35	0.94
5.167	1.25	11.233	4.84	17.300	1.41	23.37	0.94
5.183	1.25	11.250	4.84	17.317	1.41	23.38	0.94
5.200	1.25	11.267	7.50	17.333	1.41	23.40	0.94
5.217	1.25	11.283	7.50	17.350	1.41	23.42	0.94
5.233	1.25	11.300	7.50	17.367	1.41	23.43	0.94
5.250	1.25	11.317	7.50	17.383	1.41	23.45	0.94
5.267	1.25	11.333	7.50	17.400	1.41	23.47	0.94
5.283	1.25	11.350	7.50	17.417	1.41	23.48	0.94
5.300	1.25	11.367	7.50	17.433	1.41	23.50	0.94
5.317	1.25	11.383	7.50	17.450	1.41	23.52	0.94
5.333	1.25	11.400	7.50	17.467	1.41	23.53	0.94
5.350	1.25	11.417	7.50	17.483	1.41	23.55	0.94
5.367	1.25	11.433	7.50	17.500	1.41	23.57	0.94
5.383	1.25	11.450	7.50	17.517	1.41	23.58	0.94
5.400	1.25	11.467	7.50	17.533	1.41	23.60	0.94
5.417	1.25	11.483	7.50	17.550	1.41	23.62	0.94
5.433	1.25	11.500	7.50	17.567	1.41	23.63	0.94
5.450	1.25	11.517	7.50	17.583	1.41	23.65	0.94
5.467	1.25	11.533	7.50	17.600	1.41	23.67	0.94
5.483	1.25	11.550	7.50	17.617	1.41	23.68	0.94
5.500	1.25	11.567	7.50	17.633	1.41	23.70	0.94
5.517	1.25	11.583	7.50	17.650	1.41	23.72	0.94
5.533	1.25	11.600	7.50	17.667	1.41	23.73	0.94
5.550	1.25	11.617	7.50	17.683	1.41	23.75	0.94
5.567	1.25	11.633	7.50	17.700	1.41	23.77	0.94
5.583	1.25	11.650	7.50	17.717	1.41	23.78	0.94
5.600	1.25	11.667	7.50	17.733	1.41	23.80	0.94
5.617	1.25	11.683	7.50	17.750	1.41	23.82	0.94
5.633	1.25	11.700	7.50	17.767	1.41	23.83	0.94
5.650	1.25	11.717	7.50	17.783	1.41	23.85	0.94
5.667	1.25	11.733	7.50	17.800	1.41	23.87	0.94
5.683	1.25	11.750	7.50	17.817	1.41	23.88	0.94
5.700	1.25	11.767	32.48	17.833	1.41	23.90	0.94
5.717	1.25	11.783	32.49	17.850	1.41	23.92	0.94
5.733	1.25	11.800	32.49	17.867	1.41	23.93	0.94
5.750	1.25	11.817	32.49	17.883	1.41	23.95	0.94
5.767	1.25	11.833	32.49	17.900	1.41	23.97	0.94
5.783	1.25	11.850	32.49	17.917	1.41	23.98	0.94
5.800	1.25	11.867	32.49	17.933	1.41	24.00	0.94
5.817	1.25	11.883	32.49	17.950	1.41	24.02	0.94
5.833	1.25	11.900	32.49	17.967	1.41	24.03	0.94
5.850	1.25	11.917	32.49	17.983	1.41	24.05	0.94
5.867	1.25	11.933	32.49	18.000	1.41	24.07	0.94
5.883	1.25	11.950	32.49	18.017	1.41	24.08	0.94
5.900	1.25	11.967	32.49	18.033	1.41	24.10	0.94
5.917	1.25	11.983	32.49	18.050	1.41	24.12	0.94
5.933	1.25	12.000	32.49	18.067	1.41	24.13	0.94
5.950	1.25	12.017	86.18	18.083	1.41	24.15	0.94
5.967	1.25	12.033	86.22	18.100	1.41	24.17	0.94
5.983	1.25	12.050	86.22	18.117	1.41	24.18	0.94
6.000	1.25	12.067	86.22	18.133	1.41	24.20	0.94
6.017	1.25	12.083	86.22	18.150	1.41	24.22	0.94
6.033	1.25	12.100	86.22	18.167	1.41	24.23	0.94
6.050	1.25	12.117	86.22	18.183	1.41	24.25	0.94
6.067	1.25	12.133	86.22	18.200	1.41		

```
     Unit Hyd Qpeak  (cms)=     0.656

     PEAK FLOW       (cms)=     0.336 (i)
     TIME TO PEAK    (hrs)=    12.617
     RUNOFF VOLUME    (mm)=    24.048
     TOTAL RAINFALL   (mm)=    78.102
     RUNOFF COEFFICIENT   =     0.308

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

CALIB STANDHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 6.57 Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

```
                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          4.83            1.74
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        209.28           10.00
     Mannings n           =         0.013           0.250

     Max.Eff.Inten.(mm/hr)=         86.22           28.64
               over (min)           5.00            7.00
     Storage Coeff.  (min)=          4.22 (ii)       6.39 (ii)
     Unit Hyd. Tpeak (min)=          5.00            7.00
     Unit Hyd. peak  (cms)=          0.25            0.17
                                                     *TOTALS*
     PEAK FLOW       (cms)=          1.12            0.12          1.231 (iii)
     TIME TO PEAK    (hrs)=         12.25           12.28           12.25
     RUNOFF VOLUME    (mm)=         75.87           21.29           61.40
     TOTAL RAINFALL   (mm)=         78.10           78.10           78.10
     RUNOFF COEFFICIENT   =          0.97            0.27            0.79

       (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 (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32 Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

```
                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          2.55            1.77
     Dep. Storage     (mm)=         27.00           30.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        169.71           20.00
     Mannings n           =         0.013           0.250

     Max.Eff.Inten.(mm/hr)=         86.22          109.28
               over (min)           5.00            9.00
     Storage Coeff.  (min)=          3.72 (ii)       8.22 (ii)
     Unit Hyd. Tpeak (min)=          5.00            9.00
     Unit Hyd. peak  (cms)=          0.29            0.13
                                                     *TOTALS*
     PEAK FLOW       (cms)=          0.00            0.40          0.405 (iii)
```

Normal Operating Model Output (SCS)

TIME TO PEAK (hrs)=	12.23	12.30	12.30
RUNOFF VOLUME (mm)=	50.87	31.16	31.17
TOTAL RAINFALL (mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT =	0.65	0.40	0.40

***** 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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	6.57	1.231	12.25	61.40
	+ ID2= 2 (0002):	4.32	0.405	12.30	31.17
	ID = 3 (0009):	10.89	1.606	12.25	49.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0009):	10.89	1.606	12.25	49.41
	+ ID2= 2 (0007):	7.90	0.336	12.62	24.05
	ID = 1 (0009):	18.79	1.780	12.27	41.51

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008)				
ID= 1 DT= 1.0 min	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)=	0.259	(i)
TIME TO PEAK (hrs)=	13.017	
RUNOFF VOLUME (mm)=	18.880	
TOTAL RAINFALL (mm)=	78.102	
RUNOFF COEFFICIENT =	0.242	

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

CALIB STANDHYD (0003)				
ID= 1 DT= 1.0 min	Area (ha)=	3.20		
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

Normal Operating Model Output (SCS)

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		86.22	109.28	
over (min)		5.00	8.00	
Storage Coeff. (min)=		3.40 (ii)	7.90 (ii)	
Unit Hyd. Tpeak (min)=		5.00	8.00	
Unit Hyd. peak (cms)=		0.31	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.31	0.308 (iii)
TIME TO PEAK	(hrs)=	12.22	12.30	12.30
RUNOFF VOLUME	(mm)=	50.87	31.16	31.17
TOTAL RAINFALL	(mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT	=	0.65	0.40	0.40

***** 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 (0004)	Area (ha)=	2.70			
ID= 1 DT= 1.0 min	Total Imp(%)=	73.50	Dir. Conn.(%)=	73.50	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		86.22	28.64	
over (min)		5.00	7.00	
Storage Coeff. (min)=		3.23 (ii)	6.52 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.30	0.17	
				TOTALS
PEAK FLOW	(cms)=	0.47	0.05	0.515 (iii)
TIME TO PEAK	(hrs)=	12.25	12.28	12.25
RUNOFF VOLUME	(mm)=	75.87	21.29	61.40
TOTAL RAINFALL	(mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT	=	0.97	0.27	0.79

(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 (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):		3.20	0.308	12.30	31.17
+ ID2= 2 (0004):		2.70	0.515	12.25	61.40
ID = 3 (0010):		5.90	0.806	12.25	45.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0010):		5.90	0.806	12.25	45.00
+ ID2= 2 (0008):		11.10	0.259	13.02	18.88
ID = 1 (0010):		17.00	0.884	12.27	31.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0010):		17.00	0.884	12.27	31.99
+ ID2= 2 (0009):		18.79	1.780	12.27	41.51
ID = 3 (0011):		35.79	2.664	12.27	36.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
STANDHYD (0013)	Area (ha)=	6.58			
ID= 1 DT= 1.0 min	Total Imp(%)=	44.40	Dir. Conn.(%)=	33.80	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	86.22	39.17	
over	(min)	5.00	12.00	
Storage Coeff.	(min)=	4.22 (ii)	11.91 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	12.00	
Unit Hyd. peak	(cms)=	0.25	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.52	0.26	0.732 (iii)
TIME TO PEAK	(hrs)=	12.25	12.35	12.27
RUNOFF VOLUME	(mm)=	75.86	24.45	41.83
TOTAL RAINFALL	(mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT	=	0.97	0.31	0.54

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

```
                    Normal Operating Model Output (SCS)
          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  (  0012)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)      (cms)      (hrs)       (mm)
        ID1= 1 (  0011):     35.79      2.664      12.27      36.99
      + ID2= 2 (  0013):      6.58      0.732      12.27      41.83
        ==========================================================
        ID = 3 (  0012):     42.37      3.396      12.27      37.74

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW       STORAGE    |     OUTFLOW         STORAGE
--------------------         (cms)       (ha.m.)    |    (cms)           (ha.m.)
                             0.0000       0.0000    |      0.0001         5.0000

                                   AREA       QPEAK       TPEAK       R.V.
                                   (ha)       (cms)       (hrs)       (mm)
   INFLOW : ID= 2 (  0012)       42.370       3.396       12.27      37.74
   OUTFLOW: ID= 1 (  0014)       42.370       0.000       28.00       0.01

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                  TIME SHIFT OF PEAK FLOW          (min)=944.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  1.5988

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================================================================================
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       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\4c1e6
883-4992-4c69-aecc-26cd243b3226\scen
  Summary filename:
```

Normal Operating Model Output (SCS)
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\4c1e6883-4992-4c69-aecc-26cd243b3226\scen

DATE: 03/29/2018 TIME: 03:40:24

USER:

COMMENTS: SCS 25 year

****
** Run 04 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\a8a29570-55aa-42fd-8717-83625671f7d2\44e43aad
Ptotal= 95.20 mm	Comments: 50yrSCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	1.90	12.75	13.71	19.00	1.71
0.50	1.05	6.75	1.90	13.00	7.04	19.25	1.71
0.75	1.05	7.00	1.90	13.25	7.04	19.50	1.71
1.00	1.05	7.25	1.90	13.50	1.33	19.75	1.71
1.25	1.05	7.50	1.90	13.75	1.33	20.00	1.71
1.50	1.05	7.75	1.90	14.00	7.81	20.25	1.71
1.75	1.05	8.00	1.90	14.25	7.81	20.50	1.14
2.00	1.05	8.25	1.90	14.50	2.86	20.75	1.14
2.25	1.05	8.50	2.57	14.75	2.86	21.00	1.14
2.50	1.24	8.75	2.57	15.00	2.86	21.25	1.14
2.75	1.24	9.00	2.57	15.25	2.86	21.50	1.14
3.00	1.24	9.25	2.57	15.50	2.86	21.75	1.14
3.25	1.24	9.50	3.05	15.75	2.86	22.00	1.14
3.50	1.24	9.75	3.05	16.00	2.86	22.25	1.14
3.75	1.24	10.00	3.43	16.25	2.86	22.50	1.14
4.00	1.24	10.25	3.43	16.50	1.71	22.75	1.14
4.25	1.24	10.50	4.38	16.75	1.71	23.00	1.14
4.50	1.52	10.75	4.38	17.00	1.71	23.25	1.14
4.75	1.52	11.00	5.90	17.25	1.71	23.50	1.14
5.00	1.52	11.25	5.90	17.50	1.71	23.75	1.14
5.25	1.52	11.50	9.14	17.75	1.71	24.00	1.14
5.50	1.52	11.75	9.14	18.00	1.71	24.25	1.14
5.75	1.52	12.00	39.60	18.25	1.71		
6.00	1.52	12.25	105.10	18.50	1.71		
6.25	1.52	12.50	13.71	18.75	1.71		

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	1.52	12.150	105.10	18.22	1.71
0.033	0.00	6.100	1.52	12.167	105.10	18.23	1.71
0.050	0.00	6.117	1.52	12.183	105.10	18.25	1.71
0.067	0.00	6.133	1.52	12.200	105.10	18.27	1.71
0.083	0.00	6.150	1.52	12.217	105.10	18.28	1.71
0.100	0.00	6.167	1.52	12.233	105.10	18.30	1.71
0.117	0.00	6.183	1.52	12.250	105.10	18.32	1.71
0.133	0.00	6.200	1.52	12.267	13.79	18.33	1.71
0.150	0.00	6.217	1.52	12.283	13.71	18.35	1.71
0.167	0.00	6.233	1.52	12.300	13.71	18.37	1.71
0.183	0.00	6.250	1.52	12.317	13.71	18.38	1.71
0.200	0.00	6.267	1.90	12.333	13.71	18.40	1.71
0.217	0.00	6.283	1.90	12.350	13.71	18.42	1.71
0.233	0.00	6.300	1.90	12.367	13.71	18.43	1.71
0.250	0.00	6.317	1.90	12.383	13.71	18.45	1.71
0.267	1.05	6.333	1.90	12.400	13.71	18.47	1.71
0.283	1.05	6.350	1.90	12.417	13.71	18.48	1.71
0.300	1.05	6.367	1.90	12.433	13.71	18.50	1.71
0.317	1.05	6.383	1.90	12.450	13.71	18.52	1.71
0.333	1.05	6.400	1.90	12.467	13.71	18.53	1.71
0.350	1.05	6.417	1.90	12.483	13.71	18.55	1.71
0.367	1.05	6.433	1.90	12.500	13.71	18.57	1.71
0.383	1.05	6.450	1.90	12.517	13.71	18.58	1.71
0.400	1.05	6.467	1.90	12.533	13.71	18.60	1.71
0.417	1.05	6.483	1.90	12.550	13.71	18.62	1.71
0.433	1.05	6.500	1.90	12.567	13.71	18.63	1.71
0.450	1.05	6.517	1.90	12.583	13.71	18.65	1.71
0.467	1.05	6.533	1.90	12.600	13.71	18.67	1.71
0.483	1.05	6.550	1.90	12.617	13.71	18.68	1.71
0.500	1.05	6.567	1.90	12.633	13.71	18.70	1.71
0.517	1.05	6.583	1.90	12.650	13.71	18.72	1.71
0.533	1.05	6.600	1.90	12.667	13.71	18.73	1.71
0.550	1.05	6.617	1.90	12.683	13.71	18.75	1.71
0.567	1.05	6.633	1.90	12.700	13.71	18.77	1.71
0.583	1.05	6.650	1.90	12.717	13.71	18.78	1.71
0.600	1.05	6.667	1.90	12.733	13.71	18.80	1.71
0.617	1.05	6.683	1.90	12.750	13.71	18.82	1.71
0.633	1.05	6.700	1.90	12.767	7.05	18.83	1.71
0.650	1.05	6.717	1.90	12.783	7.04	18.85	1.71
0.667	1.05	6.733	1.90	12.800	7.04	18.87	1.71
0.683	1.05	6.750	1.90	12.817	7.04	18.88	1.71
0.700	1.05	6.767	1.90	12.833	7.04	18.90	1.71
0.717	1.05	6.783	1.90	12.850	7.04	18.92	1.71
0.733	1.05	6.800	1.90	12.867	7.04	18.93	1.71
0.750	1.05	6.817	1.90	12.883	7.04	18.95	1.71
0.767	1.05	6.833	1.90	12.900	7.04	18.97	1.71
0.783	1.05	6.850	1.90	12.917	7.04	18.98	1.71
0.800	1.05	6.867	1.90	12.933	7.04	19.00	1.71
0.817	1.05	6.883	1.90	12.950	7.04	19.02	1.71
0.833	1.05	6.900	1.90	12.967	7.04	19.03	1.71
0.850	1.05	6.917	1.90	12.983	7.04	19.05	1.71
0.867	1.05	6.933	1.90	13.000	7.04	19.07	1.71
0.883	1.05	6.950	1.90	13.017	7.04	19.08	1.71
0.900	1.05	6.967	1.90	13.033	7.04	19.10	1.71
0.917	1.05	6.983	1.90	13.050	7.04	19.12	1.71
0.933	1.05	7.000	1.90	13.067	7.04	19.13	1.71
0.950	1.05	7.017	1.90	13.083	7.04	19.15	1.71
0.967	1.05	7.033	1.90	13.100	7.04	19.17	1.71

Normal Operating Model Output (SCS)

0.983	1.05	7.050	1.90	13.117	7.04	19.18	1.71
1.000	1.05	7.067	1.90	13.133	7.04	19.20	1.71
1.017	1.05	7.083	1.90	13.150	7.04	19.22	1.71
1.033	1.05	7.100	1.90	13.167	7.04	19.23	1.71
1.050	1.05	7.117	1.90	13.183	7.04	19.25	1.71
1.067	1.05	7.133	1.90	13.200	7.04	19.27	1.71
1.083	1.05	7.150	1.90	13.217	7.04	19.28	1.71
1.100	1.05	7.167	1.90	13.233	7.04	19.30	1.71
1.117	1.05	7.183	1.90	13.250	7.04	19.32	1.71
1.133	1.05	7.200	1.90	13.267	1.34	19.33	1.71
1.150	1.05	7.217	1.90	13.283	1.33	19.35	1.71
1.167	1.05	7.233	1.90	13.300	1.33	19.37	1.71
1.183	1.05	7.250	1.90	13.317	1.33	19.38	1.71
1.200	1.05	7.267	1.90	13.333	1.33	19.40	1.71
1.217	1.05	7.283	1.90	13.350	1.33	19.42	1.71
1.233	1.05	7.300	1.90	13.367	1.33	19.43	1.71
1.250	1.05	7.317	1.90	13.383	1.33	19.45	1.71
1.267	1.05	7.333	1.90	13.400	1.33	19.47	1.71
1.283	1.05	7.350	1.90	13.417	1.33	19.48	1.71
1.300	1.05	7.367	1.90	13.433	1.33	19.50	1.71
1.317	1.05	7.383	1.90	13.450	1.33	19.52	1.71
1.333	1.05	7.400	1.90	13.467	1.33	19.53	1.71
1.350	1.05	7.417	1.90	13.483	1.33	19.55	1.71
1.367	1.05	7.433	1.90	13.500	1.33	19.57	1.71
1.383	1.05	7.450	1.90	13.517	1.33	19.58	1.71
1.400	1.05	7.467	1.90	13.533	1.33	19.60	1.71
1.417	1.05	7.483	1.90	13.550	1.33	19.62	1.71
1.433	1.05	7.500	1.90	13.567	1.33	19.63	1.71
1.450	1.05	7.517	1.90	13.583	1.33	19.65	1.71
1.467	1.05	7.533	1.90	13.600	1.33	19.67	1.71
1.483	1.05	7.550	1.90	13.617	1.33	19.68	1.71
1.500	1.05	7.567	1.90	13.633	1.33	19.70	1.71
1.517	1.05	7.583	1.90	13.650	1.33	19.72	1.71
1.533	1.05	7.600	1.90	13.667	1.33	19.73	1.71
1.550	1.05	7.617	1.90	13.683	1.33	19.75	1.71
1.567	1.05	7.633	1.90	13.700	1.33	19.77	1.71
1.583	1.05	7.650	1.90	13.717	1.33	19.78	1.71
1.600	1.05	7.667	1.90	13.733	1.33	19.80	1.71
1.617	1.05	7.683	1.90	13.750	1.33	19.82	1.71
1.633	1.05	7.700	1.90	13.767	7.79	19.83	1.71
1.650	1.05	7.717	1.90	13.783	7.81	19.85	1.71
1.667	1.05	7.733	1.90	13.800	7.81	19.87	1.71
1.683	1.05	7.750	1.90	13.817	7.81	19.88	1.71
1.700	1.05	7.767	1.90	13.833	7.81	19.90	1.71
1.717	1.05	7.783	1.90	13.850	7.81	19.92	1.71
1.733	1.05	7.800	1.90	13.867	7.81	19.93	1.71
1.750	1.05	7.817	1.90	13.883	7.81	19.95	1.71
1.767	1.05	7.833	1.90	13.900	7.81	19.97	1.71
1.783	1.05	7.850	1.90	13.917	7.81	19.98	1.71
1.800	1.05	7.867	1.90	13.933	7.81	20.00	1.71
1.817	1.05	7.883	1.90	13.950	7.81	20.02	1.71
1.833	1.05	7.900	1.90	13.967	7.81	20.03	1.71
1.850	1.05	7.917	1.90	13.983	7.81	20.05	1.71
1.867	1.05	7.933	1.90	14.000	7.81	20.07	1.71
1.883	1.05	7.950	1.90	14.017	7.81	20.08	1.71
1.900	1.05	7.967	1.90	14.033	7.81	20.10	1.71
1.917	1.05	7.983	1.90	14.050	7.81	20.12	1.71
1.933	1.05	8.000	1.90	14.067	7.81	20.13	1.71
1.950	1.05	8.017	1.90	14.083	7.81	20.15	1.71
1.967	1.05	8.033	1.90	14.100	7.81	20.17	1.71
1.983	1.05	8.050	1.90	14.117	7.81	20.18	1.71
2.000	1.05	8.067	1.90	14.133	7.81	20.20	1.71
2.017	1.05	8.083	1.90	14.150	7.81	20.22	1.71

Normal Operating Model Output (SCS)

2.033	1.05	8.100	1.90	14.167	7.81	20.23	1.71
2.050	1.05	8.117	1.90	14.183	7.81	20.25	1.71
2.067	1.05	8.133	1.90	14.200	7.81	20.27	1.15
2.083	1.05	8.150	1.90	14.217	7.81	20.28	1.14
2.100	1.05	8.167	1.90	14.233	7.81	20.30	1.14
2.117	1.05	8.183	1.90	14.250	7.81	20.32	1.14
2.133	1.05	8.200	1.90	14.267	2.87	20.33	1.14
2.150	1.05	8.217	1.90	14.283	2.86	20.35	1.14
2.167	1.05	8.233	1.90	14.300	2.86	20.37	1.14
2.183	1.05	8.250	1.91	14.317	2.86	20.38	1.14
2.200	1.05	8.267	2.57	14.333	2.86	20.40	1.14
2.217	1.05	8.283	2.57	14.350	2.86	20.42	1.14
2.233	1.05	8.300	2.57	14.367	2.86	20.43	1.14
2.250	1.05	8.317	2.57	14.383	2.86	20.45	1.14
2.267	1.24	8.333	2.57	14.400	2.86	20.47	1.14
2.283	1.24	8.350	2.57	14.417	2.86	20.48	1.14
2.300	1.24	8.367	2.57	14.433	2.86	20.50	1.14
2.317	1.24	8.383	2.57	14.450	2.86	20.52	1.14
2.333	1.24	8.400	2.57	14.467	2.86	20.53	1.14
2.350	1.24	8.417	2.57	14.483	2.86	20.55	1.14
2.367	1.24	8.433	2.57	14.500	2.86	20.57	1.14
2.383	1.24	8.450	2.57	14.517	2.86	20.58	1.14
2.400	1.24	8.467	2.57	14.533	2.86	20.60	1.14
2.417	1.24	8.483	2.57	14.550	2.86	20.62	1.14
2.433	1.24	8.500	2.57	14.567	2.86	20.63	1.14
2.450	1.24	8.517	2.57	14.583	2.86	20.65	1.14
2.467	1.24	8.533	2.57	14.600	2.86	20.67	1.14
2.483	1.24	8.550	2.57	14.617	2.86	20.68	1.14
2.500	1.24	8.567	2.57	14.633	2.86	20.70	1.14
2.517	1.24	8.583	2.57	14.650	2.86	20.72	1.14
2.533	1.24	8.600	2.57	14.667	2.86	20.73	1.14
2.550	1.24	8.617	2.57	14.683	2.86	20.75	1.14
2.567	1.24	8.633	2.57	14.700	2.86	20.77	1.14
2.583	1.24	8.650	2.57	14.717	2.86	20.78	1.14
2.600	1.24	8.667	2.57	14.733	2.86	20.80	1.14
2.617	1.24	8.683	2.57	14.750	2.86	20.82	1.14
2.633	1.24	8.700	2.57	14.767	2.86	20.83	1.14
2.650	1.24	8.717	2.57	14.783	2.86	20.85	1.14
2.667	1.24	8.733	2.57	14.800	2.86	20.87	1.14
2.683	1.24	8.750	2.57	14.817	2.86	20.88	1.14
2.700	1.24	8.767	2.57	14.833	2.86	20.90	1.14
2.717	1.24	8.783	2.57	14.850	2.86	20.92	1.14
2.733	1.24	8.800	2.57	14.867	2.86	20.93	1.14
2.750	1.24	8.817	2.57	14.883	2.86	20.95	1.14
2.767	1.24	8.833	2.57	14.900	2.86	20.97	1.14
2.783	1.24	8.850	2.57	14.917	2.86	20.98	1.14
2.800	1.24	8.867	2.57	14.933	2.86	21.00	1.14
2.817	1.24	8.883	2.57	14.950	2.86	21.02	1.14
2.833	1.24	8.900	2.57	14.967	2.86	21.03	1.14
2.850	1.24	8.917	2.57	14.983	2.86	21.05	1.14
2.867	1.24	8.933	2.57	15.000	2.86	21.07	1.14
2.883	1.24	8.950	2.57	15.017	2.86	21.08	1.14
2.900	1.24	8.967	2.57	15.033	2.86	21.10	1.14
2.917	1.24	8.983	2.57	15.050	2.86	21.12	1.14
2.933	1.24	9.000	2.57	15.067	2.86	21.13	1.14
2.950	1.24	9.017	2.57	15.083	2.86	21.15	1.14
2.967	1.24	9.033	2.57	15.100	2.86	21.17	1.14
2.983	1.24	9.050	2.57	15.117	2.86	21.18	1.14
3.000	1.24	9.067	2.57	15.133	2.86	21.20	1.14
3.017	1.24	9.083	2.57	15.150	2.86	21.22	1.14
3.033	1.24	9.100	2.57	15.167	2.86	21.23	1.14
3.050	1.24	9.117	2.57	15.183	2.86	21.25	1.14
3.067	1.24	9.133	2.57	15.200	2.86	21.27	1.14

Normal Operating Model Output (SCS)

3.083	1.24	9.150	2.57	15.217	2.86	21.28	1.14
3.100	1.24	9.167	2.57	15.233	2.86	21.30	1.14
3.117	1.24	9.183	2.57	15.250	2.86	21.32	1.14
3.133	1.24	9.200	2.57	15.267	2.86	21.33	1.14
3.150	1.24	9.217	2.57	15.283	2.86	21.35	1.14
3.167	1.24	9.233	2.57	15.300	2.86	21.37	1.14
3.183	1.24	9.250	2.57	15.317	2.86	21.38	1.14
3.200	1.24	9.267	3.05	15.333	2.86	21.40	1.14
3.217	1.24	9.283	3.05	15.350	2.86	21.42	1.14
3.233	1.24	9.300	3.05	15.367	2.86	21.43	1.14
3.250	1.24	9.317	3.05	15.383	2.86	21.45	1.14
3.267	1.24	9.333	3.05	15.400	2.86	21.47	1.14
3.283	1.24	9.350	3.05	15.417	2.86	21.48	1.14
3.300	1.24	9.367	3.05	15.433	2.86	21.50	1.14
3.317	1.24	9.383	3.05	15.450	2.86	21.52	1.14
3.333	1.24	9.400	3.05	15.467	2.86	21.53	1.14
3.350	1.24	9.417	3.05	15.483	2.86	21.55	1.14
3.367	1.24	9.433	3.05	15.500	2.86	21.57	1.14
3.383	1.24	9.450	3.05	15.517	2.86	21.58	1.14
3.400	1.24	9.467	3.05	15.533	2.86	21.60	1.14
3.417	1.24	9.483	3.05	15.550	2.86	21.62	1.14
3.433	1.24	9.500	3.05	15.567	2.86	21.63	1.14
3.450	1.24	9.517	3.05	15.583	2.86	21.65	1.14
3.467	1.24	9.533	3.05	15.600	2.86	21.67	1.14
3.483	1.24	9.550	3.05	15.617	2.86	21.68	1.14
3.500	1.24	9.567	3.05	15.633	2.86	21.70	1.14
3.517	1.24	9.583	3.05	15.650	2.86	21.72	1.14
3.533	1.24	9.600	3.05	15.667	2.86	21.73	1.14
3.550	1.24	9.617	3.05	15.683	2.86	21.75	1.14
3.567	1.24	9.633	3.05	15.700	2.86	21.77	1.14
3.583	1.24	9.650	3.05	15.717	2.86	21.78	1.14
3.600	1.24	9.667	3.05	15.733	2.86	21.80	1.14
3.617	1.24	9.683	3.05	15.750	2.86	21.82	1.14
3.633	1.24	9.700	3.05	15.767	2.86	21.83	1.14
3.650	1.24	9.717	3.05	15.783	2.86	21.85	1.14
3.667	1.24	9.733	3.05	15.800	2.86	21.87	1.14
3.683	1.24	9.750	3.05	15.817	2.86	21.88	1.14
3.700	1.24	9.767	3.43	15.833	2.86	21.90	1.14
3.717	1.24	9.783	3.43	15.850	2.86	21.92	1.14
3.733	1.24	9.800	3.43	15.867	2.86	21.93	1.14
3.750	1.24	9.817	3.43	15.883	2.86	21.95	1.14
3.767	1.24	9.833	3.43	15.900	2.86	21.97	1.14
3.783	1.24	9.850	3.43	15.917	2.86	21.98	1.14
3.800	1.24	9.867	3.43	15.933	2.86	22.00	1.14
3.817	1.24	9.883	3.43	15.950	2.86	22.02	1.14
3.833	1.24	9.900	3.43	15.967	2.86	22.03	1.14
3.850	1.24	9.917	3.43	15.983	2.86	22.05	1.14
3.867	1.24	9.933	3.43	16.000	2.86	22.07	1.14
3.883	1.24	9.950	3.43	16.017	2.86	22.08	1.14
3.900	1.24	9.967	3.43	16.033	2.86	22.10	1.14
3.917	1.24	9.983	3.43	16.050	2.86	22.12	1.14
3.933	1.24	10.000	3.43	16.067	2.86	22.13	1.14
3.950	1.24	10.017	3.43	16.083	2.86	22.15	1.14
3.967	1.24	10.033	3.43	16.100	2.86	22.17	1.14
3.983	1.24	10.050	3.43	16.117	2.86	22.18	1.14
4.000	1.24	10.067	3.43	16.133	2.86	22.20	1.14
4.017	1.24	10.083	3.43	16.150	2.86	22.22	1.14
4.033	1.24	10.100	3.43	16.167	2.86	22.23	1.14
4.050	1.24	10.117	3.43	16.183	2.86	22.25	1.14
4.067	1.24	10.133	3.43	16.200	2.86	22.27	1.14
4.083	1.24	10.150	3.43	16.217	2.86	22.28	1.14
4.100	1.24	10.167	3.43	16.233	2.86	22.30	1.14
4.117	1.24	10.183	3.43	16.250	2.86	22.32	1.14

Normal Operating Model Output (SCS)

4.133	1.24	10.200	3.43	16.267	1.72	22.33	1.14
4.150	1.24	10.217	3.43	16.283	1.71	22.35	1.14
4.167	1.24	10.233	3.43	16.300	1.71	22.37	1.14
4.183	1.24	10.250	3.43	16.317	1.71	22.38	1.14
4.200	1.24	10.267	4.38	16.333	1.71	22.40	1.14
4.217	1.24	10.283	4.38	16.350	1.71	22.42	1.14
4.233	1.24	10.300	4.38	16.367	1.71	22.43	1.14
4.250	1.24	10.317	4.38	16.383	1.71	22.45	1.14
4.267	1.52	10.333	4.38	16.400	1.71	22.47	1.14
4.283	1.52	10.350	4.38	16.417	1.71	22.48	1.14
4.300	1.52	10.367	4.38	16.433	1.71	22.50	1.14
4.317	1.52	10.383	4.38	16.450	1.71	22.52	1.14
4.333	1.52	10.400	4.38	16.467	1.71	22.53	1.14
4.350	1.52	10.417	4.38	16.483	1.71	22.55	1.14
4.367	1.52	10.433	4.38	16.500	1.71	22.57	1.14
4.383	1.52	10.450	4.38	16.517	1.71	22.58	1.14
4.400	1.52	10.467	4.38	16.533	1.71	22.60	1.14
4.417	1.52	10.483	4.38	16.550	1.71	22.62	1.14
4.433	1.52	10.500	4.38	16.567	1.71	22.63	1.14
4.450	1.52	10.517	4.38	16.583	1.71	22.65	1.14
4.467	1.52	10.533	4.38	16.600	1.71	22.67	1.14
4.483	1.52	10.550	4.38	16.617	1.71	22.68	1.14
4.500	1.52	10.567	4.38	16.633	1.71	22.70	1.14
4.517	1.52	10.583	4.38	16.650	1.71	22.72	1.14
4.533	1.52	10.600	4.38	16.667	1.71	22.73	1.14
4.550	1.52	10.617	4.38	16.683	1.71	22.75	1.14
4.567	1.52	10.633	4.38	16.700	1.71	22.77	1.14
4.583	1.52	10.650	4.38	16.717	1.71	22.78	1.14
4.600	1.52	10.667	4.38	16.733	1.71	22.80	1.14
4.617	1.52	10.683	4.38	16.750	1.71	22.82	1.14
4.633	1.52	10.700	4.38	16.767	1.71	22.83	1.14
4.650	1.52	10.717	4.38	16.783	1.71	22.85	1.14
4.667	1.52	10.733	4.38	16.800	1.71	22.87	1.14
4.683	1.52	10.750	4.38	16.817	1.71	22.88	1.14
4.700	1.52	10.767	5.90	16.833	1.71	22.90	1.14
4.717	1.52	10.783	5.90	16.850	1.71	22.92	1.14
4.733	1.52	10.800	5.90	16.867	1.71	22.93	1.14
4.750	1.52	10.817	5.90	16.883	1.71	22.95	1.14
4.767	1.52	10.833	5.90	16.900	1.71	22.97	1.14
4.783	1.52	10.850	5.90	16.917	1.71	22.98	1.14
4.800	1.52	10.867	5.90	16.933	1.71	23.00	1.14
4.817	1.52	10.883	5.90	16.950	1.71	23.02	1.14
4.833	1.52	10.900	5.90	16.967	1.71	23.03	1.14
4.850	1.52	10.917	5.90	16.983	1.71	23.05	1.14
4.867	1.52	10.933	5.90	17.000	1.71	23.07	1.14
4.883	1.52	10.950	5.90	17.017	1.71	23.08	1.14
4.900	1.52	10.967	5.90	17.033	1.71	23.10	1.14
4.917	1.52	10.983	5.90	17.050	1.71	23.12	1.14
4.933	1.52	11.000	5.90	17.067	1.71	23.13	1.14
4.950	1.52	11.017	5.90	17.083	1.71	23.15	1.14
4.967	1.52	11.033	5.90	17.100	1.71	23.17	1.14
4.983	1.52	11.050	5.90	17.117	1.71	23.18	1.14
5.000	1.52	11.067	5.90	17.133	1.71	23.20	1.14
5.017	1.52	11.083	5.90	17.150	1.71	23.22	1.14
5.033	1.52	11.100	5.90	17.167	1.71	23.23	1.14
5.050	1.52	11.117	5.90	17.183	1.71	23.25	1.14
5.067	1.52	11.133	5.90	17.200	1.71	23.27	1.14
5.083	1.52	11.150	5.90	17.217	1.71	23.28	1.14
5.100	1.52	11.167	5.90	17.233	1.71	23.30	1.14
5.117	1.52	11.183	5.90	17.250	1.71	23.32	1.14
5.133	1.52	11.200	5.90	17.267	1.71	23.33	1.14
5.150	1.52	11.217	5.90	17.283	1.71	23.35	1.14
5.167	1.52	11.233	5.90	17.300	1.71	23.37	1.14

Normal Operating Model Output (SCS)

5.183	1.52	11.250	5.90	17.317	1.71	23.38	1.14
5.200	1.52	11.267	9.14	17.333	1.71	23.40	1.14
5.217	1.52	11.283	9.14	17.350	1.71	23.42	1.14
5.233	1.52	11.300	9.14	17.367	1.71	23.43	1.14
5.250	1.52	11.317	9.14	17.383	1.71	23.45	1.14
5.267	1.52	11.333	9.14	17.400	1.71	23.47	1.14
5.283	1.52	11.350	9.14	17.417	1.71	23.48	1.14
5.300	1.52	11.367	9.14	17.433	1.71	23.50	1.14
5.317	1.52	11.383	9.14	17.450	1.71	23.52	1.14
5.333	1.52	11.400	9.14	17.467	1.71	23.53	1.14
5.350	1.52	11.417	9.14	17.483	1.71	23.55	1.14
5.367	1.52	11.433	9.14	17.500	1.71	23.57	1.14
5.383	1.52	11.450	9.14	17.517	1.71	23.58	1.14
5.400	1.52	11.467	9.14	17.533	1.71	23.60	1.14
5.417	1.52	11.483	9.14	17.550	1.71	23.62	1.14
5.433	1.52	11.500	9.14	17.567	1.71	23.63	1.14
5.450	1.52	11.517	9.14	17.583	1.71	23.65	1.14
5.467	1.52	11.533	9.14	17.600	1.71	23.67	1.14
5.483	1.52	11.550	9.14	17.617	1.71	23.68	1.14
5.500	1.52	11.567	9.14	17.633	1.71	23.70	1.14
5.517	1.52	11.583	9.14	17.650	1.71	23.72	1.14
5.533	1.52	11.600	9.14	17.667	1.71	23.73	1.14
5.550	1.52	11.617	9.14	17.683	1.71	23.75	1.14
5.567	1.52	11.633	9.14	17.700	1.71	23.77	1.14
5.583	1.52	11.650	9.14	17.717	1.71	23.78	1.14
5.600	1.52	11.667	9.14	17.733	1.71	23.80	1.14
5.617	1.52	11.683	9.14	17.750	1.71	23.82	1.14
5.633	1.52	11.700	9.14	17.767	1.71	23.83	1.14
5.650	1.52	11.717	9.14	17.783	1.71	23.85	1.14
5.667	1.52	11.733	9.14	17.800	1.71	23.87	1.14
5.683	1.52	11.750	9.14	17.817	1.71	23.88	1.14
5.700	1.52	11.767	39.59	17.833	1.71	23.90	1.14
5.717	1.52	11.783	39.60	17.850	1.71	23.92	1.14
5.733	1.52	11.800	39.60	17.867	1.71	23.93	1.14
5.750	1.52	11.817	39.60	17.883	1.71	23.95	1.14
5.767	1.52	11.833	39.60	17.900	1.71	23.97	1.14
5.783	1.52	11.850	39.60	17.917	1.71	23.98	1.14
5.800	1.52	11.867	39.60	17.933	1.71	24.00	1.14
5.817	1.52	11.883	39.60	17.950	1.71	24.02	1.14
5.833	1.52	11.900	39.60	17.967	1.71	24.03	1.14
5.850	1.52	11.917	39.60	17.983	1.71	24.05	1.14
5.867	1.52	11.933	39.60	18.000	1.71	24.07	1.14
5.883	1.52	11.950	39.60	18.017	1.71	24.08	1.14
5.900	1.52	11.967	39.60	18.033	1.71	24.10	1.14
5.917	1.52	11.983	39.60	18.050	1.71	24.12	1.14
5.933	1.52	12.000	39.60	18.067	1.71	24.13	1.14
5.950	1.52	12.017	105.06	18.083	1.71	24.15	1.14
5.967	1.52	12.033	105.10	18.100	1.71	24.17	1.14
5.983	1.52	12.050	105.10	18.117	1.71	24.18	1.14
6.000	1.52	12.067	105.10	18.133	1.71	24.20	1.14
6.017	1.52	12.083	105.10	18.150	1.71	24.22	1.14
6.033	1.52	12.100	105.10	18.167	1.71	24.23	1.14
6.050	1.52	12.117	105.10	18.183	1.71	24.25	1.14
6.067	1.52	12.133	105.10	18.200	1.71		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.474 (i)
TIME TO PEAK (hrs)= 12.617
RUNOFF VOLUME (mm)= 33.892
TOTAL RAINFALL (mm)= 95.200
RUNOFF COEFFICIENT = 0.356

Normal Operating Model Output (SCS)

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

CALIB STANDHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 6.57 Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		105.10	40.82	
over (min)		5.00	6.00	
Storage Coeff.	(min)=	3.90 (ii)	5.90 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	6.00	
Unit Hyd. peak	(cms)=	0.26	0.19	
				TOTALS
PEAK FLOW	(cms)=	1.37	0.17	1.543 (iii)
TIME TO PEAK	(hrs)=	12.25	12.27	12.25
RUNOFF VOLUME	(mm)=	92.91	30.34	76.33
TOTAL RAINFALL	(mm)=	95.20	95.20	95.20
RUNOFF COEFFICIENT	=	0.98	0.32	0.80

(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 (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32 Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		105.10	153.20	
over (min)		5.00	8.00	
Storage Coeff.	(min)=	3.44 (ii)	7.37 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	8.00	
Unit Hyd. peak	(cms)=	0.30	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.60	0.603 (iii)
TIME TO PEAK	(hrs)=	12.25	12.28	12.28
RUNOFF VOLUME	(mm)=	67.91	44.03	44.04
TOTAL RAINFALL	(mm)=	95.20	95.20	95.20
RUNOFF COEFFICIENT	=	0.71	0.46	0.46

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

Normal Operating Model Output (SCS)

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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		6.57	1.543	12.25	76.33
+ ID2= 2 (0002):		4.32	0.603	12.28	44.04
ID = 3 (0009):		10.89	2.120	12.25	63.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0009):		10.89	2.120	12.25	63.52
+ ID2= 2 (0007):		7.90	0.474	12.62	33.89
ID = 1 (0009):		18.79	2.367	12.27	54.74

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008)	ID= 1 DT= 1.0 min				
		Area (ha)=	11.10	Curve Number (CN)=	66.4
		Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
		U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.373 (i)
TIME TO PEAK (hrs)= 13.017
RUNOFF VOLUME (mm)= 27.168
TOTAL RAINFALL (mm)= 95.200
RUNOFF COEFFICIENT = 0.285

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

CALIB STANDHYD (0003)	ID= 1 DT= 1.0 min				
		Area (ha)=	3.20		
		Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.89	1.31
Dep. Storage	(mm)=	27.00	30.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	146.06	20.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		105.10	153.20
over (min)		5.00	8.00

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                        Normal Operating Model Output (SCS)
     Storage Coeff.  (min)=          3.14 (ii)       7.07 (ii)
     Unit Hyd. Tpeak (min)=          5.00            8.00
     Unit Hyd. peak  (cms)=          0.32            0.15
                                                                  *TOTALS*
     PEAK FLOW       (cms)=          0.00            0.45          0.452 (iii)
     TIME TO PEAK    (hrs)=         12.22           12.28          12.28
     RUNOFF VOLUME    (mm)=         67.91           44.03          44.04
     TOTAL RAINFALL   (mm)=         95.20           95.20          95.20
     RUNOFF COEFFICIENT    =         0.71            0.46           0.46

***** 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.

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| CALIB            |
| STANDHYD (  0004)|   Area    (ha)=      2.70
|ID= 1 DT= 1.0 min |   Total Imp(%)=     73.50   Dir. Conn.(%)=  73.50
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                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          1.98            0.72
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        134.16           20.00
     Mannings n             =       0.013           0.250

     Max.Eff.Inten.(mm/hr)=        105.10           40.82
               over (min)            5.00            7.00
     Storage Coeff.  (min)=          2.99 (ii)       6.02 (ii)
     Unit Hyd. Tpeak (min)=          5.00            7.00
     Unit Hyd. peak  (cms)=          0.31            0.18
                                                                  *TOTALS*
     PEAK FLOW       (cms)=          0.57            0.07          0.641 (iii)
     TIME TO PEAK    (hrs)=         12.25           12.28          12.25
     RUNOFF VOLUME    (mm)=         92.91           30.34          76.33
     TOTAL RAINFALL   (mm)=         95.20           95.20          95.20
     RUNOFF COEFFICIENT    =         0.98            0.32           0.80


       (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  (  0010)|
|   1 +  2 =  3    |                AREA      QPEAK       TPEAK        R.V.
--------------------                (ha)      (cms)       (hrs)        (mm)
        ID1= 1 (  0003):          3.20       0.452       12.28       44.04
      + ID2= 2 (  0004):          2.70       0.641       12.25       76.33
        ==========================================================
        ID = 3 (  0010):          5.90       1.075       12.25       58.82

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
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| ADD HYD  (  0010)|
|   3 +  2 =  1    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)       (cms)      (hrs)       (mm)
       ID1= 3 (  0010):       5.90       1.075      12.25      58.82
     + ID2= 2 (  0008):      11.10       0.373      13.02      27.17
       ================================================================
       ID = 1 (  0010):      17.00       1.191      12.27      43.64

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)       (cms)      (hrs)       (mm)
       ID1= 1 (  0010):      17.00       1.191      12.27      43.64
     + ID2= 2 (  0009):      18.79       2.367      12.27      54.74
       ================================================================
       ID = 3 (  0011):      35.79       3.558      12.27      49.47

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0013)|   Area    (ha)=      6.58
|ID= 1 DT= 1.0 min |   Total Imp(%)=     44.40   Dir. Conn.(%)=  33.80
--------------------
                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          2.92            3.66
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        209.44           30.00
     Mannings n           =         0.013           0.250

     Max.Eff.Inten.(mm/hr)=        105.10           55.14
               over (min)            5.00           12.00
     Storage Coeff.  (min)=          3.90 (ii)       11.01 (ii)
     Unit Hyd. Tpeak (min)=          5.00           12.00
     Unit Hyd. peak  (cms)=          0.26            0.10
                                                              *TOTALS*
     PEAK FLOW       (cms)=          0.63            0.37        0.955 (iii)
     TIME TO PEAK    (hrs)=         12.25           12.35       12.27
     RUNOFF VOLUME    (mm)=         92.90           34.43       54.20
     TOTAL RAINFALL   (mm)=         95.20           95.20       95.20
     RUNOFF COEFFICIENT   =          0.98            0.36        0.57


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

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--------------------
| ADD HYD  (  0012)|
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                        Normal Operating Model Output (SCS)
|   1 +  2 =  3    |          AREA      QPEAK       TPEAK        R.V.
--------------------          (ha)       (cms)       (hrs)        (mm)
        ID1= 1 (  0011):      35.79      3.558       12.27       49.47
      + ID2= 2 (  0013):       6.58      0.955       12.27       54.20
        ================================================================
        ID = 3 (  0012):      42.37      4.513       12.27       50.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW        STORAGE    |     OUTFLOW         STORAGE
--------------------         (cms)         (ha.m.)    |     (cms)           (ha.m.)
                             0.0000         0.0000    |       0.0001          5.0000

                                      AREA        QPEAK        TPEAK        R.V.
                                      (ha)        (cms)        (hrs)        (mm)
   INFLOW : ID= 2 (  0012)          42.370        4.513        12.27       50.20
   OUTFLOW: ID= 1 (  0014)          42.370        0.000        27.90        0.01

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                  TIME SHIFT OF PEAK FLOW          (min)=938.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.1269

--------------------------------------------------------------------------------
================================================================================
========================

       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ef15b
87c-98a4-46c8-b8a1-4d39983c2dad\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ef15b
87c-98a4-46c8-b8a1-4d39983c2dad\scen


DATE: 03/29/2018                          TIME: 03:40:25

USER:
```

Normal Operating Model Output (SCS)

COMMENTS: SCS 50 year

****
** Run 05 **
****

READ STORM | Ptotal=107.90 mm

Filename: C:\Users\bpowers\AppData\Local\Temp\a8a29570-55aa-42fd-8717-83625671f7d2\27db90fd

Comments: 50yrSCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	2.16	12.75	15.54	19.00	1.94
0.50	1.19	6.75	2.16	13.00	7.99	19.25	1.94
0.75	1.19	7.00	2.16	13.25	7.99	19.50	1.94
1.00	1.19	7.25	2.16	13.50	1.51	19.75	1.94
1.25	1.19	7.50	2.16	13.75	1.51	20.00	1.94
1.50	1.19	7.75	2.16	14.00	8.85	20.25	1.94
1.75	1.19	8.00	2.16	14.25	8.85	20.50	1.29
2.00	1.19	8.25	2.16	14.50	3.24	20.75	1.29
2.25	1.19	8.50	2.91	14.75	3.24	21.00	1.29
2.50	1.40	8.75	2.91	15.00	3.24	21.25	1.29
2.75	1.40	9.00	2.91	15.25	3.24	21.50	1.29
3.00	1.40	9.25	2.91	15.50	3.24	21.75	1.29
3.25	1.40	9.50	3.45	15.75	3.24	22.00	1.29
3.50	1.40	9.75	3.45	16.00	3.24	22.25	1.29
3.75	1.40	10.00	3.88	16.25	3.24	22.50	1.29
4.00	1.40	10.25	3.88	16.50	1.94	22.75	1.29
4.25	1.40	10.50	4.96	16.75	1.94	23.00	1.29
4.50	1.73	10.75	4.96	17.00	1.94	23.25	1.29
4.75	1.73	11.00	6.69	17.25	1.94	23.50	1.29
5.00	1.73	11.25	6.69	17.50	1.94	23.75	1.29
5.25	1.73	11.50	10.36	17.75	1.94	24.00	1.29
5.50	1.73	11.75	10.36	18.00	1.94	24.25	1.29
5.75	1.73	12.00	44.89	18.25	1.94		
6.00	1.73	12.25	119.12	18.50	1.94		
6.25	1.73	12.50	15.54	18.75	1.94		

CALIB NASHYD (0007) | ID= 1 DT= 1.0 min

Area (ha)= 7.90
Curve Number (CN)= 72.6
Ia (mm)= 6.50
# of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.46

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	1.73	12.150	119.12	18.22	1.94
0.033	0.00	6.100	1.73	12.167	119.12	18.23	1.94
0.050	0.00	6.117	1.73	12.183	119.12	18.25	1.94
0.067	0.00	6.133	1.73	12.200	119.12	18.27	1.94

	Normal Operating Model Output (SCS)						
0.083	0.00	6.150	1.73	12.217	119.12	18.28	1.94
0.100	0.00	6.167	1.73	12.233	119.12	18.30	1.94
0.117	0.00	6.183	1.73	12.250	119.12	18.32	1.94
0.133	0.00	6.200	1.73	12.267	15.63	18.33	1.94
0.150	0.00	6.217	1.73	12.283	15.54	18.35	1.94
0.167	0.00	6.233	1.73	12.300	15.54	18.37	1.94
0.183	0.00	6.250	1.73	12.317	15.54	18.38	1.94
0.200	0.00	6.267	2.16	12.333	15.54	18.40	1.94
0.217	0.00	6.283	2.16	12.350	15.54	18.42	1.94
0.233	0.00	6.300	2.16	12.367	15.54	18.43	1.94
0.250	0.00	6.317	2.16	12.383	15.54	18.45	1.94
0.267	1.19	6.333	2.16	12.400	15.54	18.47	1.94
0.283	1.19	6.350	2.16	12.417	15.54	18.48	1.94
0.300	1.19	6.367	2.16	12.433	15.54	18.50	1.94
0.317	1.19	6.383	2.16	12.450	15.54	18.52	1.94
0.333	1.19	6.400	2.16	12.467	15.54	18.53	1.94
0.350	1.19	6.417	2.16	12.483	15.54	18.55	1.94
0.367	1.19	6.433	2.16	12.500	15.54	18.57	1.94
0.383	1.19	6.450	2.16	12.517	15.54	18.58	1.94
0.400	1.19	6.467	2.16	12.533	15.54	18.60	1.94
0.417	1.19	6.483	2.16	12.550	15.54	18.62	1.94
0.433	1.19	6.500	2.16	12.567	15.54	18.63	1.94
0.450	1.19	6.517	2.16	12.583	15.54	18.65	1.94
0.467	1.19	6.533	2.16	12.600	15.54	18.67	1.94
0.483	1.19	6.550	2.16	12.617	15.54	18.68	1.94
0.500	1.19	6.567	2.16	12.633	15.54	18.70	1.94
0.517	1.19	6.583	2.16	12.650	15.54	18.72	1.94
0.533	1.19	6.600	2.16	12.667	15.54	18.73	1.94
0.550	1.19	6.617	2.16	12.683	15.54	18.75	1.94
0.567	1.19	6.633	2.16	12.700	15.54	18.77	1.94
0.583	1.19	6.650	2.16	12.717	15.54	18.78	1.94
0.600	1.19	6.667	2.16	12.733	15.54	18.80	1.94
0.617	1.19	6.683	2.16	12.750	15.54	18.82	1.94
0.633	1.19	6.700	2.16	12.767	8.00	18.83	1.94
0.650	1.19	6.717	2.16	12.783	7.99	18.85	1.94
0.667	1.19	6.733	2.16	12.800	7.99	18.87	1.94
0.683	1.19	6.750	2.16	12.817	7.99	18.88	1.94
0.700	1.19	6.767	2.16	12.833	7.99	18.90	1.94
0.717	1.19	6.783	2.16	12.850	7.99	18.92	1.94
0.733	1.19	6.800	2.16	12.867	7.99	18.93	1.94
0.750	1.19	6.817	2.16	12.883	7.99	18.95	1.94
0.767	1.19	6.833	2.16	12.900	7.99	18.97	1.94
0.783	1.19	6.850	2.16	12.917	7.99	18.98	1.94
0.800	1.19	6.867	2.16	12.933	7.99	19.00	1.94
0.817	1.19	6.883	2.16	12.950	7.99	19.02	1.94
0.833	1.19	6.900	2.16	12.967	7.99	19.03	1.94
0.850	1.19	6.917	2.16	12.983	7.99	19.05	1.94
0.867	1.19	6.933	2.16	13.000	7.99	19.07	1.94
0.883	1.19	6.950	2.16	13.017	7.99	19.08	1.94
0.900	1.19	6.967	2.16	13.033	7.99	19.10	1.94
0.917	1.19	6.983	2.16	13.050	7.99	19.12	1.94
0.933	1.19	7.000	2.16	13.067	7.99	19.13	1.94
0.950	1.19	7.017	2.16	13.083	7.99	19.15	1.94
0.967	1.19	7.033	2.16	13.100	7.99	19.17	1.94
0.983	1.19	7.050	2.16	13.117	7.99	19.18	1.94
1.000	1.19	7.067	2.16	13.133	7.99	19.20	1.94
1.017	1.19	7.083	2.16	13.150	7.99	19.22	1.94
1.033	1.19	7.100	2.16	13.167	7.99	19.23	1.94
1.050	1.19	7.117	2.16	13.183	7.99	19.25	1.94
1.067	1.19	7.133	2.16	13.200	7.99	19.27	1.94
1.083	1.19	7.150	2.16	13.217	7.99	19.28	1.94
1.100	1.19	7.167	2.16	13.233	7.99	19.30	1.94
1.117	1.19	7.183	2.16	13.250	7.99	19.32	1.94

Normal Operating Model Output (SCS)

1.133	1.19	7.200	2.16	13.267	1.52	19.33	1.94
1.150	1.19	7.217	2.16	13.283	1.51	19.35	1.94
1.167	1.19	7.233	2.16	13.300	1.51	19.37	1.94
1.183	1.19	7.250	2.16	13.317	1.51	19.38	1.94
1.200	1.19	7.267	2.16	13.333	1.51	19.40	1.94
1.217	1.19	7.283	2.16	13.350	1.51	19.42	1.94
1.233	1.19	7.300	2.16	13.367	1.51	19.43	1.94
1.250	1.19	7.317	2.16	13.383	1.51	19.45	1.94
1.267	1.19	7.333	2.16	13.400	1.51	19.47	1.94
1.283	1.19	7.350	2.16	13.417	1.51	19.48	1.94
1.300	1.19	7.367	2.16	13.433	1.51	19.50	1.94
1.317	1.19	7.383	2.16	13.450	1.51	19.52	1.94
1.333	1.19	7.400	2.16	13.467	1.51	19.53	1.94
1.350	1.19	7.417	2.16	13.483	1.51	19.55	1.94
1.367	1.19	7.433	2.16	13.500	1.51	19.57	1.94
1.383	1.19	7.450	2.16	13.517	1.51	19.58	1.94
1.400	1.19	7.467	2.16	13.533	1.51	19.60	1.94
1.417	1.19	7.483	2.16	13.550	1.51	19.62	1.94
1.433	1.19	7.500	2.16	13.567	1.51	19.63	1.94
1.450	1.19	7.517	2.16	13.583	1.51	19.65	1.94
1.467	1.19	7.533	2.16	13.600	1.51	19.67	1.94
1.483	1.19	7.550	2.16	13.617	1.51	19.68	1.94
1.500	1.19	7.567	2.16	13.633	1.51	19.70	1.94
1.517	1.19	7.583	2.16	13.650	1.51	19.72	1.94
1.533	1.19	7.600	2.16	13.667	1.51	19.73	1.94
1.550	1.19	7.617	2.16	13.683	1.51	19.75	1.94
1.567	1.19	7.633	2.16	13.700	1.51	19.77	1.94
1.583	1.19	7.650	2.16	13.717	1.51	19.78	1.94
1.600	1.19	7.667	2.16	13.733	1.51	19.80	1.94
1.617	1.19	7.683	2.16	13.750	1.51	19.82	1.94
1.633	1.19	7.700	2.16	13.767	8.83	19.83	1.94
1.650	1.19	7.717	2.16	13.783	8.85	19.85	1.94
1.667	1.19	7.733	2.16	13.800	8.85	19.87	1.94
1.683	1.19	7.750	2.16	13.817	8.85	19.88	1.94
1.700	1.19	7.767	2.16	13.833	8.85	19.90	1.94
1.717	1.19	7.783	2.16	13.850	8.85	19.92	1.94
1.733	1.19	7.800	2.16	13.867	8.85	19.93	1.94
1.750	1.19	7.817	2.16	13.883	8.85	19.95	1.94
1.767	1.19	7.833	2.16	13.900	8.85	19.97	1.94
1.783	1.19	7.850	2.16	13.917	8.85	19.98	1.94
1.800	1.19	7.867	2.16	13.933	8.85	20.00	1.94
1.817	1.19	7.883	2.16	13.950	8.85	20.02	1.94
1.833	1.19	7.900	2.16	13.967	8.85	20.03	1.94
1.850	1.19	7.917	2.16	13.983	8.85	20.05	1.94
1.867	1.19	7.933	2.16	14.000	8.85	20.07	1.94
1.883	1.19	7.950	2.16	14.017	8.85	20.08	1.94
1.900	1.19	7.967	2.16	14.033	8.85	20.10	1.94
1.917	1.19	7.983	2.16	14.050	8.85	20.12	1.94
1.933	1.19	8.000	2.16	14.067	8.85	20.13	1.94
1.950	1.19	8.017	2.16	14.083	8.85	20.15	1.94
1.967	1.19	8.033	2.16	14.100	8.85	20.17	1.94
1.983	1.19	8.050	2.16	14.117	8.85	20.18	1.94
2.000	1.19	8.067	2.16	14.133	8.85	20.20	1.94
2.017	1.19	8.083	2.16	14.150	8.85	20.22	1.94
2.033	1.19	8.100	2.16	14.167	8.85	20.23	1.94
2.050	1.19	8.117	2.16	14.183	8.85	20.25	1.94
2.067	1.19	8.133	2.16	14.200	8.85	20.27	1.30
2.083	1.19	8.150	2.16	14.217	8.85	20.28	1.29
2.100	1.19	8.167	2.16	14.233	8.85	20.30	1.29
2.117	1.19	8.183	2.16	14.250	8.85	20.32	1.29
2.133	1.19	8.200	2.16	14.267	3.25	20.33	1.29
2.150	1.19	8.217	2.16	14.283	3.24	20.35	1.29
2.167	1.19	8.233	2.16	14.300	3.24	20.37	1.29

Normal Operating Model Output (SCS)

2.183	1.19	8.250	2.16	14.317	3.24	20.38	1.29
2.200	1.19	8.267	2.91	14.333	3.24	20.40	1.29
2.217	1.19	8.283	2.91	14.350	3.24	20.42	1.29
2.233	1.19	8.300	2.91	14.367	3.24	20.43	1.29
2.250	1.19	8.317	2.91	14.383	3.24	20.45	1.29
2.267	1.40	8.333	2.91	14.400	3.24	20.47	1.29
2.283	1.40	8.350	2.91	14.417	3.24	20.48	1.29
2.300	1.40	8.367	2.91	14.433	3.24	20.50	1.29
2.317	1.40	8.383	2.91	14.450	3.24	20.52	1.29
2.333	1.40	8.400	2.91	14.467	3.24	20.53	1.29
2.350	1.40	8.417	2.91	14.483	3.24	20.55	1.29
2.367	1.40	8.433	2.91	14.500	3.24	20.57	1.29
2.383	1.40	8.450	2.91	14.517	3.24	20.58	1.29
2.400	1.40	8.467	2.91	14.533	3.24	20.60	1.29
2.417	1.40	8.483	2.91	14.550	3.24	20.62	1.29
2.433	1.40	8.500	2.91	14.567	3.24	20.63	1.29
2.450	1.40	8.517	2.91	14.583	3.24	20.65	1.29
2.467	1.40	8.533	2.91	14.600	3.24	20.67	1.29
2.483	1.40	8.550	2.91	14.617	3.24	20.68	1.29
2.500	1.40	8.567	2.91	14.633	3.24	20.70	1.29
2.517	1.40	8.583	2.91	14.650	3.24	20.72	1.29
2.533	1.40	8.600	2.91	14.667	3.24	20.73	1.29
2.550	1.40	8.617	2.91	14.683	3.24	20.75	1.29
2.567	1.40	8.633	2.91	14.700	3.24	20.77	1.29
2.583	1.40	8.650	2.91	14.717	3.24	20.78	1.29
2.600	1.40	8.667	2.91	14.733	3.24	20.80	1.29
2.617	1.40	8.683	2.91	14.750	3.24	20.82	1.29
2.633	1.40	8.700	2.91	14.767	3.24	20.83	1.29
2.650	1.40	8.717	2.91	14.783	3.24	20.85	1.29
2.667	1.40	8.733	2.91	14.800	3.24	20.87	1.29
2.683	1.40	8.750	2.91	14.817	3.24	20.88	1.29
2.700	1.40	8.767	2.91	14.833	3.24	20.90	1.29
2.717	1.40	8.783	2.91	14.850	3.24	20.92	1.29
2.733	1.40	8.800	2.91	14.867	3.24	20.93	1.29
2.750	1.40	8.817	2.91	14.883	3.24	20.95	1.29
2.767	1.40	8.833	2.91	14.900	3.24	20.97	1.29
2.783	1.40	8.850	2.91	14.917	3.24	20.98	1.29
2.800	1.40	8.867	2.91	14.933	3.24	21.00	1.29
2.817	1.40	8.883	2.91	14.950	3.24	21.02	1.29
2.833	1.40	8.900	2.91	14.967	3.24	21.03	1.29
2.850	1.40	8.917	2.91	14.983	3.24	21.05	1.29
2.867	1.40	8.933	2.91	15.000	3.24	21.07	1.29
2.883	1.40	8.950	2.91	15.017	3.24	21.08	1.29
2.900	1.40	8.967	2.91	15.033	3.24	21.10	1.29
2.917	1.40	8.983	2.91	15.050	3.24	21.12	1.29
2.933	1.40	9.000	2.91	15.067	3.24	21.13	1.29
2.950	1.40	9.017	2.91	15.083	3.24	21.15	1.29
2.967	1.40	9.033	2.91	15.100	3.24	21.17	1.29
2.983	1.40	9.050	2.91	15.117	3.24	21.18	1.29
3.000	1.40	9.067	2.91	15.133	3.24	21.20	1.29
3.017	1.40	9.083	2.91	15.150	3.24	21.22	1.29
3.033	1.40	9.100	2.91	15.167	3.24	21.23	1.29
3.050	1.40	9.117	2.91	15.183	3.24	21.25	1.29
3.067	1.40	9.133	2.91	15.200	3.24	21.27	1.29
3.083	1.40	9.150	2.91	15.217	3.24	21.28	1.29
3.100	1.40	9.167	2.91	15.233	3.24	21.30	1.29
3.117	1.40	9.183	2.91	15.250	3.24	21.32	1.29
3.133	1.40	9.200	2.91	15.267	3.24	21.33	1.29
3.150	1.40	9.217	2.91	15.283	3.24	21.35	1.29
3.167	1.40	9.233	2.91	15.300	3.24	21.37	1.29
3.183	1.40	9.250	2.91	15.317	3.24	21.38	1.29
3.200	1.40	9.267	3.45	15.333	3.24	21.40	1.29
3.217	1.40	9.283	3.45	15.350	3.24	21.42	1.29

Normal Operating Model Output (SCS)

3.233	1.40	9.300	3.45	15.367	3.24	21.43	1.29
3.250	1.40	9.317	3.45	15.383	3.24	21.45	1.29
3.267	1.40	9.333	3.45	15.400	3.24	21.47	1.29
3.283	1.40	9.350	3.45	15.417	3.24	21.48	1.29
3.300	1.40	9.367	3.45	15.433	3.24	21.50	1.29
3.317	1.40	9.383	3.45	15.450	3.24	21.52	1.29
3.333	1.40	9.400	3.45	15.467	3.24	21.53	1.29
3.350	1.40	9.417	3.45	15.483	3.24	21.55	1.29
3.367	1.40	9.433	3.45	15.500	3.24	21.57	1.29
3.383	1.40	9.450	3.45	15.517	3.24	21.58	1.29
3.400	1.40	9.467	3.45	15.533	3.24	21.60	1.29
3.417	1.40	9.483	3.45	15.550	3.24	21.62	1.29
3.433	1.40	9.500	3.45	15.567	3.24	21.63	1.29
3.450	1.40	9.517	3.45	15.583	3.24	21.65	1.29
3.467	1.40	9.533	3.45	15.600	3.24	21.67	1.29
3.483	1.40	9.550	3.45	15.617	3.24	21.68	1.29
3.500	1.40	9.567	3.45	15.633	3.24	21.70	1.29
3.517	1.40	9.583	3.45	15.650	3.24	21.72	1.29
3.533	1.40	9.600	3.45	15.667	3.24	21.73	1.29
3.550	1.40	9.617	3.45	15.683	3.24	21.75	1.29
3.567	1.40	9.633	3.45	15.700	3.24	21.77	1.29
3.583	1.40	9.650	3.45	15.717	3.24	21.78	1.29
3.600	1.40	9.667	3.45	15.733	3.24	21.80	1.29
3.617	1.40	9.683	3.45	15.750	3.24	21.82	1.29
3.633	1.40	9.700	3.45	15.767	3.24	21.83	1.29
3.650	1.40	9.717	3.45	15.783	3.24	21.85	1.29
3.667	1.40	9.733	3.45	15.800	3.24	21.87	1.29
3.683	1.40	9.750	3.45	15.817	3.24	21.88	1.29
3.700	1.40	9.767	3.88	15.833	3.24	21.90	1.29
3.717	1.40	9.783	3.88	15.850	3.24	21.92	1.29
3.733	1.40	9.800	3.88	15.867	3.24	21.93	1.29
3.750	1.40	9.817	3.88	15.883	3.24	21.95	1.29
3.767	1.40	9.833	3.88	15.900	3.24	21.97	1.29
3.783	1.40	9.850	3.88	15.917	3.24	21.98	1.29
3.800	1.40	9.867	3.88	15.933	3.24	22.00	1.29
3.817	1.40	9.883	3.88	15.950	3.24	22.02	1.29
3.833	1.40	9.900	3.88	15.967	3.24	22.03	1.29
3.850	1.40	9.917	3.88	15.983	3.24	22.05	1.29
3.867	1.40	9.933	3.88	16.000	3.24	22.07	1.29
3.883	1.40	9.950	3.88	16.017	3.24	22.08	1.29
3.900	1.40	9.967	3.88	16.033	3.24	22.10	1.29
3.917	1.40	9.983	3.88	16.050	3.24	22.12	1.29
3.933	1.40	10.000	3.88	16.067	3.24	22.13	1.29
3.950	1.40	10.017	3.88	16.083	3.24	22.15	1.29
3.967	1.40	10.033	3.88	16.100	3.24	22.17	1.29
3.983	1.40	10.050	3.88	16.117	3.24	22.18	1.29
4.000	1.40	10.067	3.88	16.133	3.24	22.20	1.29
4.017	1.40	10.083	3.88	16.150	3.24	22.22	1.29
4.033	1.40	10.100	3.88	16.167	3.24	22.23	1.29
4.050	1.40	10.117	3.88	16.183	3.24	22.25	1.29
4.067	1.40	10.133	3.88	16.200	3.24	22.27	1.29
4.083	1.40	10.150	3.88	16.217	3.24	22.28	1.29
4.100	1.40	10.167	3.88	16.233	3.24	22.30	1.29
4.117	1.40	10.183	3.88	16.250	3.24	22.32	1.29
4.133	1.40	10.200	3.88	16.267	1.95	22.33	1.29
4.150	1.40	10.217	3.88	16.283	1.94	22.35	1.29
4.167	1.40	10.233	3.88	16.300	1.94	22.37	1.29
4.183	1.40	10.250	3.88	16.317	1.94	22.38	1.29
4.200	1.40	10.267	4.96	16.333	1.94	22.40	1.29
4.217	1.40	10.283	4.96	16.350	1.94	22.42	1.29
4.233	1.40	10.300	4.96	16.367	1.94	22.43	1.29
4.250	1.40	10.317	4.96	16.383	1.94	22.45	1.29
4.267	1.73	10.333	4.96	16.400	1.94	22.47	1.29

Normal Operating Model Output (SCS)

4.283	1.73	10.350	4.96	16.417	1.94	22.48	1.29
4.300	1.73	10.367	4.96	16.433	1.94	22.50	1.29
4.317	1.73	10.383	4.96	16.450	1.94	22.52	1.29
4.333	1.73	10.400	4.96	16.467	1.94	22.53	1.29
4.350	1.73	10.417	4.96	16.483	1.94	22.55	1.29
4.367	1.73	10.433	4.96	16.500	1.94	22.57	1.29
4.383	1.73	10.450	4.96	16.517	1.94	22.58	1.29
4.400	1.73	10.467	4.96	16.533	1.94	22.60	1.29
4.417	1.73	10.483	4.96	16.550	1.94	22.62	1.29
4.433	1.73	10.500	4.96	16.567	1.94	22.63	1.29
4.450	1.73	10.517	4.96	16.583	1.94	22.65	1.29
4.467	1.73	10.533	4.96	16.600	1.94	22.67	1.29
4.483	1.73	10.550	4.96	16.617	1.94	22.68	1.29
4.500	1.73	10.567	4.96	16.633	1.94	22.70	1.29
4.517	1.73	10.583	4.96	16.650	1.94	22.72	1.29
4.533	1.73	10.600	4.96	16.667	1.94	22.73	1.29
4.550	1.73	10.617	4.96	16.683	1.94	22.75	1.29
4.567	1.73	10.633	4.96	16.700	1.94	22.77	1.29
4.583	1.73	10.650	4.96	16.717	1.94	22.78	1.29
4.600	1.73	10.667	4.96	16.733	1.94	22.80	1.29
4.617	1.73	10.683	4.96	16.750	1.94	22.82	1.29
4.633	1.73	10.700	4.96	16.767	1.94	22.83	1.29
4.650	1.73	10.717	4.96	16.783	1.94	22.85	1.29
4.667	1.73	10.733	4.96	16.800	1.94	22.87	1.29
4.683	1.73	10.750	4.96	16.817	1.94	22.88	1.29
4.700	1.73	10.767	6.69	16.833	1.94	22.90	1.29
4.717	1.73	10.783	6.69	16.850	1.94	22.92	1.29
4.733	1.73	10.800	6.69	16.867	1.94	22.93	1.29
4.750	1.73	10.817	6.69	16.883	1.94	22.95	1.29
4.767	1.73	10.833	6.69	16.900	1.94	22.97	1.29
4.783	1.73	10.850	6.69	16.917	1.94	22.98	1.29
4.800	1.73	10.867	6.69	16.933	1.94	23.00	1.29
4.817	1.73	10.883	6.69	16.950	1.94	23.02	1.29
4.833	1.73	10.900	6.69	16.967	1.94	23.03	1.29
4.850	1.73	10.917	6.69	16.983	1.94	23.05	1.29
4.867	1.73	10.933	6.69	17.000	1.94	23.07	1.29
4.883	1.73	10.950	6.69	17.017	1.94	23.08	1.29
4.900	1.73	10.967	6.69	17.033	1.94	23.10	1.29
4.917	1.73	10.983	6.69	17.050	1.94	23.12	1.29
4.933	1.73	11.000	6.69	17.067	1.94	23.13	1.29
4.950	1.73	11.017	6.69	17.083	1.94	23.15	1.29
4.967	1.73	11.033	6.69	17.100	1.94	23.17	1.29
4.983	1.73	11.050	6.69	17.117	1.94	23.18	1.29
5.000	1.73	11.067	6.69	17.133	1.94	23.20	1.29
5.017	1.73	11.083	6.69	17.150	1.94	23.22	1.29
5.033	1.73	11.100	6.69	17.167	1.94	23.23	1.29
5.050	1.73	11.117	6.69	17.183	1.94	23.25	1.29
5.067	1.73	11.133	6.69	17.200	1.94	23.27	1.29
5.083	1.73	11.150	6.69	17.217	1.94	23.28	1.29
5.100	1.73	11.167	6.69	17.233	1.94	23.30	1.29
5.117	1.73	11.183	6.69	17.250	1.94	23.32	1.29
5.133	1.73	11.200	6.69	17.267	1.94	23.33	1.29
5.150	1.73	11.217	6.69	17.283	1.94	23.35	1.29
5.167	1.73	11.233	6.69	17.300	1.94	23.37	1.29
5.183	1.73	11.250	6.69	17.317	1.94	23.38	1.29
5.200	1.73	11.267	10.36	17.333	1.94	23.40	1.29
5.217	1.73	11.283	10.36	17.350	1.94	23.42	1.29
5.233	1.73	11.300	10.36	17.367	1.94	23.43	1.29
5.250	1.73	11.317	10.36	17.383	1.94	23.45	1.29
5.267	1.73	11.333	10.36	17.400	1.94	23.47	1.29
5.283	1.73	11.350	10.36	17.417	1.94	23.48	1.29
5.300	1.73	11.367	10.36	17.433	1.94	23.50	1.29
5.317	1.73	11.383	10.36	17.450	1.94	23.52	1.29

Normal Operating Model Output (SCS)

5.333	1.73	11.400	10.36	17.467	1.94	23.53	1.29
5.350	1.73	11.417	10.36	17.483	1.94	23.55	1.29
5.367	1.73	11.433	10.36	17.500	1.94	23.57	1.29
5.383	1.73	11.450	10.36	17.517	1.94	23.58	1.29
5.400	1.73	11.467	10.36	17.533	1.94	23.60	1.29
5.417	1.73	11.483	10.36	17.550	1.94	23.62	1.29
5.433	1.73	11.500	10.36	17.567	1.94	23.63	1.29
5.450	1.73	11.517	10.36	17.583	1.94	23.65	1.29
5.467	1.73	11.533	10.36	17.600	1.94	23.67	1.29
5.483	1.73	11.550	10.36	17.617	1.94	23.68	1.29
5.500	1.73	11.567	10.36	17.633	1.94	23.70	1.29
5.517	1.73	11.583	10.36	17.650	1.94	23.72	1.29
5.533	1.73	11.600	10.36	17.667	1.94	23.73	1.29
5.550	1.73	11.617	10.36	17.683	1.94	23.75	1.29
5.567	1.73	11.633	10.36	17.700	1.94	23.77	1.29
5.583	1.73	11.650	10.36	17.717	1.94	23.78	1.29
5.600	1.73	11.667	10.36	17.733	1.94	23.80	1.29
5.617	1.73	11.683	10.36	17.750	1.94	23.82	1.29
5.633	1.73	11.700	10.36	17.767	1.94	23.83	1.29
5.650	1.73	11.717	10.36	17.783	1.94	23.85	1.29
5.667	1.73	11.733	10.36	17.800	1.94	23.87	1.29
5.683	1.73	11.750	10.36	17.817	1.94	23.88	1.29
5.700	1.73	11.767	44.87	17.833	1.94	23.90	1.29
5.717	1.73	11.783	44.89	17.850	1.94	23.92	1.29
5.733	1.73	11.800	44.89	17.867	1.94	23.93	1.29
5.750	1.73	11.817	44.89	17.883	1.94	23.95	1.29
5.767	1.73	11.833	44.89	17.900	1.94	23.97	1.29
5.783	1.73	11.850	44.89	17.917	1.94	23.98	1.29
5.800	1.73	11.867	44.89	17.933	1.94	24.00	1.29
5.817	1.73	11.883	44.89	17.950	1.94	24.02	1.29
5.833	1.73	11.900	44.89	17.967	1.94	24.03	1.29
5.850	1.73	11.917	44.89	17.983	1.94	24.05	1.29
5.867	1.73	11.933	44.89	18.000	1.94	24.07	1.29
5.883	1.73	11.950	44.89	18.017	1.94	24.08	1.29
5.900	1.73	11.967	44.89	18.033	1.94	24.10	1.29
5.917	1.73	11.983	44.89	18.050	1.94	24.12	1.29
5.933	1.73	12.000	44.89	18.067	1.94	24.13	1.29
5.950	1.73	12.017	119.07	18.083	1.94	24.15	1.29
5.967	1.73	12.033	119.12	18.100	1.94	24.17	1.29
5.983	1.73	12.050	119.12	18.117	1.94	24.18	1.29
6.000	1.73	12.067	119.12	18.133	1.94	24.20	1.29
6.017	1.73	12.083	119.12	18.150	1.94	24.22	1.29
6.033	1.73	12.100	119.12	18.167	1.94	24.23	1.29
6.050	1.73	12.117	119.12	18.183	1.94	24.25	1.29
6.067	1.73	12.133	119.12	18.200	1.94		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.583 (i)
TIME TO PEAK (hrs)= 12.617
RUNOFF VOLUME (mm)= 41.735
TOTAL RAINFALL (mm)= 107.901
RUNOFF COEFFICIENT = 0.387

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

CALIB STANDHYD (0001)	Area (ha)= 6.57		
ID= 1 DT= 1.0 min	Total Imp(%)= 73.50	Dir. Conn.(%)=	73.50

	IMPERVIOUS	PERVIOUS (i)

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                    Normal Operating Model Output (SCS)
Surface Area     (ha)=        4.83           1.74
Dep. Storage     (mm)=        2.00           5.00
Average Slope     (%)=        1.00           2.00
Length            (m)=      209.28          10.00
Mannings n           =       0.013          0.250

Max.Eff.Inten.(mm/hr)=      119.12          50.71
          over (min)          5.00           6.00
Storage Coeff.  (min)=        3.71 (ii)      5.61 (ii)
Unit Hyd. Tpeak (min)=        5.00           6.00
Unit Hyd. peak  (cms)=        0.27           0.20
                                                      *TOTALS*
PEAK FLOW        (cms)=        1.56           0.22      1.776 (iii)
TIME TO PEAK     (hrs)=       12.25          12.27        12.25
RUNOFF VOLUME     (mm)=      105.58          37.70        87.59
TOTAL RAINFALL    (mm)=      107.90         107.90       107.90
RUNOFF COEFFICIENT   =        0.98           0.35         0.81


  (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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| CALIB            |
| STANDHYD (  0002)|   Area    (ha)=      4.32
|ID= 1 DT= 1.0 min |   Total Imp(%)=     59.00   Dir. Conn.(%)=   0.00
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                                IMPERVIOUS      PERVIOUS (i)
Surface Area     (ha)=          2.55            1.77
Dep. Storage     (mm)=         27.00           30.00
Average Slope     (%)=          1.00            2.00
Length            (m)=        169.71           20.00
Mannings n           =         0.013           0.250

Max.Eff.Inten.(mm/hr)=        119.12          187.07
          over (min)            5.00            7.00
Storage Coeff.  (min)=          3.27 (ii)       6.90 (ii)
Unit Hyd. Tpeak (min)=          5.00            7.00
Unit Hyd. peak  (cms)=          0.30            0.16
                                                      *TOTALS*
PEAK FLOW        (cms)=          0.00            0.77      0.766 (iii)
TIME TO PEAK     (hrs)=         12.25           12.28        12.28
RUNOFF VOLUME     (mm)=         80.58           54.14        54.15
TOTAL RAINFALL    (mm)=        107.90          107.90       107.90
RUNOFF COEFFICIENT   =          0.75            0.50         0.50

***** 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.

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| ADD HYD  (  0009)|
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Normal Operating Model Output (SCS)

1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):		6.57	1.776	12.25	87.59
+ ID2= 2 (0002):		4.32	0.766	12.28	54.15
ID = 3 (0009):		10.89	2.524	12.25	74.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)					
3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0009):		10.89	2.524	12.25	74.32
+ ID2= 2 (0007):		7.90	0.583	12.62	41.73
ID = 1 (0009):		18.79	2.827	12.27	64.99

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min				
	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.464 (i)
TIME TO PEAK (hrs)= 13.000
RUNOFF VOLUME (mm)= 33.886
TOTAL RAINFALL (mm)= 107.901
RUNOFF COEFFICIENT = 0.314

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min				
	Area (ha)=	3.20		
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		119.12	187.07	
over (min)		5.00	7.00	
Storage Coeff. (min)=		2.99 (ii)	6.61 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.32	0.17	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.57	0.573 (iii)
TIME TO PEAK	(hrs)=	12.22	12.28	12.28
RUNOFF VOLUME	(mm)=	80.58	54.14	54.15
TOTAL RAINFALL	(mm)=	107.90	107.90	107.90
RUNOFF COEFFICIENT	=	0.75	0.50	0.50

Normal Operating Model Output (SCS)

***** 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 (0004)	ID= 1 DT= 1.0 min

Area (ha)= 2.70
Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		119.12	50.71	
over (min)		5.00	6.00	
Storage Coeff. (min)=		2.84 (ii)	5.73 (ii)	
Unit Hyd. Tpeak (min)=		5.00	6.00	
Unit Hyd. peak (cms)=		0.32	0.19	
				TOTALS
PEAK FLOW	(cms)=	0.65	0.09	0.739 (iii)
TIME TO PEAK	(hrs)=	12.25	12.27	12.25
RUNOFF VOLUME	(mm)=	105.57	37.70	87.59
TOTAL RAINFALL	(mm)=	107.90	107.90	107.90
RUNOFF COEFFICIENT	=	0.98	0.35	0.81

(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 (0010)	1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.573	12.28	54.15
+ ID2= 2 (0004):	2.70	0.739	12.25	87.59
ID = 3 (0010):	5.90	1.299	12.25	69.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)	3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	1.299	12.25	69.45
+ ID2= 2 (0008):	11.10	0.464	13.00	33.89

ID = 1 (0010):	17.00	1.444	12.27	52.84

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	1.444	12.27	52.84
+ ID2= 2 (0009):	18.79	2.827	12.27	64.99
ID = 3 (0011):	35.79	4.271	12.27	59.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0013)
ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		119.12	67.96	
over (min)		5.00	11.00	
Storage Coeff. (min)=		3.71 (ii)	10.47 (ii)	
Unit Hyd. Tpeak (min)=		5.00	11.00	
Unit Hyd. peak (cms)=		0.27	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.72	0.48	1.144 (iii)
TIME TO PEAK	(hrs)=	12.25	12.33	12.27
RUNOFF VOLUME	(mm)=	105.57	42.47	63.80
TOTAL RAINFALL	(mm)=	107.90	107.90	107.90
RUNOFF COEFFICIENT	=	0.98	0.39	0.59

(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 (0012)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	35.79	4.271	12.27	59.22
+ ID2= 2 (0013):	6.58	1.144	12.27	63.80
ID = 3 (0012):	42.37	5.416	12.27	59.93

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Normal Operating Model Output (SCS)

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--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW       STORAGE    |     OUTFLOW         STORAGE
--------------------          (cms)       (ha.m.)    |     (cms)         (ha.m.)
                              0.0000       0.0000    |       0.0001        5.0000

                                      AREA        QPEAK        TPEAK        R.V.
                                      (ha)        (cms)        (hrs)        (mm)
   INFLOW : ID= 2 (  0012)          42.370        5.416        12.27       59.93
   OUTFLOW: ID= 1 (  0014)          42.370        0.000        27.98        0.01

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                    TIME SHIFT OF PEAK FLOW          (min)=943.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  2.5391

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 FINISH
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       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\7ff1e
865-01a2-4262-bdcf-56ccf7e5bd17\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\7ff1e
865-01a2-4262-bdcf-56ccf7e5bd17\scen

DATE: 03/29/2018                          TIME: 03:40:25

USER:

COMMENTS: SCS 100 year
```

****
** Run 06 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\a8a29570-55aa-42fd-8717-83625671f7d2\a8da804a
Ptotal=120.50 mm	Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	2.41	12.75	17.35	19.00	2.17
0.50	1.33	6.75	2.41	13.00	8.92	19.25	2.17
0.75	1.33	7.00	2.41	13.25	8.92	19.50	2.17
1.00	1.33	7.25	2.41	13.50	1.69	19.75	2.17
1.25	1.33	7.50	2.41	13.75	1.69	20.00	2.17
1.50	1.33	7.75	2.41	14.00	9.88	20.25	2.17
1.75	1.33	8.00	2.41	14.25	9.88	20.50	1.45
2.00	1.33	8.25	2.41	14.50	3.62	20.75	1.45
2.25	1.33	8.50	3.25	14.75	3.62	21.00	1.45
2.50	1.57	8.75	3.25	15.00	3.62	21.25	1.45
2.75	1.57	9.00	3.25	15.25	3.62	21.50	1.45
3.00	1.57	9.25	3.25	15.50	3.62	21.75	1.45
3.25	1.57	9.50	3.86	15.75	3.62	22.00	1.45
3.50	1.57	9.75	3.86	16.00	3.62	22.25	1.45
3.75	1.57	10.00	4.34	16.25	3.62	22.50	1.45
4.00	1.57	10.25	4.34	16.50	2.17	22.75	1.45
4.25	1.57	10.50	5.54	16.75	2.17	23.00	1.45
4.50	1.93	10.75	5.54	17.00	2.17	23.25	1.45
4.75	1.93	11.00	7.47	17.25	2.17	23.50	1.45
5.00	1.93	11.25	7.47	17.50	2.17	23.75	1.45
5.25	1.93	11.50	11.57	17.75	2.17	24.00	1.45
5.50	1.93	11.75	11.57	18.00	2.17	24.25	1.45
5.75	1.93	12.00	50.13	18.25	2.17		
6.00	1.93	12.25	133.03	18.50	2.17		
6.25	1.93	12.50	17.35	18.75	2.17		

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	1.93	12.150	133.03	18.22	2.17
0.033	0.00	6.100	1.93	12.167	133.03	18.23	2.17
0.050	0.00	6.117	1.93	12.183	133.03	18.25	2.17
0.067	0.00	6.133	1.93	12.200	133.03	18.27	2.17
0.083	0.00	6.150	1.93	12.217	133.03	18.28	2.17
0.100	0.00	6.167	1.93	12.233	133.03	18.30	2.17
0.117	0.00	6.183	1.93	12.250	133.03	18.32	2.17
0.133	0.00	6.200	1.93	12.267	17.46	18.33	2.17

Normal Operating Model Output (SCS)

0.150	0.00	6.217	1.93	12.283	17.35	18.35	2.17
0.167	0.00	6.233	1.93	12.300	17.35	18.37	2.17
0.183	0.00	6.250	1.93	12.317	17.35	18.38	2.17
0.200	0.00	6.267	2.41	12.333	17.35	18.40	2.17
0.217	0.00	6.283	2.41	12.350	17.35	18.42	2.17
0.233	0.00	6.300	2.41	12.367	17.35	18.43	2.17
0.250	0.00	6.317	2.41	12.383	17.35	18.45	2.17
0.267	1.33	6.333	2.41	12.400	17.35	18.47	2.17
0.283	1.33	6.350	2.41	12.417	17.35	18.48	2.17
0.300	1.33	6.367	2.41	12.433	17.35	18.50	2.17
0.317	1.33	6.383	2.41	12.450	17.35	18.52	2.17
0.333	1.33	6.400	2.41	12.467	17.35	18.53	2.17
0.350	1.33	6.417	2.41	12.483	17.35	18.55	2.17
0.367	1.33	6.433	2.41	12.500	17.35	18.57	2.17
0.383	1.33	6.450	2.41	12.517	17.35	18.58	2.17
0.400	1.33	6.467	2.41	12.533	17.35	18.60	2.17
0.417	1.33	6.483	2.41	12.550	17.35	18.62	2.17
0.433	1.33	6.500	2.41	12.567	17.35	18.63	2.17
0.450	1.33	6.517	2.41	12.583	17.35	18.65	2.17
0.467	1.33	6.533	2.41	12.600	17.35	18.67	2.17
0.483	1.33	6.550	2.41	12.617	17.35	18.68	2.17
0.500	1.33	6.567	2.41	12.633	17.35	18.70	2.17
0.517	1.33	6.583	2.41	12.650	17.35	18.72	2.17
0.533	1.33	6.600	2.41	12.667	17.35	18.73	2.17
0.550	1.33	6.617	2.41	12.683	17.35	18.75	2.17
0.567	1.33	6.633	2.41	12.700	17.35	18.77	2.17
0.583	1.33	6.650	2.41	12.717	17.35	18.78	2.17
0.600	1.33	6.667	2.41	12.733	17.35	18.80	2.17
0.617	1.33	6.683	2.41	12.750	17.35	18.82	2.17
0.633	1.33	6.700	2.41	12.767	8.93	18.83	2.17
0.650	1.33	6.717	2.41	12.783	8.92	18.85	2.17
0.667	1.33	6.733	2.41	12.800	8.92	18.87	2.17
0.683	1.33	6.750	2.41	12.817	8.92	18.88	2.17
0.700	1.33	6.767	2.41	12.833	8.92	18.90	2.17
0.717	1.33	6.783	2.41	12.850	8.92	18.92	2.17
0.733	1.33	6.800	2.41	12.867	8.92	18.93	2.17
0.750	1.33	6.817	2.41	12.883	8.92	18.95	2.17
0.767	1.33	6.833	2.41	12.900	8.92	18.97	2.17
0.783	1.33	6.850	2.41	12.917	8.92	18.98	2.17
0.800	1.33	6.867	2.41	12.933	8.92	19.00	2.17
0.817	1.33	6.883	2.41	12.950	8.92	19.02	2.17
0.833	1.33	6.900	2.41	12.967	8.92	19.03	2.17
0.850	1.33	6.917	2.41	12.983	8.92	19.05	2.17
0.867	1.33	6.933	2.41	13.000	8.92	19.07	2.17
0.883	1.33	6.950	2.41	13.017	8.92	19.08	2.17
0.900	1.33	6.967	2.41	13.033	8.92	19.10	2.17
0.917	1.33	6.983	2.41	13.050	8.92	19.12	2.17
0.933	1.33	7.000	2.41	13.067	8.92	19.13	2.17
0.950	1.33	7.017	2.41	13.083	8.92	19.15	2.17
0.967	1.33	7.033	2.41	13.100	8.92	19.17	2.17
0.983	1.33	7.050	2.41	13.117	8.92	19.18	2.17
1.000	1.33	7.067	2.41	13.133	8.92	19.20	2.17
1.017	1.33	7.083	2.41	13.150	8.92	19.22	2.17
1.033	1.33	7.100	2.41	13.167	8.92	19.23	2.17
1.050	1.33	7.117	2.41	13.183	8.92	19.25	2.17
1.067	1.33	7.133	2.41	13.200	8.92	19.27	2.17
1.083	1.33	7.150	2.41	13.217	8.92	19.28	2.17
1.100	1.33	7.167	2.41	13.233	8.92	19.30	2.17
1.117	1.33	7.183	2.41	13.250	8.92	19.32	2.17
1.133	1.33	7.200	2.41	13.267	1.70	19.33	2.17
1.150	1.33	7.217	2.41	13.283	1.69	19.35	2.17
1.167	1.33	7.233	2.41	13.300	1.69	19.37	2.17
1.183	1.33	7.250	2.41	13.317	1.69	19.38	2.17

Normal Operating Model Output (SCS)

1.200	1.33	7.267	2.41	13.333	1.69	19.40	2.17
1.217	1.33	7.283	2.41	13.350	1.69	19.42	2.17
1.233	1.33	7.300	2.41	13.367	1.69	19.43	2.17
1.250	1.33	7.317	2.41	13.383	1.69	19.45	2.17
1.267	1.33	7.333	2.41	13.400	1.69	19.47	2.17
1.283	1.33	7.350	2.41	13.417	1.69	19.48	2.17
1.300	1.33	7.367	2.41	13.433	1.69	19.50	2.17
1.317	1.33	7.383	2.41	13.450	1.69	19.52	2.17
1.333	1.33	7.400	2.41	13.467	1.69	19.53	2.17
1.350	1.33	7.417	2.41	13.483	1.69	19.55	2.17
1.367	1.33	7.433	2.41	13.500	1.69	19.57	2.17
1.383	1.33	7.450	2.41	13.517	1.69	19.58	2.17
1.400	1.33	7.467	2.41	13.533	1.69	19.60	2.17
1.417	1.33	7.483	2.41	13.550	1.69	19.62	2.17
1.433	1.33	7.500	2.41	13.567	1.69	19.63	2.17
1.450	1.33	7.517	2.41	13.583	1.69	19.65	2.17
1.467	1.33	7.533	2.41	13.600	1.69	19.67	2.17
1.483	1.33	7.550	2.41	13.617	1.69	19.68	2.17
1.500	1.33	7.567	2.41	13.633	1.69	19.70	2.17
1.517	1.33	7.583	2.41	13.650	1.69	19.72	2.17
1.533	1.33	7.600	2.41	13.667	1.69	19.73	2.17
1.550	1.33	7.617	2.41	13.683	1.69	19.75	2.17
1.567	1.33	7.633	2.41	13.700	1.69	19.77	2.17
1.583	1.33	7.650	2.41	13.717	1.69	19.78	2.17
1.600	1.33	7.667	2.41	13.733	1.69	19.80	2.17
1.617	1.33	7.683	2.41	13.750	1.69	19.82	2.17
1.633	1.33	7.700	2.41	13.767	9.86	19.83	2.17
1.650	1.33	7.717	2.41	13.783	9.88	19.85	2.17
1.667	1.33	7.733	2.41	13.800	9.88	19.87	2.17
1.683	1.33	7.750	2.41	13.817	9.88	19.88	2.17
1.700	1.33	7.767	2.41	13.833	9.88	19.90	2.17
1.717	1.33	7.783	2.41	13.850	9.88	19.92	2.17
1.733	1.33	7.800	2.41	13.867	9.88	19.93	2.17
1.750	1.33	7.817	2.41	13.883	9.88	19.95	2.17
1.767	1.33	7.833	2.41	13.900	9.88	19.97	2.17
1.783	1.33	7.850	2.41	13.917	9.88	19.98	2.17
1.800	1.33	7.867	2.41	13.933	9.88	20.00	2.17
1.817	1.33	7.883	2.41	13.950	9.88	20.02	2.17
1.833	1.33	7.900	2.41	13.967	9.88	20.03	2.17
1.850	1.33	7.917	2.41	13.983	9.88	20.05	2.17
1.867	1.33	7.933	2.41	14.000	9.88	20.07	2.17
1.883	1.33	7.950	2.41	14.017	9.88	20.08	2.17
1.900	1.33	7.967	2.41	14.033	9.88	20.10	2.17
1.917	1.33	7.983	2.41	14.050	9.88	20.12	2.17
1.933	1.33	8.000	2.41	14.067	9.88	20.13	2.17
1.950	1.33	8.017	2.41	14.083	9.88	20.15	2.17
1.967	1.33	8.033	2.41	14.100	9.88	20.17	2.17
1.983	1.33	8.050	2.41	14.117	9.88	20.18	2.17
2.000	1.33	8.067	2.41	14.133	9.88	20.20	2.17
2.017	1.33	8.083	2.41	14.150	9.88	20.22	2.17
2.033	1.33	8.100	2.41	14.167	9.88	20.23	2.17
2.050	1.33	8.117	2.41	14.183	9.88	20.25	2.17
2.067	1.33	8.133	2.41	14.200	9.88	20.27	1.45
2.083	1.33	8.150	2.41	14.217	9.88	20.28	1.45
2.100	1.33	8.167	2.41	14.233	9.88	20.30	1.45
2.117	1.33	8.183	2.41	14.250	9.88	20.32	1.45
2.133	1.33	8.200	2.41	14.267	3.63	20.33	1.45
2.150	1.33	8.217	2.41	14.283	3.62	20.35	1.45
2.167	1.33	8.233	2.41	14.300	3.62	20.37	1.45
2.183	1.33	8.250	2.41	14.317	3.62	20.38	1.45
2.200	1.33	8.267	3.25	14.333	3.62	20.40	1.45
2.217	1.33	8.283	3.25	14.350	3.62	20.42	1.45
2.233	1.33	8.300	3.25	14.367	3.62	20.43	1.45

Normal Operating Model Output (SCS)							
2.250	1.33	8.317	3.25	14.383	3.62	20.45	1.45
2.267	1.57	8.333	3.25	14.400	3.62	20.47	1.45
2.283	1.57	8.350	3.25	14.417	3.62	20.48	1.45
2.300	1.57	8.367	3.25	14.433	3.62	20.50	1.45
2.317	1.57	8.383	3.25	14.450	3.62	20.52	1.45
2.333	1.57	8.400	3.25	14.467	3.62	20.53	1.45
2.350	1.57	8.417	3.25	14.483	3.62	20.55	1.45
2.367	1.57	8.433	3.25	14.500	3.62	20.57	1.45
2.383	1.57	8.450	3.25	14.517	3.62	20.58	1.45
2.400	1.57	8.467	3.25	14.533	3.62	20.60	1.45
2.417	1.57	8.483	3.25	14.550	3.62	20.62	1.45
2.433	1.57	8.500	3.25	14.567	3.62	20.63	1.45
2.450	1.57	8.517	3.25	14.583	3.62	20.65	1.45
2.467	1.57	8.533	3.25	14.600	3.62	20.67	1.45
2.483	1.57	8.550	3.25	14.617	3.62	20.68	1.45
2.500	1.57	8.567	3.25	14.633	3.62	20.70	1.45
2.517	1.57	8.583	3.25	14.650	3.62	20.72	1.45
2.533	1.57	8.600	3.25	14.667	3.62	20.73	1.45
2.550	1.57	8.617	3.25	14.683	3.62	20.75	1.45
2.567	1.57	8.633	3.25	14.700	3.62	20.77	1.45
2.583	1.57	8.650	3.25	14.717	3.62	20.78	1.45
2.600	1.57	8.667	3.25	14.733	3.62	20.80	1.45
2.617	1.57	8.683	3.25	14.750	3.62	20.82	1.45
2.633	1.57	8.700	3.25	14.767	3.62	20.83	1.45
2.650	1.57	8.717	3.25	14.783	3.62	20.85	1.45
2.667	1.57	8.733	3.25	14.800	3.62	20.87	1.45
2.683	1.57	8.750	3.25	14.817	3.62	20.88	1.45
2.700	1.57	8.767	3.25	14.833	3.62	20.90	1.45
2.717	1.57	8.783	3.25	14.850	3.62	20.92	1.45
2.733	1.57	8.800	3.25	14.867	3.62	20.93	1.45
2.750	1.57	8.817	3.25	14.883	3.62	20.95	1.45
2.767	1.57	8.833	3.25	14.900	3.62	20.97	1.45
2.783	1.57	8.850	3.25	14.917	3.62	20.98	1.45
2.800	1.57	8.867	3.25	14.933	3.62	21.00	1.45
2.817	1.57	8.883	3.25	14.950	3.62	21.02	1.45
2.833	1.57	8.900	3.25	14.967	3.62	21.03	1.45
2.850	1.57	8.917	3.25	14.983	3.62	21.05	1.45
2.867	1.57	8.933	3.25	15.000	3.62	21.07	1.45
2.883	1.57	8.950	3.25	15.017	3.62	21.08	1.45
2.900	1.57	8.967	3.25	15.033	3.62	21.10	1.45
2.917	1.57	8.983	3.25	15.050	3.62	21.12	1.45
2.933	1.57	9.000	3.25	15.067	3.62	21.13	1.45
2.950	1.57	9.017	3.25	15.083	3.62	21.15	1.45
2.967	1.57	9.033	3.25	15.100	3.62	21.17	1.45
2.983	1.57	9.050	3.25	15.117	3.62	21.18	1.45
3.000	1.57	9.067	3.25	15.133	3.62	21.20	1.45
3.017	1.57	9.083	3.25	15.150	3.62	21.22	1.45
3.033	1.57	9.100	3.25	15.167	3.62	21.23	1.45
3.050	1.57	9.117	3.25	15.183	3.62	21.25	1.45
3.067	1.57	9.133	3.25	15.200	3.62	21.27	1.45
3.083	1.57	9.150	3.25	15.217	3.62	21.28	1.45
3.100	1.57	9.167	3.25	15.233	3.62	21.30	1.45
3.117	1.57	9.183	3.25	15.250	3.62	21.32	1.45
3.133	1.57	9.200	3.25	15.267	3.62	21.33	1.45
3.150	1.57	9.217	3.25	15.283	3.62	21.35	1.45
3.167	1.57	9.233	3.25	15.300	3.62	21.37	1.45
3.183	1.57	9.250	3.26	15.317	3.62	21.38	1.45
3.200	1.57	9.267	3.86	15.333	3.62	21.40	1.45
3.217	1.57	9.283	3.86	15.350	3.62	21.42	1.45
3.233	1.57	9.300	3.86	15.367	3.62	21.43	1.45
3.250	1.57	9.317	3.86	15.383	3.62	21.45	1.45
3.267	1.57	9.333	3.86	15.400	3.62	21.47	1.45
3.283	1.57	9.350	3.86	15.417	3.62	21.48	1.45

Normal Operating Model Output (SCS)

3.300	1.57	9.367	3.86	15.433	3.62	21.50	1.45
3.317	1.57	9.383	3.86	15.450	3.62	21.52	1.45
3.333	1.57	9.400	3.86	15.467	3.62	21.53	1.45
3.350	1.57	9.417	3.86	15.483	3.62	21.55	1.45
3.367	1.57	9.433	3.86	15.500	3.62	21.57	1.45
3.383	1.57	9.450	3.86	15.517	3.62	21.58	1.45
3.400	1.57	9.467	3.86	15.533	3.62	21.60	1.45
3.417	1.57	9.483	3.86	15.550	3.62	21.62	1.45
3.433	1.57	9.500	3.86	15.567	3.62	21.63	1.45
3.450	1.57	9.517	3.86	15.583	3.62	21.65	1.45
3.467	1.57	9.533	3.86	15.600	3.62	21.67	1.45
3.483	1.57	9.550	3.86	15.617	3.62	21.68	1.45
3.500	1.57	9.567	3.86	15.633	3.62	21.70	1.45
3.517	1.57	9.583	3.86	15.650	3.62	21.72	1.45
3.533	1.57	9.600	3.86	15.667	3.62	21.73	1.45
3.550	1.57	9.617	3.86	15.683	3.62	21.75	1.45
3.567	1.57	9.633	3.86	15.700	3.62	21.77	1.45
3.583	1.57	9.650	3.86	15.717	3.62	21.78	1.45
3.600	1.57	9.667	3.86	15.733	3.62	21.80	1.45
3.617	1.57	9.683	3.86	15.750	3.62	21.82	1.45
3.633	1.57	9.700	3.86	15.767	3.62	21.83	1.45
3.650	1.57	9.717	3.86	15.783	3.62	21.85	1.45
3.667	1.57	9.733	3.86	15.800	3.62	21.87	1.45
3.683	1.57	9.750	3.86	15.817	3.62	21.88	1.45
3.700	1.57	9.767	4.34	15.833	3.62	21.90	1.45
3.717	1.57	9.783	4.34	15.850	3.62	21.92	1.45
3.733	1.57	9.800	4.34	15.867	3.62	21.93	1.45
3.750	1.57	9.817	4.34	15.883	3.62	21.95	1.45
3.767	1.57	9.833	4.34	15.900	3.62	21.97	1.45
3.783	1.57	9.850	4.34	15.917	3.62	21.98	1.45
3.800	1.57	9.867	4.34	15.933	3.62	22.00	1.45
3.817	1.57	9.883	4.34	15.950	3.62	22.02	1.45
3.833	1.57	9.900	4.34	15.967	3.62	22.03	1.45
3.850	1.57	9.917	4.34	15.983	3.62	22.05	1.45
3.867	1.57	9.933	4.34	16.000	3.62	22.07	1.45
3.883	1.57	9.950	4.34	16.017	3.62	22.08	1.45
3.900	1.57	9.967	4.34	16.033	3.62	22.10	1.45
3.917	1.57	9.983	4.34	16.050	3.62	22.12	1.45
3.933	1.57	10.000	4.34	16.067	3.62	22.13	1.45
3.950	1.57	10.017	4.34	16.083	3.62	22.15	1.45
3.967	1.57	10.033	4.34	16.100	3.62	22.17	1.45
3.983	1.57	10.050	4.34	16.117	3.62	22.18	1.45
4.000	1.57	10.067	4.34	16.133	3.62	22.20	1.45
4.017	1.57	10.083	4.34	16.150	3.62	22.22	1.45
4.033	1.57	10.100	4.34	16.167	3.62	22.23	1.45
4.050	1.57	10.117	4.34	16.183	3.62	22.25	1.45
4.067	1.57	10.133	4.34	16.200	3.62	22.27	1.45
4.083	1.57	10.150	4.34	16.217	3.62	22.28	1.45
4.100	1.57	10.167	4.34	16.233	3.62	22.30	1.45
4.117	1.57	10.183	4.34	16.250	3.62	22.32	1.45
4.133	1.57	10.200	4.34	16.267	2.18	22.33	1.45
4.150	1.57	10.217	4.34	16.283	2.17	22.35	1.45
4.167	1.57	10.233	4.34	16.300	2.17	22.37	1.45
4.183	1.57	10.250	4.34	16.317	2.17	22.38	1.45
4.200	1.57	10.267	5.54	16.333	2.17	22.40	1.45
4.217	1.57	10.283	5.54	16.350	2.17	22.42	1.45
4.233	1.57	10.300	5.54	16.367	2.17	22.43	1.45
4.250	1.57	10.317	5.54	16.383	2.17	22.45	1.45
4.267	1.93	10.333	5.54	16.400	2.17	22.47	1.45
4.283	1.93	10.350	5.54	16.417	2.17	22.48	1.45
4.300	1.93	10.367	5.54	16.433	2.17	22.50	1.45
4.317	1.93	10.383	5.54	16.450	2.17	22.52	1.45
4.333	1.93	10.400	5.54	16.467	2.17	22.53	1.45

Normal Operating Model Output (SCS)

4.350	1.93	10.417	5.54	16.483	2.17	22.55	1.45
4.367	1.93	10.433	5.54	16.500	2.17	22.57	1.45
4.383	1.93	10.450	5.54	16.517	2.17	22.58	1.45
4.400	1.93	10.467	5.54	16.533	2.17	22.60	1.45
4.417	1.93	10.483	5.54	16.550	2.17	22.62	1.45
4.433	1.93	10.500	5.54	16.567	2.17	22.63	1.45
4.450	1.93	10.517	5.54	16.583	2.17	22.65	1.45
4.467	1.93	10.533	5.54	16.600	2.17	22.67	1.45
4.483	1.93	10.550	5.54	16.617	2.17	22.68	1.45
4.500	1.93	10.567	5.54	16.633	2.17	22.70	1.45
4.517	1.93	10.583	5.54	16.650	2.17	22.72	1.45
4.533	1.93	10.600	5.54	16.667	2.17	22.73	1.45
4.550	1.93	10.617	5.54	16.683	2.17	22.75	1.45
4.567	1.93	10.633	5.54	16.700	2.17	22.77	1.45
4.583	1.93	10.650	5.54	16.717	2.17	22.78	1.45
4.600	1.93	10.667	5.54	16.733	2.17	22.80	1.45
4.617	1.93	10.683	5.54	16.750	2.17	22.82	1.45
4.633	1.93	10.700	5.54	16.767	2.17	22.83	1.45
4.650	1.93	10.717	5.54	16.783	2.17	22.85	1.45
4.667	1.93	10.733	5.54	16.800	2.17	22.87	1.45
4.683	1.93	10.750	5.54	16.817	2.17	22.88	1.45
4.700	1.93	10.767	7.47	16.833	2.17	22.90	1.45
4.717	1.93	10.783	7.47	16.850	2.17	22.92	1.45
4.733	1.93	10.800	7.47	16.867	2.17	22.93	1.45
4.750	1.93	10.817	7.47	16.883	2.17	22.95	1.45
4.767	1.93	10.833	7.47	16.900	2.17	22.97	1.45
4.783	1.93	10.850	7.47	16.917	2.17	22.98	1.45
4.800	1.93	10.867	7.47	16.933	2.17	23.00	1.45
4.817	1.93	10.883	7.47	16.950	2.17	23.02	1.45
4.833	1.93	10.900	7.47	16.967	2.17	23.03	1.45
4.850	1.93	10.917	7.47	16.983	2.17	23.05	1.45
4.867	1.93	10.933	7.47	17.000	2.17	23.07	1.45
4.883	1.93	10.950	7.47	17.017	2.17	23.08	1.45
4.900	1.93	10.967	7.47	17.033	2.17	23.10	1.45
4.917	1.93	10.983	7.47	17.050	2.17	23.12	1.45
4.933	1.93	11.000	7.47	17.067	2.17	23.13	1.45
4.950	1.93	11.017	7.47	17.083	2.17	23.15	1.45
4.967	1.93	11.033	7.47	17.100	2.17	23.17	1.45
4.983	1.93	11.050	7.47	17.117	2.17	23.18	1.45
5.000	1.93	11.067	7.47	17.133	2.17	23.20	1.45
5.017	1.93	11.083	7.47	17.150	2.17	23.22	1.45
5.033	1.93	11.100	7.47	17.167	2.17	23.23	1.45
5.050	1.93	11.117	7.47	17.183	2.17	23.25	1.45
5.067	1.93	11.133	7.47	17.200	2.17	23.27	1.45
5.083	1.93	11.150	7.47	17.217	2.17	23.28	1.45
5.100	1.93	11.167	7.47	17.233	2.17	23.30	1.45
5.117	1.93	11.183	7.47	17.250	2.17	23.32	1.45
5.133	1.93	11.200	7.47	17.267	2.17	23.33	1.45
5.150	1.93	11.217	7.47	17.283	2.17	23.35	1.45
5.167	1.93	11.233	7.47	17.300	2.17	23.37	1.45
5.183	1.93	11.250	7.47	17.317	2.17	23.38	1.45
5.200	1.93	11.267	11.57	17.333	2.17	23.40	1.45
5.217	1.93	11.283	11.57	17.350	2.17	23.42	1.45
5.233	1.93	11.300	11.57	17.367	2.17	23.43	1.45
5.250	1.93	11.317	11.57	17.383	2.17	23.45	1.45
5.267	1.93	11.333	11.57	17.400	2.17	23.47	1.45
5.283	1.93	11.350	11.57	17.417	2.17	23.48	1.45
5.300	1.93	11.367	11.57	17.433	2.17	23.50	1.45
5.317	1.93	11.383	11.57	17.450	2.17	23.52	1.45
5.333	1.93	11.400	11.57	17.467	2.17	23.53	1.45
5.350	1.93	11.417	11.57	17.483	2.17	23.55	1.45
5.367	1.93	11.433	11.57	17.500	2.17	23.57	1.45
5.383	1.93	11.450	11.57	17.517	2.17	23.58	1.45

Normal Operating Model Output (SCS)

5.400	1.93	11.467	11.57	17.533	2.17	23.60	1.45
5.417	1.93	11.483	11.57	17.550	2.17	23.62	1.45
5.433	1.93	11.500	11.57	17.567	2.17	23.63	1.45
5.450	1.93	11.517	11.57	17.583	2.17	23.65	1.45
5.467	1.93	11.533	11.57	17.600	2.17	23.67	1.45
5.483	1.93	11.550	11.57	17.617	2.17	23.68	1.45
5.500	1.93	11.567	11.57	17.633	2.17	23.70	1.45
5.517	1.93	11.583	11.57	17.650	2.17	23.72	1.45
5.533	1.93	11.600	11.57	17.667	2.17	23.73	1.45
5.550	1.93	11.617	11.57	17.683	2.17	23.75	1.45
5.567	1.93	11.633	11.57	17.700	2.17	23.77	1.45
5.583	1.93	11.650	11.57	17.717	2.17	23.78	1.45
5.600	1.93	11.667	11.57	17.733	2.17	23.80	1.45
5.617	1.93	11.683	11.57	17.750	2.17	23.82	1.45
5.633	1.93	11.700	11.57	17.767	2.17	23.83	1.45
5.650	1.93	11.717	11.57	17.783	2.17	23.85	1.45
5.667	1.93	11.733	11.57	17.800	2.17	23.87	1.45
5.683	1.93	11.750	11.57	17.817	2.17	23.88	1.45
5.700	1.93	11.767	50.11	17.833	2.17	23.90	1.45
5.717	1.93	11.783	50.13	17.850	2.17	23.92	1.45
5.733	1.93	11.800	50.13	17.867	2.17	23.93	1.45
5.750	1.93	11.817	50.13	17.883	2.17	23.95	1.45
5.767	1.93	11.833	50.13	17.900	2.17	23.97	1.45
5.783	1.93	11.850	50.13	17.917	2.17	23.98	1.45
5.800	1.93	11.867	50.13	17.933	2.17	24.00	1.45
5.817	1.93	11.883	50.13	17.950	2.17	24.02	1.45
5.833	1.93	11.900	50.13	17.967	2.17	24.03	1.45
5.850	1.93	11.917	50.13	17.983	2.17	24.05	1.45
5.867	1.93	11.933	50.13	18.000	2.17	24.07	1.45
5.883	1.93	11.950	50.13	18.017	2.17	24.08	1.45
5.900	1.93	11.967	50.13	18.033	2.17	24.10	1.45
5.917	1.93	11.983	50.13	18.050	2.17	24.12	1.45
5.933	1.93	12.000	50.13	18.067	2.17	24.13	1.45
5.950	1.93	12.017	132.97	18.083	2.17	24.15	1.45
5.967	1.93	12.033	133.03	18.100	2.17	24.17	1.45
5.983	1.93	12.050	133.03	18.117	2.17	24.18	1.45
6.000	1.93	12.067	133.03	18.133	2.17	24.20	1.45
6.017	1.93	12.083	133.03	18.150	2.17	24.22	1.45
6.033	1.93	12.100	133.03	18.167	2.17	24.23	1.45
6.050	1.93	12.117	133.03	18.183	2.17	24.25	1.45
6.067	1.93	12.133	133.03	18.200	2.17		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.695 (i)
TIME TO PEAK (hrs)= 12.600
RUNOFF VOLUME (mm)= 49.879
TOTAL RAINFALL (mm)= 120.502
RUNOFF COEFFICIENT = 0.414

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

CALIB STANDHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 6.57 Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.83	1.74
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	209.28	10.00

```
                    Normal Operating Model Output (SCS)
Mannings n              =        0.013          0.250

Max.Eff.Inten.(mm/hr)=         133.03          61.11
          over (min)             5.00           6.00
Storage Coeff.  (min)=           3.55 (ii)      5.37 (ii)
Unit Hyd. Tpeak (min)=           5.00           6.00
Unit Hyd. peak  (cms)=           0.28           0.20
                                                          *TOTALS*
PEAK FLOW       (cms)=           1.75           0.26        2.011 (iii)
TIME TO PEAK    (hrs)=          12.25          12.27        12.25
RUNOFF VOLUME    (mm)=         118.13          45.46        98.88
TOTAL RAINFALL   (mm)=         120.50         120.50       120.50
RUNOFF COEFFICIENT   =           0.98           0.38         0.82


  (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 (  0002)|   Area    (ha)=      4.32
|ID= 1 DT= 1.0 min |   Total Imp(%)=     59.00   Dir. Conn.(%)=   0.00
--------------------

                        IMPERVIOUS      PERVIOUS (i)
Surface Area     (ha)=        2.55            1.77
Dep. Storage     (mm)=       27.00           30.00
Average Slope     (%)=        1.00            2.00
Length            (m)=      169.71           20.00
Mannings n              =     0.013           0.250

Max.Eff.Inten.(mm/hr)=       133.03          221.39
          over (min)           5.00            7.00
Storage Coeff.  (min)=         3.13 (ii)       6.52 (ii)
Unit Hyd. Tpeak (min)=         5.00            7.00
Unit Hyd. peak  (cms)=         0.31            0.17
                                                          *TOTALS*
PEAK FLOW       (cms)=         0.00            0.92        0.923 (iii)
TIME TO PEAK    (hrs)=        12.25           12.27        12.27
RUNOFF VOLUME    (mm)=        93.14           64.53        64.53
TOTAL RAINFALL   (mm)=       120.50          120.50       120.50
RUNOFF COEFFICIENT   =         0.77            0.54         0.54

***** 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.

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--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA      QPEAK       TPEAK        R.V.
--------------------          (ha)      (cms)       (hrs)        (mm)
      ID1= 1 (  0001):        6.57      2.011       12.25       98.88
    + ID2= 2 (  0002):        4.32      0.923       12.27       64.53
```

ID = 3 (0009):	10.89	2.918	12.25	85.26

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0009):	10.89	2.918	12.25	85.26
	+ ID2= 2 (0007):	7.90	0.695	12.60	49.88
	ID = 1 (0009):	18.79	3.281	12.27	75.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008)					
ID= 1 DT= 1.0 min	Area (ha)=	11.10	Curve Number (CN)=	66.4	
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.79			

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)=	0.560	(i)
TIME TO PEAK (hrs)=	13.000	
RUNOFF VOLUME (mm)=	40.948	
TOTAL RAINFALL (mm)=	120.502	
RUNOFF COEFFICIENT =	0.340	

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

CALIB STANDHYD (0003)					
ID= 1 DT= 1.0 min	Area (ha)=	3.20			
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00	

		IMPERVIOUS		PERVIOUS (i)		
Surface Area	(ha)=	1.89		1.31		
Dep. Storage	(mm)=	27.00		30.00		
Average Slope	(%)=	1.00		2.00		
Length	(m)=	146.06		20.00		
Mannings n	=	0.013		0.250		
Max.Eff.Inten.(mm/hr)=		133.03		221.39		
over (min)		5.00		7.00		
Storage Coeff. (min)=		2.86	(ii)	6.25	(ii)	
Unit Hyd. Tpeak (min)=		5.00		7.00		
Unit Hyd. peak (cms)=		0.33		0.17		
						TOTALS
PEAK FLOW	(cms)=	0.00		0.69		0.691 (iii)
TIME TO PEAK	(hrs)=	12.22		12.27		12.27
RUNOFF VOLUME	(mm)=	93.14		64.53		64.53
TOTAL RAINFALL	(mm)=	120.50		120.50		120.50
RUNOFF COEFFICIENT	=	0.77		0.54		0.54

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

Normal Operating Model Output (SCS)

(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 (0004) | ID= 1 DT= 1.0 min |

Area (ha)= 2.70
Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		133.03	61.11	
over (min)		5.00	6.00	
Storage Coeff. (min)=		2.72 (ii)	5.48 (ii)	
Unit Hyd. Tpeak (min)=		5.00	6.00	
Unit Hyd. peak (cms)=		0.32	0.20	
				TOTALS
PEAK FLOW	(cms)=	0.73	0.11	0.835 (iii)
TIME TO PEAK	(hrs)=	12.25	12.27	12.25
RUNOFF VOLUME	(mm)=	118.14	45.45	98.88
TOTAL RAINFALL	(mm)=	120.50	120.50	120.50
RUNOFF COEFFICIENT	=	0.98	0.38	0.82

(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 (0010) | 1 + 2 = 3 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.691	12.27	64.53
+ ID2= 2 (0004):	2.70	0.835	12.25	98.88
ID = 3 (0010):	5.90	1.514	12.25	80.25

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

| ADD HYD (0010) | 3 + 2 = 1 |

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	1.514	12.25	80.25
+ ID2= 2 (0008):	11.10	0.560	13.00	40.95
ID = 1 (0010):	17.00	1.692	12.27	62.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)       (cms)      (hrs)       (mm)
       ID1= 1 (  0010):     17.00      1.692      12.27      62.34
     + ID2= 2 (  0009):     18.79      3.281      12.27      75.45
       ==========================================================
       ID = 3 (  0011):     35.79      4.973      12.27      69.22

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| CALIB            |
| STANDHYD (  0013)|   Area    (ha)=      6.58
|ID= 1 DT= 1.0 min |   Total Imp(%)=     44.40   Dir. Conn.(%)=  33.80
--------------------
                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          2.92            3.66
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        209.44           30.00
     Mannings n             =       0.013           0.250

     Max.Eff.Inten.(mm/hr)=        133.03           81.35
               over (min)            5.00           11.00
     Storage Coeff.  (min)=          3.55 (ii)      10.02 (ii)
     Unit Hyd. Tpeak (min)=          5.00           11.00
     Unit Hyd. peak  (cms)=          0.28            0.11
                                                              *TOTALS*
     PEAK FLOW       (cms)=          0.81            0.58        1.329 (iii)
     TIME TO PEAK    (hrs)=         12.25           12.33          12.27
     RUNOFF VOLUME    (mm)=        118.13           50.87          73.62
     TOTAL RAINFALL   (mm)=        120.50          120.50         120.50
     RUNOFF COEFFICIENT    =         0.98            0.42           0.61


       (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  (  0012)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)       (cms)      (hrs)       (mm)
       ID1= 1 (  0011):     35.79      4.973      12.27      69.22
     + ID2= 2 (  0013):      6.58      1.329      12.27      73.62
       ==========================================================
       ID = 3 (  0012):     42.37      6.302      12.27      69.91

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
```

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                              Normal Operating Model Output (SCS)
| DT=  1.0 min     |        OUTFLOW        STORAGE    |     OUTFLOW          STORAGE
--------------------         (cms)         (ha.m.)    |    (cms)           (ha.m.)
                             0.0000         0.0000    |      0.0001          5.0000

                                        AREA          QPEAK         TPEAK        R.V.
                                        (ha)          (cms)         (hrs)        (mm)
   INFLOW : ID= 2 (  0012)            42.370         6.302         12.27       69.91
   OUTFLOW: ID= 1 (  0014)            42.370         0.000         27.97        0.01

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                    TIME SHIFT OF PEAK FLOW          (min)=942.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  2.9617

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================================================================================
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       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\01e42
fd7-cefe-4abb-93d1-4b7c1e288642\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\01e42
fd7-cefe-4abb-93d1-4b7c1e288642\scen

DATE: 03/29/2018                                TIME: 03:40:24

USER:

COMMENTS: 25 mm 4hr Chicago

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  ************************************
  ** Run 07                         **
  ************************************

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| CHICAGO STORM    |    IDF curve parameters: A= 568.700
| Ptotal= 24.99 mm |                          B=   6.662
```

Normal Operating Model Output (SCS)

C= 0.819

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	1.36	1.08	6.91	2.08	4.18	3.08	1.86
0.17	1.45	1.17	11.03	2.17	3.77	3.17	1.78
0.25	1.55	1.25	26.16	2.25	3.43	3.25	1.71
0.33	1.67	1.33	76.07	2.33	3.16	3.33	1.64
0.42	1.81	1.42	33.71	2.42	2.92	3.42	1.58
0.50	1.99	1.50	18.64	2.50	2.72	3.50	1.52
0.58	2.20	1.58	12.62	2.58	2.55	3.58	1.47
0.67	2.47	1.67	9.46	2.67	2.39	3.67	1.43
0.75	2.82	1.75	7.55	2.75	2.26	3.75	1.38
0.83	3.29	1.83	6.28	2.83	2.14	3.83	1.34
0.92	3.97	1.92	5.38	2.92	2.04	3.92	1.30
1.00	5.03	2.00	4.70	3.00	1.94	4.00	1.26

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	1.36	1.017	6.91	2.017	4.18	3.02	1.86
0.033	1.36	1.033	6.91	2.033	4.18	3.03	1.86
0.050	1.36	1.050	6.91	2.050	4.18	3.05	1.86
0.067	1.36	1.067	6.91	2.067	4.18	3.07	1.86
0.083	1.36	1.083	6.91	2.083	4.18	3.08	1.86
0.100	1.45	1.100	11.03	2.100	3.77	3.10	1.78
0.117	1.45	1.117	11.03	2.117	3.77	3.12	1.78
0.133	1.45	1.133	11.03	2.133	3.77	3.13	1.78
0.150	1.45	1.150	11.03	2.150	3.77	3.15	1.78
0.167	1.45	1.167	11.03	2.167	3.77	3.17	1.78
0.183	1.55	1.183	26.16	2.183	3.43	3.18	1.71
0.200	1.55	1.200	26.16	2.200	3.43	3.20	1.71
0.217	1.55	1.217	26.16	2.217	3.43	3.22	1.71
0.233	1.55	1.233	26.16	2.233	3.43	3.23	1.71
0.250	1.55	1.250	26.16	2.250	3.43	3.25	1.71
0.267	1.67	1.267	76.07	2.267	3.16	3.27	1.64
0.283	1.67	1.283	76.07	2.283	3.16	3.28	1.64
0.300	1.67	1.300	76.07	2.300	3.16	3.30	1.64
0.317	1.67	1.317	76.07	2.317	3.16	3.32	1.64
0.333	1.67	1.333	76.07	2.333	3.16	3.33	1.64
0.350	1.81	1.350	33.71	2.350	2.92	3.35	1.58
0.367	1.81	1.367	33.71	2.367	2.92	3.37	1.58
0.383	1.81	1.383	33.71	2.383	2.92	3.38	1.58
0.400	1.81	1.400	33.71	2.400	2.92	3.40	1.58
0.417	1.81	1.417	33.71	2.417	2.92	3.42	1.58
0.433	1.99	1.433	18.64	2.433	2.72	3.43	1.53
0.450	1.99	1.450	18.64	2.450	2.72	3.45	1.52

Normal Operating Model Output (SCS)

0.467	1.99	1.467	18.64	2.467	2.72	3.47	1.52
0.483	1.99	1.483	18.64	2.483	2.72	3.48	1.52
0.500	1.99	1.500	18.64	2.500	2.72	3.50	1.52
0.517	2.20	1.517	12.62	2.517	2.55	3.52	1.47
0.533	2.20	1.533	12.62	2.533	2.55	3.53	1.47
0.550	2.20	1.550	12.62	2.550	2.55	3.55	1.47
0.567	2.20	1.567	12.62	2.567	2.55	3.57	1.47
0.583	2.20	1.583	12.62	2.583	2.55	3.58	1.47
0.600	2.47	1.600	9.46	2.600	2.39	3.60	1.43
0.617	2.47	1.617	9.46	2.617	2.39	3.62	1.43
0.633	2.47	1.633	9.46	2.633	2.39	3.63	1.43
0.650	2.47	1.650	9.46	2.650	2.39	3.65	1.43
0.667	2.47	1.667	9.46	2.667	2.39	3.67	1.43
0.683	2.82	1.683	7.55	2.683	2.26	3.68	1.38
0.700	2.82	1.700	7.55	2.700	2.26	3.70	1.38
0.717	2.82	1.717	7.55	2.717	2.26	3.72	1.38
0.733	2.82	1.733	7.55	2.733	2.26	3.73	1.38
0.750	2.82	1.750	7.55	2.750	2.26	3.75	1.38
0.767	3.29	1.767	6.28	2.767	2.14	3.77	1.34
0.783	3.29	1.783	6.28	2.783	2.14	3.78	1.34
0.800	3.29	1.800	6.28	2.800	2.14	3.80	1.34
0.817	3.29	1.817	6.28	2.817	2.14	3.82	1.34
0.833	3.29	1.833	6.28	2.833	2.14	3.83	1.34
0.850	3.97	1.850	5.38	2.850	2.04	3.85	1.30
0.867	3.97	1.867	5.38	2.867	2.04	3.87	1.30
0.883	3.97	1.883	5.38	2.883	2.04	3.88	1.30
0.900	3.97	1.900	5.38	2.900	2.04	3.90	1.30
0.917	3.97	1.917	5.38	2.917	2.04	3.92	1.30
0.933	5.03	1.933	4.70	2.933	1.94	3.93	1.26
0.950	5.03	1.950	4.70	2.950	1.94	3.95	1.26
0.967	5.03	1.967	4.70	2.967	1.94	3.97	1.26
0.983	5.03	1.983	4.70	2.983	1.94	3.98	1.26
1.000	5.03	2.000	4.70	3.000	1.94	4.00	1.26

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.039 (i)
TIME TO PEAK (hrs)= 2.050
RUNOFF VOLUME (mm)= 2.990
TOTAL RAINFALL (mm)= 24.991
RUNOFF COEFFICIENT = 0.120

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

CALIB STANDHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 6.57 Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.83	1.74
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	209.28	10.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		76.07	3.41
over (min)		5.00	7.00
Storage Coeff. (min)=		4.44 (ii)	6.72 (ii)
Unit Hyd. Tpeak (min)=		5.00	7.00
Unit Hyd. peak (cms)=		0.24	0.17

TOTALS

Normal Operating Model Output (SCS)

PEAK FLOW	(cms)=	0.71	0.01	0.715 (iii)
TIME TO PEAK	(hrs)=	1.38	1.50	1.38
RUNOFF VOLUME	(mm)=	22.99	2.03	17.44
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.92	0.08	0.70

(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 (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	0.00	4.05	
over	(min)	30.00	114.00	
Storage Coeff.	(min)=	96.21 (ii)	113.00 (ii)	
Unit Hyd. Tpeak	(min)=	30.00	114.00	
Unit Hyd. peak	(cms)=	0.11	0.01	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.01	0.006 (iii)
TIME TO PEAK	(hrs)=	0.00	4.15	4.15
RUNOFF VOLUME	(mm)=	0.00	1.89	1.88
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.00	0.08	0.08

***** 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 (0009)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	6.57	0.715	1.38	17.44
+ ID2= 2 (0002):	4.32	0.006	4.15	1.88
ID = 3 (0009):	10.89	0.715	1.38	11.26

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0009):		10.89	0.715	1.38	11.26
+ ID2= 2 (0007):		7.90	0.039	2.05	2.99
ID = 1 (0009):		18.79	0.717	1.38	7.79

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min					
	Area	(ha)=	11.10	Curve Number	(CN)= 66.4
	Ia	(mm)=	7.20	# of Linear Res.	(N)= 3.00
	U.H. Tp	(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.028 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 2.163
TOTAL RAINFALL (mm)= 24.991
RUNOFF COEFFICIENT = 0.087

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min					
	Area	(ha)=	3.20		
	Total Imp	(%)=	59.00	Dir. Conn.	(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	27.00	30.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	0.00	4.05	
over	(min)	30.00	105.00	
Storage Coeff.	(min)=	87.93 (ii)	104.72 (ii)	
Unit Hyd. Tpeak	(min)=	30.00	105.00	
Unit Hyd. peak	(cms)=	0.11	0.01	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.00	0.004 (iii)
TIME TO PEAK	(hrs)=	0.00	4.03	4.03
RUNOFF VOLUME	(mm)=	0.00	1.89	1.87
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.00	0.08	0.07

***** 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.

Normal Operating Model Output (SCS)

CALIB STANDHYD (0004) ID= 1 DT= 1.0 min	Area (ha)= 2.70	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	76.07	3.41	
over	(min)	5.00	7.00	
Storage Coeff.	(min)=	3.40 (ii)	6.85 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	7.00	
Unit Hyd. peak	(cms)=	0.29	0.16	
				TOTALS
PEAK FLOW	(cms)=	0.31	0.00	0.317 (iii)
TIME TO PEAK	(hrs)=	1.37	1.50	1.37
RUNOFF VOLUME	(mm)=	22.99	2.03	17.44
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.92	0.08	0.70

(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 (0010) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.004	4.03	1.87
+ ID2= 2 (0004):	2.70	0.317	1.37	17.44
ID = 3 (0010):	5.90	0.317	1.37	9.00

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010) 3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	0.317	1.37	9.00
+ ID2= 2 (0008):	11.10	0.028	2.58	2.16
ID = 1 (0010):	17.00	0.317	1.37	4.53

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	0.317	1.37	4.53

+ ID2= 2 (0009):	18.79	0.717	1.38	7.79
ID = 3 (0011):	35.79	1.032	1.38	6.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013) ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		76.07	5.33	
over (min)		5.00	13.00	
Storage Coeff. (min)=		4.44 (ii)	12.53 (ii)	
Unit Hyd. Tpeak (min)=		5.00	13.00	
Unit Hyd. peak (cms)=		0.24	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.33	0.03	0.334 (iii)
TIME TO PEAK	(hrs)=	1.38	1.62	1.38
RUNOFF VOLUME	(mm)=	22.99	2.56	9.46
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.92	0.10	0.38

(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 (0012)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	35.79	1.032	1.38	6.24
+ ID2= 2 (0013):	6.58	0.334	1.38	9.46
ID = 3 (0012):	42.37	1.366	1.38	6.74

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)
IN= 2---> OUT= 1
DT= 1.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0001	5.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0012)	42.370	1.366	1.38	6.74
OUTFLOW: ID= 1 (0014)	42.370	0.000	12.62	0.00

Normal Operating Model Output (SCS)

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=674.00
MAXIMUM STORAGE USED (ha.m.)= 0.2856

Conservative Model Output (Chicago)

```
       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\d947d6a6-17ae-4fbd-aa08-611e7485c5b0\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\d947d6a6-17ae-4fbd-aa08-611e7485c5b0\scen

DATE: 03/29/2018 TIME: 10:20:12

USER:

COMMENTS: Chicago 2 year

****
** Run 01 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\321a918a-b405-4c12-8798-665daffe2fc8\c9b502ef
Ptotal= 29.17 mm	Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	1.72	1.08	7.70	2.08	4.86	3.08	2.30
0.17	1.83	1.17	11.94	2.17	4.42	3.17	2.21
0.25	1.95	1.25	28.32	2.25	4.05	3.25	2.13
0.33	2.09	1.33	95.76	2.33	3.75	3.33	2.05
0.42	2.25	1.42	36.80	2.42	3.49	3.42	1.98
0.50	2.45	1.50	19.89	2.50	3.27	3.50	1.92
0.58	2.69	1.58	13.58	2.58	3.08	3.58	1.86
0.67	2.99	1.67	10.33	2.67	2.91	3.67	1.80

Conservative Model Output (Chicago)

0.75	3.38	1.75	8.37	2.75	2.76	3.75	1.75
0.83	3.90	1.83	7.06	2.83	2.63	3.83	1.70
0.92	4.63	1.92	6.11	2.92	2.51	3.92	1.65
1.00	5.75	2.00	5.41	3.00	2.40	4.00	1.61

CALIB NASHYD (0007) ID= 1 DT= 1.0 min					
	Area (ha)=	7.90	Curve Number (CN)=	72.6	
	Ia (mm)=	6.50	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.46			

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	1.72	1.017	7.70	2.017	4.86	3.02	2.30
0.033	1.72	1.033	7.70	2.033	4.86	3.03	2.30
0.050	1.72	1.050	7.70	2.050	4.86	3.05	2.30
0.067	1.72	1.067	7.70	2.067	4.86	3.07	2.30
0.083	1.72	1.083	7.70	2.083	4.86	3.08	2.30
0.100	1.83	1.100	11.94	2.100	4.42	3.10	2.21
0.117	1.83	1.117	11.94	2.117	4.42	3.12	2.21
0.133	1.83	1.133	11.94	2.133	4.42	3.13	2.21
0.150	1.83	1.150	11.94	2.150	4.42	3.15	2.21
0.167	1.83	1.167	11.94	2.167	4.42	3.17	2.21
0.183	1.95	1.183	28.32	2.183	4.05	3.18	2.13
0.200	1.95	1.200	28.32	2.200	4.05	3.20	2.13
0.217	1.95	1.217	28.32	2.217	4.05	3.22	2.13
0.233	1.95	1.233	28.32	2.233	4.05	3.23	2.13
0.250	1.95	1.250	28.32	2.250	4.05	3.25	2.13
0.267	2.09	1.267	95.76	2.267	3.75	3.27	2.05
0.283	2.09	1.283	95.76	2.283	3.75	3.28	2.05
0.300	2.09	1.300	95.76	2.300	3.75	3.30	2.05
0.317	2.09	1.317	95.76	2.317	3.75	3.32	2.05
0.333	2.09	1.333	95.76	2.333	3.75	3.33	2.05
0.350	2.25	1.350	36.80	2.350	3.49	3.35	1.98
0.367	2.25	1.367	36.80	2.367	3.49	3.37	1.98
0.383	2.25	1.383	36.80	2.383	3.49	3.38	1.98
0.400	2.25	1.400	36.80	2.400	3.49	3.40	1.98
0.417	2.25	1.417	36.80	2.417	3.49	3.42	1.98
0.433	2.45	1.433	19.89	2.433	3.27	3.43	1.92
0.450	2.45	1.450	19.89	2.450	3.27	3.45	1.92
0.467	2.45	1.467	19.89	2.467	3.27	3.47	1.92
0.483	2.45	1.483	19.89	2.483	3.27	3.48	1.92
0.500	2.45	1.500	19.89	2.500	3.27	3.50	1.92
0.517	2.69	1.517	13.58	2.517	3.08	3.52	1.86
0.533	2.69	1.533	13.58	2.533	3.08	3.53	1.86
0.550	2.69	1.550	13.58	2.550	3.08	3.55	1.86
0.567	2.69	1.567	13.58	2.567	3.08	3.57	1.86
0.583	2.69	1.583	13.58	2.583	3.08	3.58	1.86
0.600	2.99	1.600	10.33	2.600	2.91	3.60	1.80
0.617	2.99	1.617	10.33	2.617	2.91	3.62	1.80
0.633	2.99	1.633	10.33	2.633	2.91	3.63	1.80
0.650	2.99	1.650	10.33	2.650	2.91	3.65	1.80
0.667	2.99	1.667	10.33	2.667	2.91	3.67	1.80
0.683	3.38	1.683	8.37	2.683	2.76	3.68	1.75
0.700	3.38	1.700	8.37	2.700	2.76	3.70	1.75
0.717	3.38	1.717	8.37	2.717	2.76	3.72	1.75
0.733	3.38	1.733	8.37	2.733	2.76	3.73	1.75

0.750	3.38	1.750	8.37	2.750	2.76	3.75	1.75
0.767	3.90	1.767	7.06	2.767	2.63	3.77	1.70
0.783	3.90	1.783	7.06	2.783	2.63	3.78	1.70
0.800	3.90	1.800	7.06	2.800	2.63	3.80	1.70
0.817	3.90	1.817	7.06	2.817	2.63	3.82	1.70
0.833	3.90	1.833	7.06	2.833	2.63	3.83	1.70
0.850	4.63	1.850	6.11	2.850	2.51	3.85	1.65
0.867	4.63	1.867	6.11	2.867	2.51	3.87	1.65
0.883	4.63	1.883	6.11	2.883	2.51	3.88	1.65
0.900	4.63	1.900	6.11	2.900	2.51	3.90	1.65
0.917	4.63	1.917	6.11	2.917	2.51	3.92	1.65
0.933	5.75	1.933	5.41	2.933	2.40	3.93	1.61
0.950	5.75	1.950	5.41	2.950	2.40	3.95	1.61
0.967	5.75	1.967	5.41	2.967	2.40	3.97	1.61
0.983	5.75	1.983	5.41	2.983	2.40	3.98	1.61
1.000	5.75	2.000	5.41	3.000	2.40	4.00	1.61

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.056 (i)
TIME TO PEAK (hrs)= 2.017
RUNOFF VOLUME (mm)= 4.334
TOTAL RAINFALL (mm)= 29.165
RUNOFF COEFFICIENT = 0.149

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

CALIB STANDHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		95.76	37.64	
over (min)		5.00	11.00	
Storage Coeff. (min)=		3.57 (ii)	10.45 (ii)	
Unit Hyd. Tpeak (min)=		5.00	11.00	
Unit Hyd. peak (cms)=		0.32	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.11	0.107 (iii)
TIME TO PEAK	(hrs)=	1.37	1.52	1.52
RUNOFF VOLUME	(mm)=	27.17	7.39	7.39
TOTAL RAINFALL	(mm)=	29.17	29.17	29.17
RUNOFF COEFFICIENT	=	0.93	0.25	0.25

***** 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.

Conservative Model Output (Chicago)

CALIB STANDHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 6.57 Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		95.76	5.23	
over (min)		5.00	7.00	
Storage Coeff. (min)=		4.05 (ii)	6.13 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.26	0.18	
				TOTALS
PEAK FLOW	(cms)=	0.89	0.02	0.902 (iii)
TIME TO PEAK	(hrs)=	1.37	1.45	1.38
RUNOFF VOLUME	(mm)=	27.16	2.91	20.74
TOTAL RAINFALL	(mm)=	29.17	29.17	29.17
RUNOFF COEFFICIENT	=	0.93	0.10	0.71

(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 (0009) 1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	6.57	0.902	1.38	20.74
+ ID2= 2 (0002):	4.32	0.107	1.52	7.39
ID = 3 (0009):	10.89	0.955	1.38	15.44

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009) 3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0009):	10.89	0.955	1.38	15.44
+ ID2= 2 (0007):	7.90	0.056	2.02	4.33
ID = 1 (0009):	18.79	0.959	1.38	10.77

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min	Area (ha)= 11.10 Curve Number (CN)= 66.4
	Ia (mm)= 7.20 # of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.79

Conservative Model Output (Chicago)

```
Unit Hyd Qpeak  (cms)=     0.537

PEAK FLOW       (cms)=     0.041 (i)
TIME TO PEAK    (hrs)=     2.533
RUNOFF VOLUME    (mm)=     3.206
TOTAL RAINFALL   (mm)=    29.165
RUNOFF COEFFICIENT   =     0.110

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min	Area (ha)= 3.20 Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		95.76	37.64	
over (min)		5.00	11.00	
Storage Coeff. (min)=		3.26 (ii)	10.15 (ii)	
Unit Hyd. Tpeak (min)=		5.00	11.00	
Unit Hyd. peak (cms)=		0.36	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.08	0.081 (iii)
TIME TO PEAK	(hrs)=	1.37	1.50	1.50
RUNOFF VOLUME	(mm)=	27.17	7.39	7.39
TOTAL RAINFALL	(mm)=	29.17	29.17	29.17
RUNOFF COEFFICIENT	=	0.93	0.25	0.25

***** 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 (0004) ID= 1 DT= 1.0 min	Area (ha)= 2.70 Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		95.76	5.23	
over (min)		5.00	7.00	
Storage Coeff. (min)=		3.10 (ii)	6.25 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.30	0.17	
				TOTALS

Conservative Model Output (Chicago)

PEAK FLOW	(cms)=	0.40	0.01	0.402 (iii)
TIME TO PEAK	(hrs)=	1.37	1.45	1.37
RUNOFF VOLUME	(mm)=	27.17	2.91	20.74
TOTAL RAINFALL	(mm)=	29.17	29.17	29.17
RUNOFF COEFFICIENT	=	0.93	0.10	0.71

(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 (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.081	1.50	7.39
+ ID2= 2 (0004):	2.70	0.402	1.37	20.74
ID = 3 (0010):	5.90	0.436	1.37	13.50

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	0.436	1.37	13.50
+ ID2= 2 (0008):	11.10	0.041	2.53	3.21
ID = 1 (0010):	17.00	0.436	1.37	6.78

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	0.436	1.37	6.78
+ ID2= 2 (0009):	18.79	0.959	1.38	10.77
ID = 3 (0011):	35.79	1.395	1.38	8.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0013)
ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.92	3.66
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	209.44	30.00

Conservative Model Output (Chicago)

Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		95.76	8.05	
over (min)		5.00	12.00	
Storage Coeff. (min)=		4.05 (ii)	11.42 (ii)	
Unit Hyd. Tpeak (min)=		5.00	12.00	
Unit Hyd. peak (cms)=		0.26	0.10	
				TOTALS
PEAK FLOW (cms)=		0.41	0.05	0.425 (iii)
TIME TO PEAK (hrs)=		1.37	1.57	1.38
RUNOFF VOLUME (mm)=		27.17	3.60	11.56
TOTAL RAINFALL (mm)=		29.17	29.17	29.17
RUNOFF COEFFICIENT	=	0.93	0.12	0.40

(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 (0012)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		35.79	1.395	1.38	8.87
+ ID2= 2 (0013):		6.58	0.425	1.38	11.56
ID = 3 (0012):		42.37	1.821	1.38	9.29

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)		OUTFLOW	STORAGE		OUTFLOW	STORAGE
IN= 2---> OUT= 1		(cms)	(ha.m.)		(cms)	(ha.m.)
DT= 1.0 min		0.0000	0.0000		0.0001	5.0000

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0012)	42.370	1.821	1.38	9.29
OUTFLOW: ID= 1 (0014)	42.370	0.000	8.62	0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=434.00
MAXIMUM STORAGE USED (ha.m.)= 0.3937

```
V    V   I    SSSSS  U   U    A    L
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
```

Conservative Model Output (Chicago)

```
      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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\06de3219-9bfd-43f8-af26-f83daa01611d\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\06de3219-9bfd-43f8-af26-f83daa01611d\scen

DATE: 03/29/2018 TIME: 10:20:12

USER:

COMMENTS: Chicago 5 year

****
** Run 02 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\321a918a-b405-4c12-8798-665daffe2fc8\14e70428
Ptotal= 41.27 mm	Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	2.85	1.08	11.23	2.08	7.39	3.08	3.73
0.17	3.01	1.17	16.72	2.17	6.78	3.17	3.59
0.25	3.20	1.25	37.22	2.25	6.27	3.25	3.47
0.33	3.41	1.33	125.51	2.33	5.84	3.33	3.36
0.42	3.66	1.42	47.75	2.42	5.47	3.42	3.25
0.50	3.95	1.50	26.72	2.50	5.15	3.50	3.15
0.58	4.31	1.58	18.81	2.58	4.88	3.58	3.06
0.67	4.75	1.67	14.67	2.67	4.63	3.67	2.97
0.75	5.31	1.75	12.12	2.75	4.41	3.75	2.89
0.83	6.05	1.83	10.38	2.83	4.21	3.83	2.82
0.92	7.08	1.92	9.11	2.92	4.04	3.92	2.75
1.00	8.62	2.00	8.15	3.00	3.88	4.00	2.68

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00

Conservative Model Output (Chicago)

---------- U.H. Tp(hrs)= 0.46

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	2.85	1.017	11.23	2.017	7.39	3.02	3.73
0.033	2.85	1.033	11.23	2.033	7.39	3.03	3.73
0.050	2.85	1.050	11.23	2.050	7.39	3.05	3.73
0.067	2.85	1.067	11.23	2.067	7.39	3.07	3.73
0.083	2.85	1.083	11.23	2.083	7.39	3.08	3.73
0.100	3.01	1.100	16.72	2.100	6.78	3.10	3.59
0.117	3.01	1.117	16.72	2.117	6.78	3.12	3.59
0.133	3.01	1.133	16.72	2.133	6.78	3.13	3.59
0.150	3.01	1.150	16.72	2.150	6.78	3.15	3.59
0.167	3.01	1.167	16.72	2.167	6.78	3.17	3.59
0.183	3.20	1.183	37.21	2.183	6.27	3.18	3.47
0.200	3.20	1.200	37.22	2.200	6.27	3.20	3.47
0.217	3.20	1.217	37.22	2.217	6.27	3.22	3.47
0.233	3.20	1.233	37.22	2.233	6.27	3.23	3.47
0.250	3.20	1.250	37.22	2.250	6.27	3.25	3.47
0.267	3.41	1.267	125.51	2.267	5.84	3.27	3.36
0.283	3.41	1.283	125.51	2.283	5.84	3.28	3.36
0.300	3.41	1.300	125.51	2.300	5.84	3.30	3.36
0.317	3.41	1.317	125.51	2.317	5.84	3.32	3.36
0.333	3.41	1.333	125.51	2.333	5.84	3.33	3.36
0.350	3.66	1.350	47.76	2.350	5.47	3.35	3.25
0.367	3.66	1.367	47.75	2.367	5.47	3.37	3.25
0.383	3.66	1.383	47.75	2.383	5.47	3.38	3.25
0.400	3.66	1.400	47.75	2.400	5.47	3.40	3.25
0.417	3.66	1.417	47.75	2.417	5.47	3.42	3.25
0.433	3.95	1.433	26.72	2.433	5.15	3.43	3.15
0.450	3.95	1.450	26.72	2.450	5.15	3.45	3.15
0.467	3.95	1.467	26.72	2.467	5.15	3.47	3.15
0.483	3.95	1.483	26.72	2.483	5.15	3.48	3.15
0.500	3.95	1.500	26.72	2.500	5.15	3.50	3.15
0.517	4.31	1.517	18.81	2.517	4.88	3.52	3.06
0.533	4.31	1.533	18.81	2.533	4.88	3.53	3.06
0.550	4.31	1.550	18.81	2.550	4.88	3.55	3.06
0.567	4.31	1.567	18.81	2.567	4.88	3.57	3.06
0.583	4.31	1.583	18.81	2.583	4.88	3.58	3.06
0.600	4.75	1.600	14.67	2.600	4.63	3.60	2.97
0.617	4.75	1.617	14.67	2.617	4.63	3.62	2.97
0.633	4.75	1.633	14.67	2.633	4.63	3.63	2.97
0.650	4.75	1.650	14.67	2.650	4.63	3.65	2.97
0.667	4.75	1.667	14.67	2.667	4.63	3.67	2.97
0.683	5.31	1.683	12.12	2.683	4.41	3.68	2.89
0.700	5.31	1.700	12.12	2.700	4.41	3.70	2.89
0.717	5.31	1.717	12.12	2.717	4.41	3.72	2.89
0.733	5.31	1.733	12.12	2.733	4.41	3.73	2.89
0.750	5.31	1.750	12.12	2.750	4.41	3.75	2.89
0.767	6.05	1.767	10.38	2.767	4.21	3.77	2.82
0.783	6.05	1.783	10.38	2.783	4.21	3.78	2.82
0.800	6.05	1.800	10.38	2.800	4.21	3.80	2.82
0.817	6.05	1.817	10.38	2.817	4.21	3.82	2.82
0.833	6.05	1.833	10.38	2.833	4.21	3.83	2.82
0.850	7.08	1.850	9.11	2.850	4.04	3.85	2.75
0.867	7.08	1.867	9.11	2.867	4.04	3.87	2.75
0.883	7.08	1.883	9.11	2.883	4.04	3.88	2.75
0.900	7.08	1.900	9.11	2.900	4.04	3.90	2.75
0.917	7.08	1.917	9.11	2.917	4.04	3.92	2.75

0.933	8.62	1.933	8.15	2.933	3.88	3.93	2.68
0.950	8.62	1.950	8.15	2.950	3.88	3.95	2.68
0.967	8.62	1.967	8.15	2.967	3.88	3.97	2.68
0.983	8.62	1.983	8.15	2.983	3.88	3.98	2.68
1.000	8.62	2.000	8.15	3.000	3.88	4.00	2.68

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.118 (i)
TIME TO PEAK (hrs)= 2.000
RUNOFF VOLUME (mm)= 9.255
TOTAL RAINFALL (mm)= 41.271
RUNOFF COEFFICIENT = 0.224

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

CALIB
STANDHYD (0002)
ID= 1 DT= 1.0 min

Area (ha)= 4.32
Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		125.51	66.28	
over (min)		5.00	9.00	
Storage Coeff. (min)=		3.20 (ii)	8.69 (ii)	
Unit Hyd. Tpeak (min)=		5.00	9.00	
Unit Hyd. peak (cms)=		0.33	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.21	0.212 (iii)
TIME TO PEAK	(hrs)=	1.37	1.47	1.47
RUNOFF VOLUME	(mm)=	39.27	13.78	13.78
TOTAL RAINFALL	(mm)=	41.27	41.27	41.27
RUNOFF COEFFICIENT	=	0.95	0.33	0.33

***** 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= 1.0 min

Area (ha)= 6.57
Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.83	1.74
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	209.28	10.00
Mannings n	=	0.013	0.250

Conservative Model Output (Chicago)

Max.Eff.Inten.(mm/hr)=	125.51	10.84		
over (min)	5.00	6.00		
Storage Coeff. (min)=	3.63 (ii)	5.50 (ii)		
Unit Hyd. Tpeak (min)=	5.00	6.00		
Unit Hyd. peak (cms)=	0.28	0.20		
			TOTALS	
PEAK FLOW (cms)=	1.21	0.04	1.242 (iii)	
TIME TO PEAK (hrs)=	1.37	1.42	1.37	
RUNOFF VOLUME (mm)=	39.27	6.18	30.50	
TOTAL RAINFALL (mm)=	41.27	41.27	41.27	
RUNOFF COEFFICIENT =	0.95	0.15	0.74	

(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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		6.57	1.242	1.37	30.50
+ ID2= 2 (0002):		4.32	0.212	1.47	13.78
ID = 3 (0009):		10.89	1.376	1.38	23.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0009):		10.89	1.376	1.38	23.87
+ ID2= 2 (0007):		7.90	0.118	2.00	9.25
ID = 1 (0009):		18.79	1.387	1.38	17.73

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min					
	Area (ha)=	11.10	Curve Number (CN)=	66.4	
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.79			

Unit Hyd Qpeak (cms)=	0.537	
PEAK FLOW (cms)=	0.090	(i)
TIME TO PEAK (hrs)=	2.517	
RUNOFF VOLUME (mm)=	7.139	
TOTAL RAINFALL (mm)=	41.271	
RUNOFF COEFFICIENT =	0.173	

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

Conservative Model Output (Chicago)

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min	Area (ha)= 3.20	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		125.51	66.28	
over (min)		5.00	9.00	
Storage Coeff.	(min)=	2.93 (ii)	8.42 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	9.00	
Unit Hyd. peak	(cms)=	0.35	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.16	0.160 (iii)
TIME TO PEAK	(hrs)=	1.37	1.47	1.47
RUNOFF VOLUME	(mm)=	39.27	13.78	13.78
TOTAL RAINFALL	(mm)=	41.27	41.27	41.27
RUNOFF COEFFICIENT	=	0.95	0.33	0.33

***** 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 (0004) ID= 1 DT= 1.0 min	Area (ha)= 2.70	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		125.51	10.84	
over (min)		5.00	6.00	
Storage Coeff.	(min)=	2.78 (ii)	5.61 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	6.00	
Unit Hyd. peak	(cms)=	0.32	0.20	
				TOTALS
PEAK FLOW	(cms)=	0.54	0.02	0.549 (iii)
TIME TO PEAK	(hrs)=	1.37	1.42	1.37
RUNOFF VOLUME	(mm)=	39.27	6.18	30.50
TOTAL RAINFALL	(mm)=	41.27	41.27	41.27
RUNOFF COEFFICIENT	=	0.95	0.15	0.74

(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 (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):		3.20	0.160	1.47	13.78
+ ID2= 2 (0004):		2.70	0.549	1.37	30.50
ID = 3 (0010):		5.90	0.642	1.38	21.43

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0010):		5.90	0.642	1.38	21.43
+ ID2= 2 (0008):		11.10	0.090	2.52	7.14
ID = 1 (0010):		17.00	0.645	1.38	12.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0010):		17.00	0.645	1.38	12.10
+ ID2= 2 (0009):		18.79	1.387	1.38	17.73
ID = 3 (0011):		35.79	2.032	1.38	15.05

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013) | ID= 1 DT= 1.0 min | Area (ha)= 6.58 | Total Imp(%)= 44.40 | Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		125.51	15.93	
over (min)		5.00	11.00	
Storage Coeff.	(min)=	3.63 (ii)	10.25 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	11.00	
Unit Hyd. peak	(cms)=	0.28	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.56	0.09	0.597 (iii)
TIME TO PEAK	(hrs)=	1.37	1.52	1.38
RUNOFF VOLUME	(mm)=	39.27	7.42	18.18

```
                        Conservative Model Output (Chicago)
     TOTAL RAINFALL   (mm)=        41.27          41.27          41.27
     RUNOFF COEFFICIENT   =         0.95           0.18           0.44

       (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  (  0012)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)      (cms)      (hrs)       (mm)
       ID1= 1 (  0011):     35.79      2.032       1.38      15.05
     + ID2= 2 (  0013):      6.58      0.597       1.38      18.18
       ==========================================================
       ID = 3 (  0012):     42.37      2.629       1.38      15.54

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW       STORAGE    |     OUTFLOW        STORAGE
--------------------          (cms)       (ha.m.)    |     (cms)         (ha.m.)
                              0.0000       0.0000    |       0.0001        5.0000

                                    AREA       QPEAK       TPEAK       R.V.
                                    (ha)       (cms)       (hrs)       (mm)
   INFLOW : ID= 2 (  0012)        42.370       2.629        1.38      15.54
   OUTFLOW: ID= 1 (  0014)        42.370       0.000        8.77       0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                  TIME SHIFT OF PEAK FLOW          (min)=443.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.6584

--------------------------------------------------------------------------------
================================================================================
========================

       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat
```

Conservative Model Output (Chicago)

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\19161cf5-1436-4123-819d-0a166b790eff\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\19161cf5-1436-4123-819d-0a166b790eff\scen

DATE: 03/29/2018 TIME: 10:20:12

USER:

COMMENTS: Chicago 10 year

****
** Run 03 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\321a918a-b405-4c12-8798-665daffe2fc8\95b78139
Ptotal= 49.17 mm	Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	3.66	1.08	13.43	2.08	9.05	3.08	4.72
0.17	3.85	1.17	19.54	2.17	8.34	3.17	4.56
0.25	4.08	1.25	42.04	2.25	7.74	3.25	4.41
0.33	4.34	1.33	147.26	2.33	7.24	3.33	4.27
0.42	4.64	1.42	53.64	2.42	6.81	3.42	4.14
0.50	4.99	1.50	30.50	2.50	6.43	3.50	4.02
0.58	5.42	1.58	21.85	2.58	6.10	3.58	3.91
0.67	5.95	1.67	17.28	2.67	5.81	3.67	3.81
0.75	6.61	1.75	14.43	2.75	5.55	3.75	3.71
0.83	7.48	1.83	12.47	2.83	5.31	3.83	3.61
0.92	8.69	1.92	11.03	2.92	5.10	3.92	3.53
1.00	10.47	2.00	9.93	3.00	4.90	4.00	3.44

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	3.66	1.017	13.43	2.017	9.05	3.02	4.72
0.033	3.66	1.033	13.43	2.033	9.05	3.03	4.72
0.050	3.66	1.050	13.43	2.050	9.05	3.05	4.72

0.067	3.66	1.067	13.43	2.067	9.05	3.07	4.72
0.083	3.66	1.083	13.43	2.083	9.05	3.08	4.72
0.100	3.85	1.100	19.54	2.100	8.34	3.10	4.56
0.117	3.85	1.117	19.54	2.117	8.34	3.12	4.56
0.133	3.85	1.133	19.54	2.133	8.34	3.13	4.56
0.150	3.85	1.150	19.54	2.150	8.34	3.15	4.56
0.167	3.85	1.167	19.54	2.167	8.34	3.17	4.56
0.183	4.08	1.183	42.04	2.183	7.74	3.18	4.41
0.200	4.08	1.200	42.04	2.200	7.74	3.20	4.41
0.217	4.08	1.217	42.04	2.217	7.74	3.22	4.41
0.233	4.08	1.233	42.04	2.233	7.74	3.23	4.41
0.250	4.08	1.250	42.04	2.250	7.74	3.25	4.41
0.267	4.34	1.267	147.25	2.267	7.24	3.27	4.27
0.283	4.34	1.283	147.26	2.283	7.24	3.28	4.27
0.300	4.34	1.300	147.26	2.300	7.24	3.30	4.27
0.317	4.34	1.317	147.26	2.317	7.24	3.32	4.27
0.333	4.34	1.333	147.26	2.333	7.24	3.33	4.27
0.350	4.64	1.350	53.64	2.350	6.81	3.35	4.14
0.367	4.64	1.367	53.64	2.367	6.81	3.37	4.14
0.383	4.64	1.383	53.64	2.383	6.81	3.38	4.14
0.400	4.64	1.400	53.64	2.400	6.81	3.40	4.14
0.417	4.64	1.417	53.64	2.417	6.81	3.42	4.14
0.433	4.99	1.433	30.50	2.433	6.43	3.43	4.02
0.450	4.99	1.450	30.50	2.450	6.43	3.45	4.02
0.467	4.99	1.467	30.50	2.467	6.43	3.47	4.02
0.483	4.99	1.483	30.50	2.483	6.43	3.48	4.02
0.500	4.99	1.500	30.50	2.500	6.43	3.50	4.02
0.517	5.42	1.517	21.85	2.517	6.10	3.52	3.91
0.533	5.42	1.533	21.85	2.533	6.10	3.53	3.91
0.550	5.42	1.550	21.85	2.550	6.10	3.55	3.91
0.567	5.42	1.567	21.85	2.567	6.10	3.57	3.91
0.583	5.42	1.583	21.85	2.583	6.10	3.58	3.91
0.600	5.95	1.600	17.28	2.600	5.81	3.60	3.81
0.617	5.95	1.617	17.28	2.617	5.81	3.62	3.81
0.633	5.95	1.633	17.28	2.633	5.81	3.63	3.81
0.650	5.95	1.650	17.28	2.650	5.81	3.65	3.81
0.667	5.95	1.667	17.28	2.667	5.81	3.67	3.81
0.683	6.61	1.683	14.43	2.683	5.55	3.68	3.71
0.700	6.61	1.700	14.43	2.700	5.55	3.70	3.71
0.717	6.61	1.717	14.43	2.717	5.55	3.72	3.71
0.733	6.61	1.733	14.43	2.733	5.55	3.73	3.71
0.750	6.61	1.750	14.43	2.750	5.55	3.75	3.71
0.767	7.48	1.767	12.47	2.767	5.31	3.77	3.61
0.783	7.48	1.783	12.47	2.783	5.31	3.78	3.61
0.800	7.48	1.800	12.47	2.800	5.31	3.80	3.61
0.817	7.48	1.817	12.47	2.817	5.31	3.82	3.61
0.833	7.48	1.833	12.47	2.833	5.31	3.83	3.61
0.850	8.69	1.850	11.03	2.850	5.10	3.85	3.53
0.867	8.69	1.867	11.03	2.867	5.10	3.87	3.53
0.883	8.69	1.883	11.03	2.883	5.10	3.88	3.53
0.900	8.69	1.900	11.03	2.900	5.10	3.90	3.53
0.917	8.69	1.917	11.03	2.917	5.10	3.92	3.53
0.933	10.47	1.933	9.93	2.933	4.90	3.93	3.44
0.950	10.47	1.950	9.93	2.950	4.90	3.95	3.44
0.967	10.47	1.967	9.93	2.967	4.90	3.97	3.44
0.983	10.47	1.983	9.93	2.983	4.90	3.98	3.44
1.000	10.47	2.000	9.93	3.000	4.90	4.00	3.44

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.167 (i)
TIME TO PEAK (hrs)= 1.983
RUNOFF VOLUME (mm)= 13.145

Conservative Model Output (Chicago)

TOTAL RAINFALL (mm)= 49.175
RUNOFF COEFFICIENT = 0.267

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

CALIB STANDHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32 Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		147.26	87.99	
over (min)		5.00	8.00	
Storage Coeff.	(min)=	3.01 (ii)	7.91 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	8.00	
Unit Hyd. peak	(cms)=	0.33	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.30	0.299 (iii)
TIME TO PEAK	(hrs)=	1.37	1.45	1.45
RUNOFF VOLUME	(mm)=	47.17	18.58	18.58
TOTAL RAINFALL	(mm)=	49.17	49.17	49.17
RUNOFF COEFFICIENT	=	0.96	0.38	0.38

***** 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= 1.0 min	Area (ha)= 6.57 Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		147.26	15.37	
over (min)		5.00	6.00	
Storage Coeff.	(min)=	3.41 (ii)	5.16 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	6.00	
Unit Hyd. peak	(cms)=	0.29	0.21	
				TOTALS
PEAK FLOW	(cms)=	1.44	0.06	1.490 (iii)
TIME TO PEAK	(hrs)=	1.37	1.42	1.37
RUNOFF VOLUME	(mm)=	47.17	8.84	37.02
TOTAL RAINFALL	(mm)=	49.17	49.17	49.17
RUNOFF COEFFICIENT	=	0.96	0.18	0.75

Conservative Model Output (Chicago)

(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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	6.57	1.490	1.37	37.02
	+ ID2= 2 (0002):	4.32	0.299	1.45	18.58
	ID = 3 (0009):	10.89	1.703	1.38	29.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0009):	10.89	1.703	1.38	29.70
	+ ID2= 2 (0007):	7.90	0.167	1.98	13.15
	ID = 1 (0009):	18.79	1.721	1.38	22.74

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min				
	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.129 (i)
TIME TO PEAK (hrs)= 2.500
RUNOFF VOLUME (mm)= 10.333
TOTAL RAINFALL (mm)= 49.175
RUNOFF COEFFICIENT = 0.210

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min				
	Area (ha)=	3.20		
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.89	1.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	146.06	20.00
Mannings n	=	0.013	0.250

Max.Eff.Inten.(mm/hr)=	147.26		87.99	
over (min)	5.00		8.00	
Storage Coeff. (min)=	2.75	(ii)	7.65	(ii)
Unit Hyd. Tpeak (min)=	5.00		8.00	
Unit Hyd. peak (cms)=	0.35		0.15	
				TOTALS
PEAK FLOW (cms)=	0.00		0.23	0.225 (iii)
TIME TO PEAK (hrs)=	1.37		1.45	1.45
RUNOFF VOLUME (mm)=	47.17		18.58	18.58
TOTAL RAINFALL (mm)=	49.17		49.17	49.17
RUNOFF COEFFICIENT =	0.96		0.38	0.38

***** 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 (0004)	Area (ha)=	2.70			
ID= 1 DT= 1.0 min	Total Imp(%)=	73.50	Dir. Conn.(%)=	73.50	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		147.26	15.37	
over (min)		5.00	6.00	
Storage Coeff. (min)=		2.61 (ii)	5.26 (ii)	
Unit Hyd. Tpeak (min)=		5.00	6.00	
Unit Hyd. peak (cms)=		0.33	0.21	
				TOTALS
PEAK FLOW (cms)=		0.64	0.03	0.656 (iii)
TIME TO PEAK (hrs)=		1.37	1.42	1.37
RUNOFF VOLUME (mm)=		47.17	8.84	37.02
TOTAL RAINFALL (mm)=		49.17	49.17	49.17
RUNOFF COEFFICIENT =		0.96	0.18	0.75

(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 (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):		3.20	0.225	1.45	18.58
+ ID2= 2 (0004):		2.70	0.656	1.37	37.02

ID = 3 (0010):	5.90	0.809	1.38	27.02

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	0.809	1.38	27.02
+ ID2= 2 (0008):	11.10	0.129	2.50	10.33
ID = 1 (0010):	17.00	0.813	1.38	16.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	0.813	1.38	16.12
+ ID2= 2 (0009):	18.79	1.721	1.38	22.74
ID = 3 (0011):	35.79	2.535	1.38	19.60

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013) ID= 1 DT= 1.0 min	Area (ha)= 6.58	Total Imp(%)= 44.40	Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		147.26	22.23	
over (min)		5.00	10.00	
Storage Coeff. (min)=		3.41 (ii)	9.62 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.29	0.12	
				TOTALS
PEAK FLOW	(cms)=	0.66	0.14	0.730 (iii)
TIME TO PEAK	(hrs)=	1.37	1.48	1.38
RUNOFF VOLUME	(mm)=	47.17	10.47	22.87
TOTAL RAINFALL	(mm)=	49.17	49.17	49.17
RUNOFF COEFFICIENT	=	0.96	0.21	0.47

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

```
--------------------
| ADD HYD  (  0012)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)      (cms)      (hrs)       (mm)
       ID1= 1 (  0011):      35.79      2.535       1.38      19.60
     + ID2= 2 (  0013):       6.58      0.730       1.38      22.87
       ================================================================
       ID = 3 (  0012):      42.37      3.265       1.38      20.11

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW       STORAGE    |     OUTFLOW        STORAGE
--------------------          (cms)       (ha.m.)    |    (cms)          (ha.m.)
                              0.0000       0.0000    |      0.0001         5.0000

                                    AREA       QPEAK       TPEAK       R.V.
                                    (ha)       (cms)       (hrs)       (mm)
  INFLOW : ID= 2 (  0012)         42.370       3.265        1.38      20.11
  OUTFLOW: ID= 1 (  0014)         42.370       0.000        8.87       0.00

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                  TIME SHIFT OF PEAK FLOW         (min)=449.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.8519

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================================================================================
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      V    V   I    SSSSS  U   U    A    L
      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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\eb39a
e76-c696-4a45-8cdf-e38ee1990512\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\eb39a
e76-c696-4a45-8cdf-e38ee1990512\scen


DATE: 03/29/2018                          TIME: 10:20:12
```

Conservative Model Output (Chicago)

USER:

COMMENTS: Chicago 25 year

****
** Run 04 **
****

READ STORM | Ptotal= 58.92 mm

Filename: C:\Users\bpowers\AppData\Local\Temp\321a918a-b405-4c12-8798-665daffe2fc8\449891c1

Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	4.51	1.08	16.25	2.08	11.03	3.08	5.81
0.17	4.75	1.17	23.49	2.17	10.17	3.17	5.61
0.25	5.03	1.25	49.82	2.25	9.46	3.25	5.43
0.33	5.34	1.33	171.39	2.33	8.85	3.33	5.26
0.42	5.71	1.42	63.33	2.42	8.33	3.42	5.11
0.50	6.14	1.50	36.38	2.50	7.88	3.50	4.96
0.58	6.66	1.58	26.22	2.58	7.48	3.58	4.82
0.67	7.29	1.67	20.82	2.67	7.12	3.67	4.70
0.75	8.09	1.75	17.44	2.75	6.81	3.75	4.58
0.83	9.14	1.83	15.11	2.83	6.52	3.83	4.46
0.92	10.59	1.92	13.39	2.92	6.26	3.92	4.36
1.00	12.72	2.00	12.08	3.00	6.03	4.00	4.26

CALIB NASHYD (0007) | ID= 1 DT= 1.0 min

Area (ha)= 7.90 Curve Number (CN)= 72.6

Ia (mm)= 6.50 # of Linear Res.(N)= 3.00

U.H. Tp(hrs)= 0.46

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	4.51	1.017	16.25	2.017	11.03	3.02	5.81
0.033	4.51	1.033	16.25	2.033	11.03	3.03	5.81
0.050	4.51	1.050	16.25	2.050	11.03	3.05	5.81
0.067	4.51	1.067	16.25	2.067	11.03	3.07	5.81
0.083	4.51	1.083	16.25	2.083	11.03	3.08	5.81
0.100	4.75	1.100	23.49	2.100	10.17	3.10	5.62
0.117	4.75	1.117	23.49	2.117	10.17	3.12	5.61
0.133	4.75	1.133	23.49	2.133	10.17	3.13	5.61
0.150	4.75	1.150	23.49	2.150	10.17	3.15	5.61
0.167	4.75	1.167	23.49	2.167	10.17	3.17	5.61
0.183	5.03	1.183	49.82	2.183	9.46	3.18	5.43
0.200	5.03	1.200	49.82	2.200	9.46	3.20	5.43
0.217	5.03	1.217	49.82	2.217	9.46	3.22	5.43
0.233	5.03	1.233	49.82	2.233	9.46	3.23	5.43

0.250	5.03	1.250	49.82	2.250	9.46	3.25	5.43
0.267	5.34	1.267	171.39	2.267	8.85	3.27	5.26
0.283	5.34	1.283	171.39	2.283	8.85	3.28	5.26
0.300	5.34	1.300	171.39	2.300	8.85	3.30	5.26
0.317	5.34	1.317	171.39	2.317	8.85	3.32	5.26
0.333	5.34	1.333	171.39	2.333	8.85	3.33	5.26
0.350	5.71	1.350	63.33	2.350	8.33	3.35	5.11
0.367	5.71	1.367	63.33	2.367	8.33	3.37	5.11
0.383	5.71	1.383	63.33	2.383	8.33	3.38	5.11
0.400	5.71	1.400	63.33	2.400	8.33	3.40	5.11
0.417	5.71	1.417	63.33	2.417	8.33	3.42	5.11
0.433	6.14	1.433	36.38	2.433	7.88	3.43	4.96
0.450	6.14	1.450	36.38	2.450	7.88	3.45	4.96
0.467	6.14	1.467	36.38	2.467	7.88	3.47	4.96
0.483	6.14	1.483	36.38	2.483	7.88	3.48	4.96
0.500	6.14	1.500	36.38	2.500	7.88	3.50	4.96
0.517	6.66	1.517	26.22	2.517	7.48	3.52	4.82
0.533	6.66	1.533	26.22	2.533	7.48	3.53	4.82
0.550	6.66	1.550	26.22	2.550	7.48	3.55	4.82
0.567	6.66	1.567	26.22	2.567	7.48	3.57	4.82
0.583	6.66	1.583	26.22	2.583	7.48	3.58	4.82
0.600	7.29	1.600	20.82	2.600	7.12	3.60	4.70
0.617	7.29	1.617	20.82	2.617	7.12	3.62	4.70
0.633	7.29	1.633	20.82	2.633	7.12	3.63	4.70
0.650	7.29	1.650	20.82	2.650	7.12	3.65	4.70
0.667	7.29	1.667	20.82	2.667	7.12	3.67	4.70
0.683	8.09	1.683	17.44	2.683	6.81	3.68	4.58
0.700	8.09	1.700	17.44	2.700	6.81	3.70	4.58
0.717	8.09	1.717	17.44	2.717	6.81	3.72	4.58
0.733	8.09	1.733	17.44	2.733	6.81	3.73	4.58
0.750	8.09	1.750	17.44	2.750	6.81	3.75	4.58
0.767	9.14	1.767	15.11	2.767	6.52	3.77	4.46
0.783	9.14	1.783	15.11	2.783	6.52	3.78	4.46
0.800	9.14	1.800	15.11	2.800	6.52	3.80	4.46
0.817	9.14	1.817	15.11	2.817	6.52	3.82	4.46
0.833	9.14	1.833	15.11	2.833	6.52	3.83	4.46
0.850	10.59	1.850	13.39	2.850	6.26	3.85	4.36
0.867	10.59	1.867	13.39	2.867	6.26	3.87	4.36
0.883	10.59	1.883	13.39	2.883	6.26	3.88	4.36
0.900	10.59	1.900	13.39	2.900	6.26	3.90	4.36
0.917	10.59	1.917	13.39	2.917	6.26	3.92	4.36
0.933	12.72	1.933	12.08	2.933	6.03	3.93	4.26
0.950	12.72	1.950	12.08	2.950	6.03	3.95	4.26
0.967	12.72	1.967	12.08	2.967	6.03	3.97	4.26
0.983	12.72	1.983	12.08	2.983	6.03	3.98	4.26
1.000	12.72	2.000	12.08	3.000	6.03	4.00	4.26

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.237 (i)
TIME TO PEAK (hrs)= 1.967
RUNOFF VOLUME (mm)= 18.529
TOTAL RAINFALL (mm)= 58.916
RUNOFF COEFFICIENT = 0.314

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

CALIB STANDHYD (0002)	Area (ha)= 4.32		
ID= 1 DT= 1.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)=	0.00

Conservative Model Output (Chicago)

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		171.39	117.38	
over (min)		5.00	8.00	
Storage Coeff. (min)=		2.83 (ii)	7.20 (ii)	
Unit Hyd. Tpeak (min)=		5.00	8.00	
Unit Hyd. peak (cms)=		0.33	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.42	0.418 (iii)
TIME TO PEAK	(hrs)=	1.37	1.45	1.45
RUNOFF VOLUME	(mm)=	56.92	25.02	25.02
TOTAL RAINFALL	(mm)=	58.92	58.92	58.92
RUNOFF COEFFICIENT	=	0.97	0.42	0.42

***** 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)=	6.57		
ID= 1 DT= 1.0 min	Total Imp(%)=		73.50	Dir. Conn.(%)=	73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		171.39	21.86	
over (min)		5.00	5.00	
Storage Coeff. (min)=		3.21 (ii)	4.85 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.30	0.23	
				TOTALS
PEAK FLOW	(cms)=	1.71	0.09	1.793 (iii)
TIME TO PEAK	(hrs)=	1.37	1.40	1.37
RUNOFF VOLUME	(mm)=	56.92	12.62	45.18
TOTAL RAINFALL	(mm)=	58.92	58.92	58.92
RUNOFF COEFFICIENT	=	0.97	0.21	0.77

(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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		6.57	1.793	1.37	45.18
+ ID2= 2 (0002):		4.32	0.418	1.45	25.02
ID = 3 (0009):		10.89	2.095	1.38	37.18

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0009):		10.89	2.095	1.38	37.18
+ ID2= 2 (0007):		7.90	0.237	1.97	18.53
ID = 1 (0009):		18.79	2.126	1.38	29.34

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min					
	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.186 (i)
TIME TO PEAK (hrs)= 2.483
RUNOFF VOLUME (mm)= 14.838
TOTAL RAINFALL (mm)= 58.916
RUNOFF COEFFICIENT = 0.252

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min				
	Area (ha)=	3.20		
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		171.39	117.38	
over (min)		5.00	7.00	
Storage Coeff. (min)=		2.59 (ii)	6.95 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.35	0.16	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.32	0.318 (iii)
TIME TO PEAK	(hrs)=	1.37	1.43	1.43
RUNOFF VOLUME	(mm)=	56.92	25.02	25.02
TOTAL RAINFALL	(mm)=	58.92	58.92	58.92

RUNOFF COEFFICIENT = 0.97 0.42 0.42

***** 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 (0004)	Area (ha)= 2.70
ID= 1 DT= 1.0 min	Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	171.39	21.86	
over	(min)	5.00	5.00	
Storage Coeff.	(min)=	2.46 (ii)	4.95 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	5.00	
Unit Hyd. peak	(cms)=	0.34	0.23	
				TOTALS
PEAK FLOW	(cms)=	0.75	0.04	0.785 (iii)
TIME TO PEAK	(hrs)=	1.37	1.40	1.37
RUNOFF VOLUME	(mm)=	56.92	12.62	45.18
TOTAL RAINFALL	(mm)=	58.92	58.92	58.92
RUNOFF COEFFICIENT	=	0.97	0.21	0.77

(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 (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):		3.20	0.318	1.43	25.02
+ ID2= 2 (0004):		2.70	0.785	1.37	45.18
ID = 3 (0010):		5.90	1.032	1.38	34.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0010):		5.90	1.032	1.38	34.24

+ ID2= 2 (0008):	11.10	0.186	2.48	14.84
ID = 1 (0010):	17.00	1.039	1.38	21.57

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	1.039	1.38	21.57
+ ID2= 2 (0009):	18.79	2.126	1.38	29.34
ID = 3 (0011):	35.79	3.165	1.38	25.65

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0013)
ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		171.39	31.15	
over (min)		5.00	10.00	
Storage Coeff. (min)=		3.21 (ii)	9.05 (ii)	
Unit Hyd. Tpeak (min)=		5.00	10.00	
Unit Hyd. peak (cms)=		0.30	0.12	
				TOTALS
PEAK FLOW	(cms)=	0.79	0.20	0.889 (iii)
TIME TO PEAK	(hrs)=	1.37	1.48	1.38
RUNOFF VOLUME	(mm)=	56.92	14.75	29.00
TOTAL RAINFALL	(mm)=	58.92	58.92	58.92
RUNOFF COEFFICIENT	=	0.97	0.25	0.49

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

ADD HYD (0012)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	35.79	3.165	1.38	25.65
+ ID2= 2 (0013):	6.58	0.889	1.38	29.00
ID = 3 (0012):	42.37	4.054	1.38	26.17

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW       STORAGE    |     OUTFLOW        STORAGE
--------------------          (cms)        (ha.m.)    |    (cms)          (ha.m.)
                              0.0000        0.0000    |      0.0001         5.0000

                                      AREA        QPEAK        TPEAK        R.V.
                                      (ha)        (cms)        (hrs)        (mm)
   INFLOW : ID= 2 (  0012)          42.370        4.054         1.38       26.17
   OUTFLOW: ID= 1 (  0014)          42.370        0.000         8.78        0.00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                    TIME SHIFT OF PEAK FLOW         (min)=444.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  1.1088

--------------------------------------------------------------------------------
================================================================================
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       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\35ee9
046-a62a-4719-a58f-235a6ca30cd3\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\35ee9
046-a62a-4719-a58f-235a6ca30cd3\scen


DATE: 03/29/2018                          TIME: 10:20:12

USER:


COMMENTS: Chicago 50 year
--------------------------------------------------------------------------------
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  ************************************
  ** Run 05                          **
```

Conservative Model Output (Chicago)
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\321a918a-b405-4c12-8798-665daffe2fc8\6a3c80d2
Ptotal= 66.20 mm	Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	5.16	1.08	18.37	2.08	12.50	3.08	6.63
0.17	5.43	1.17	26.45	2.17	11.54	3.17	6.40
0.25	5.74	1.25	55.66	2.25	10.74	3.25	6.20
0.33	6.09	1.33	189.32	2.33	10.06	3.33	6.01
0.42	6.51	1.42	70.60	2.42	9.47	3.42	5.83
0.50	7.00	1.50	40.78	2.50	8.96	3.50	5.66
0.58	7.58	1.58	29.49	2.58	8.51	3.58	5.51
0.67	8.30	1.67	23.47	2.67	8.11	3.67	5.36
0.75	9.20	1.75	19.69	2.75	7.75	3.75	5.23
0.83	10.39	1.83	17.08	2.83	7.43	3.83	5.10
0.92	12.01	1.92	15.16	2.92	7.14	3.92	4.98
1.00	14.41	2.00	13.68	3.00	6.87	4.00	4.86

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.16	1.017	18.37	2.017	12.50	3.02	6.63
0.033	5.16	1.033	18.37	2.033	12.50	3.03	6.63
0.050	5.16	1.050	18.37	2.050	12.50	3.05	6.63
0.067	5.16	1.067	18.37	2.067	12.50	3.07	6.63
0.083	5.16	1.083	18.37	2.083	12.50	3.08	6.63
0.100	5.43	1.100	26.45	2.100	11.54	3.10	6.40
0.117	5.43	1.117	26.45	2.117	11.54	3.12	6.40
0.133	5.43	1.133	26.45	2.133	11.54	3.13	6.40
0.150	5.43	1.150	26.45	2.150	11.54	3.15	6.40
0.167	5.43	1.167	26.45	2.167	11.54	3.17	6.40
0.183	5.74	1.183	55.66	2.183	10.74	3.18	6.20
0.200	5.74	1.200	55.66	2.200	10.74	3.20	6.20
0.217	5.74	1.217	55.66	2.217	10.74	3.22	6.20
0.233	5.74	1.233	55.66	2.233	10.74	3.23	6.20
0.250	5.74	1.250	55.66	2.250	10.74	3.25	6.20
0.267	6.09	1.267	189.31	2.267	10.06	3.27	6.01
0.283	6.09	1.283	189.32	2.283	10.06	3.28	6.01
0.300	6.09	1.300	189.32	2.300	10.06	3.30	6.01
0.317	6.09	1.317	189.32	2.317	10.06	3.32	6.01
0.333	6.09	1.333	189.32	2.333	10.06	3.33	6.01
0.350	6.51	1.350	70.60	2.350	9.47	3.35	5.83
0.367	6.51	1.367	70.60	2.367	9.47	3.37	5.83
0.383	6.51	1.383	70.60	2.383	9.47	3.38	5.83
0.400	6.51	1.400	70.60	2.400	9.47	3.40	5.83
0.417	6.51	1.417	70.60	2.417	9.47	3.42	5.83

0.433	7.00	1.433	40.78	2.433	8.96	3.43	5.66
0.450	7.00	1.450	40.78	2.450	8.96	3.45	5.66
0.467	7.00	1.467	40.78	2.467	8.96	3.47	5.66
0.483	7.00	1.483	40.78	2.483	8.96	3.48	5.66
0.500	7.00	1.500	40.78	2.500	8.96	3.50	5.66
0.517	7.58	1.517	29.49	2.517	8.51	3.52	5.51
0.533	7.58	1.533	29.49	2.533	8.51	3.53	5.51
0.550	7.58	1.550	29.49	2.550	8.51	3.55	5.51
0.567	7.58	1.567	29.49	2.567	8.51	3.57	5.51
0.583	7.58	1.583	29.49	2.583	8.51	3.58	5.51
0.600	8.30	1.600	23.47	2.600	8.11	3.60	5.36
0.617	8.30	1.617	23.47	2.617	8.11	3.62	5.36
0.633	8.30	1.633	23.47	2.633	8.11	3.63	5.36
0.650	8.30	1.650	23.47	2.650	8.11	3.65	5.36
0.667	8.30	1.667	23.47	2.667	8.11	3.67	5.36
0.683	9.20	1.683	19.69	2.683	7.75	3.68	5.23
0.700	9.20	1.700	19.69	2.700	7.75	3.70	5.23
0.717	9.20	1.717	19.69	2.717	7.75	3.72	5.23
0.733	9.20	1.733	19.69	2.733	7.75	3.73	5.23
0.750	9.20	1.750	19.69	2.750	7.75	3.75	5.23
0.767	10.39	1.767	17.08	2.767	7.43	3.77	5.10
0.783	10.39	1.783	17.08	2.783	7.43	3.78	5.10
0.800	10.39	1.800	17.08	2.800	7.43	3.80	5.10
0.817	10.39	1.817	17.08	2.817	7.43	3.82	5.10
0.833	10.39	1.833	17.08	2.833	7.43	3.83	5.10
0.850	12.01	1.850	15.16	2.850	7.14	3.85	4.98
0.867	12.01	1.867	15.16	2.867	7.14	3.87	4.98
0.883	12.01	1.883	15.16	2.883	7.14	3.88	4.98
0.900	12.01	1.900	15.16	2.900	7.14	3.90	4.98
0.917	12.01	1.917	15.16	2.917	7.14	3.92	4.98
0.933	14.41	1.933	13.68	2.933	6.87	3.93	4.86
0.950	14.41	1.950	13.68	2.950	6.87	3.95	4.86
0.967	14.41	1.967	13.68	2.967	6.87	3.97	4.86
0.983	14.41	1.983	13.68	2.983	6.87	3.98	4.86
1.000	14.41	2.000	13.68	3.000	6.87	4.00	4.86

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.295 (i)
TIME TO PEAK (hrs)= 1.967
RUNOFF VOLUME (mm)= 22.910
TOTAL RAINFALL (mm)= 66.198
RUNOFF COEFFICIENT = 0.346

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

CALIB STANDHYD (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32 Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.55	1.77
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	169.71	20.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)	=	189.32	140.79
over	(min)	5.00	7.00
Storage Coeff.	(min)=	2.72 (ii)	6.78 (ii)
Unit Hyd. Tpeak	(min)=	5.00	7.00

Conservative Model Output (Chicago)

Unit Hyd. peak	(cms)=	0.34	0.17	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.52	0.523 (iii)
TIME TO PEAK	(hrs)=	1.37	1.43	1.43
RUNOFF VOLUME	(mm)=	64.20	30.14	30.14
TOTAL RAINFALL	(mm)=	66.20	66.20	66.20
RUNOFF COEFFICIENT	=	0.97	0.46	0.46

***** 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= 1.0 min

Area (ha)= 6.57
Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		189.32	27.27	
over (min)		5.00	5.00	
Storage Coeff.	(min)=	3.08 (ii)	4.66 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	5.00	
Unit Hyd. peak	(cms)=	0.30	0.24	
				TOTALS
PEAK FLOW	(cms)=	1.91	0.12	2.020 (iii)
TIME TO PEAK	(hrs)=	1.37	1.40	1.37
RUNOFF VOLUME	(mm)=	64.20	15.76	51.36
TOTAL RAINFALL	(mm)=	66.20	66.20	66.20
RUNOFF COEFFICIENT	=	0.97	0.24	0.78

(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 (0009)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	6.57	2.020	1.37	51.36
+ ID2= 2 (0002):	4.32	0.523	1.43	30.14
ID = 3 (0009):	10.89	2.439	1.38	42.94

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

```
--------------------
| ADD HYD  (  0009)|
|   3 +  2 =  1    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)      (cms)      (hrs)       (mm)
       ID1= 3 (  0009):      10.89      2.439       1.38      42.94
     + ID2= 2 (  0007):       7.90      0.295       1.97      22.91
       ================================================================
       ID = 1 (  0009):      18.79      2.480       1.38      34.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| NASHYD   (  0008)|   Area    (ha)=     11.10   Curve Number   (CN)= 66.4
|ID= 1 DT= 1.0 min |   Ia      (mm)=      7.20   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=      0.79

     Unit Hyd Qpeak  (cms)=      0.537

     PEAK FLOW       (cms)=      0.234 (i)
     TIME TO PEAK    (hrs)=      2.467
     RUNOFF VOLUME    (mm)=     18.561
     TOTAL RAINFALL   (mm)=     66.198
     RUNOFF COEFFICIENT   =      0.280

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

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=      3.20
|ID= 1 DT= 1.0 min |   Total Imp(%)=     59.00   Dir. Conn.(%)=   0.00
--------------------

                                  IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          1.89            1.31
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        146.06           20.00
     Mannings n           =         0.013           0.250

     Max.Eff.Inten.(mm/hr)=        189.32          140.79
               over (min)            5.00            7.00
     Storage Coeff.  (min)=          2.48 (ii)       6.55 (ii)
     Unit Hyd. Tpeak (min)=          5.00            7.00
     Unit Hyd. peak  (cms)=          0.36            0.17
                                                          *TOTALS*
     PEAK FLOW       (cms)=          0.00            0.39          0.393 (iii)
     TIME TO PEAK    (hrs)=          1.37            1.43           1.43
     RUNOFF VOLUME    (mm)=         64.20           30.14          30.14
     TOTAL RAINFALL   (mm)=         66.20           66.20          66.20
     RUNOFF COEFFICIENT   =          0.97            0.46           0.46

***** 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 (0004) ID= 1 DT= 1.0 min	Area (ha)= 2.70	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		189.32	27.27	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.36 (ii)	4.76 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.35	0.23	
				TOTALS
PEAK FLOW	(cms)=	0.84	0.05	0.881 (iii)
TIME TO PEAK	(hrs)=	1.37	1.40	1.37
RUNOFF VOLUME	(mm)=	64.20	15.76	51.36
TOTAL RAINFALL	(mm)=	66.20	66.20	66.20
RUNOFF COEFFICIENT	=	0.97	0.24	0.78

(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 (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.393	1.43	30.14
+ ID2= 2 (0004):	2.70	0.881	1.37	51.36
ID = 3 (0010):	5.90	1.191	1.38	39.85

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	1.191	1.38	39.85
+ ID2= 2 (0008):	11.10	0.234	2.47	18.56
ID = 1 (0010):	17.00	1.202	1.38	25.95

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)
1 + 2 = 3

	AREA	QPEAK	TPEAK	R.V.

Conservative Model Output (Chicago)

	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0010):	17.00	1.202	1.38	25.95
+ ID2= 2 (0009):	18.79	2.480	1.38	34.52
ID = 3 (0011):	35.79	3.682	1.38	30.45

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB			
STANDHYD (0013)	Area (ha)=	6.58	
ID= 1 DT= 1.0 min	Total Imp(%)=	44.40	Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		189.32	38.52	
over (min)		5.00	9.00	
Storage Coeff. (min)=		3.08 (ii)	8.70 (ii)	
Unit Hyd. Tpeak (min)=		5.00	9.00	
Unit Hyd. peak (cms)=		0.30	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.88	0.26	1.030 (iii)
TIME TO PEAK	(hrs)=	1.37	1.47	1.38
RUNOFF VOLUME	(mm)=	64.20	18.28	33.80
TOTAL RAINFALL	(mm)=	66.20	66.20	66.20
RUNOFF COEFFICIENT	=	0.97	0.28	0.51

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

ADD HYD (0012)					
1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):		35.79	3.682	1.38	30.45
+ ID2= 2 (0013):		6.58	1.030	1.38	33.80
ID = 3 (0012):		42.37	4.712	1.38	30.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)				
IN= 2---> OUT= 1				
DT= 1.0 min	OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
	0.0000	0.0000	0.0001	5.0000

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

Conservative Model Output (Chicago)

INFLOW : ID= 2 (	0012)	42.370	4.712	1.38	30.97
OUTFLOW: ID= 1 (	0014)	42.370	0.000	8.88	0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=450.00
MAXIMUM STORAGE USED (ha.m.)= 1.3121

```
V    V   I    SSSSS  U   U    A    L
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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\1b2f5fff-c301-4ba0-994f-12ab7babc583\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\1b2f5fff-c301-4ba0-994f-12ab7babc583\scen

DATE: 03/29/2018 TIME: 10:20:12

USER:

COMMENTS: Chicago 100 year

****
** Run 06 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\321a918a-b405-4c12-8798-665daffe2fc8\37ad9543
Ptotal= 73.59 mm	Comments:

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

Conservative Model Output (Chicago)

0.08	5.81	1.08	20.51	2.08	14.00	3.08	7.45
0.17	6.11	1.17	29.46	2.17	12.93	3.17	7.20
0.25	6.46	1.25	61.60	2.25	12.04	3.25	6.97
0.33	6.86	1.33	207.54	2.33	11.28	3.33	6.76
0.42	7.32	1.42	78.00	2.42	10.62	3.42	6.56
0.50	7.86	1.50	45.26	2.50	10.05	3.50	6.37
0.58	8.52	1.58	32.81	2.58	9.55	3.58	6.20
0.67	9.32	1.67	26.16	2.67	9.10	3.67	6.04
0.75	10.33	1.75	21.98	2.75	8.71	3.75	5.89
0.83	11.65	1.83	19.09	2.83	8.35	3.83	5.74
0.92	13.45	1.92	16.95	2.92	8.02	3.92	5.61
1.00	16.12	2.00	15.31	3.00	7.72	4.00	5.48

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	5.81	1.017	20.51	2.017	14.00	3.02	7.45
0.033	5.81	1.033	20.51	2.033	14.00	3.03	7.45
0.050	5.81	1.050	20.51	2.050	14.00	3.05	7.45
0.067	5.81	1.067	20.51	2.067	14.00	3.07	7.45
0.083	5.81	1.083	20.51	2.083	14.00	3.08	7.45
0.100	6.11	1.100	29.46	2.100	12.93	3.10	7.20
0.117	6.11	1.117	29.46	2.117	12.93	3.12	7.20
0.133	6.11	1.133	29.46	2.133	12.93	3.13	7.20
0.150	6.11	1.150	29.46	2.150	12.93	3.15	7.20
0.167	6.11	1.167	29.46	2.167	12.93	3.17	7.20
0.183	6.46	1.183	61.59	2.183	12.04	3.18	6.97
0.200	6.46	1.200	61.60	2.200	12.04	3.20	6.97
0.217	6.46	1.217	61.60	2.217	12.04	3.22	6.97
0.233	6.46	1.233	61.60	2.233	12.04	3.23	6.97
0.250	6.46	1.250	61.60	2.250	12.04	3.25	6.97
0.267	6.86	1.267	207.53	2.267	11.28	3.27	6.76
0.283	6.86	1.283	207.54	2.283	11.28	3.28	6.76
0.300	6.86	1.300	207.54	2.300	11.28	3.30	6.76
0.317	6.86	1.317	207.54	2.317	11.28	3.32	6.76
0.333	6.86	1.333	207.54	2.333	11.28	3.33	6.76
0.350	7.32	1.350	78.01	2.350	10.62	3.35	6.56
0.367	7.32	1.367	78.00	2.367	10.62	3.37	6.56
0.383	7.32	1.383	78.00	2.383	10.62	3.38	6.56
0.400	7.32	1.400	78.00	2.400	10.62	3.40	6.56
0.417	7.32	1.417	78.00	2.417	10.62	3.42	6.56
0.433	7.86	1.433	45.26	2.433	10.05	3.43	6.37
0.450	7.86	1.450	45.26	2.450	10.05	3.45	6.37
0.467	7.86	1.467	45.26	2.467	10.05	3.47	6.37
0.483	7.86	1.483	45.26	2.483	10.05	3.48	6.37
0.500	7.86	1.500	45.26	2.500	10.05	3.50	6.37
0.517	8.52	1.517	32.81	2.517	9.55	3.52	6.20
0.533	8.52	1.533	32.81	2.533	9.55	3.53	6.20
0.550	8.52	1.550	32.81	2.550	9.55	3.55	6.20
0.567	8.52	1.567	32.81	2.567	9.55	3.57	6.20
0.583	8.52	1.583	32.81	2.583	9.55	3.58	6.20
0.600	9.32	1.600	26.16	2.600	9.11	3.60	6.04

0.617	9.32	1.617	26.16	2.617	9.10	3.62	6.04
0.633	9.32	1.633	26.16	2.633	9.10	3.63	6.04
0.650	9.32	1.650	26.16	2.650	9.10	3.65	6.04
0.667	9.32	1.667	26.16	2.667	9.10	3.67	6.04
0.683	10.33	1.683	21.98	2.683	8.71	3.68	5.89
0.700	10.33	1.700	21.98	2.700	8.71	3.70	5.89
0.717	10.33	1.717	21.98	2.717	8.71	3.72	5.89
0.733	10.33	1.733	21.98	2.733	8.71	3.73	5.89
0.750	10.33	1.750	21.98	2.750	8.71	3.75	5.89
0.767	11.65	1.767	19.09	2.767	8.35	3.77	5.74
0.783	11.65	1.783	19.09	2.783	8.35	3.78	5.74
0.800	11.65	1.800	19.09	2.800	8.35	3.80	5.74
0.817	11.65	1.817	19.09	2.817	8.35	3.82	5.74
0.833	11.65	1.833	19.09	2.833	8.35	3.83	5.74
0.850	13.45	1.850	16.95	2.850	8.02	3.85	5.61
0.867	13.45	1.867	16.95	2.867	8.02	3.87	5.61
0.883	13.45	1.883	16.95	2.883	8.02	3.88	5.61
0.900	13.45	1.900	16.95	2.900	8.02	3.90	5.61
0.917	13.45	1.917	16.95	2.917	8.02	3.92	5.61
0.933	16.12	1.933	15.31	2.933	7.72	3.93	5.48
0.950	16.12	1.950	15.31	2.950	7.72	3.95	5.48
0.967	16.12	1.967	15.31	2.967	7.72	3.97	5.48
0.983	16.12	1.983	15.31	2.983	7.72	3.98	5.48
1.000	16.12	2.000	15.31	3.000	7.72	4.00	5.48

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.358 (i)
TIME TO PEAK (hrs)= 1.950
RUNOFF VOLUME (mm)= 27.623
TOTAL RAINFALL (mm)= 73.591
RUNOFF COEFFICIENT = 0.375

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

CALIB STANDHYD (0002)	Area (ha)= 4.32		
ID= 1 DT= 1.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		207.54	165.69	
over (min)		5.00	7.00	
Storage Coeff. (min)=		2.62 (ii)	6.42 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.34	0.17	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.63	0.630 (iii)
TIME TO PEAK	(hrs)=	1.37	1.43	1.43
RUNOFF VOLUME	(mm)=	71.59	35.56	35.56
TOTAL RAINFALL	(mm)=	73.59	73.59	73.59
RUNOFF COEFFICIENT	=	0.97	0.48	0.48

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

Conservative Model Output (Chicago)

(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)= 6.57
ID= 1 DT= 1.0 min	Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		207.54	33.22	
over (min)		5.00	5.00	
Storage Coeff. (min)=		2.97 (ii)	4.50 (ii)	
Unit Hyd. Tpeak (min)=		5.00	5.00	
Unit Hyd. peak (cms)=		0.31	0.24	
				TOTALS
PEAK FLOW	(cms)=	2.12	0.14	2.254 (iii)
TIME TO PEAK	(hrs)=	1.37	1.40	1.37
RUNOFF VOLUME	(mm)=	71.59	19.20	57.71
TOTAL RAINFALL	(mm)=	73.59	73.59	73.59
RUNOFF COEFFICIENT	=	0.97	0.26	0.78

(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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		6.57	2.254	1.37	57.71
+ ID2= 2 (0002):		4.32	0.630	1.43	35.56
ID = 3 (0009):		10.89	2.765	1.38	48.92

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0009):		10.89	2.765	1.38	48.92
+ ID2= 2 (0007):		7.90	0.358	1.95	27.62
ID = 1 (0009):		18.79	2.818	1.38	39.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Conservative Model Output (Chicago)

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| CALIB            |
| NASHYD   (  0008)|   Area    (ha)=     11.10   Curve Number    (CN)= 66.4
|ID= 1 DT= 1.0 min |   Ia      (mm)=      7.20   # of Linear Res.(N)= 3.00
--------------------   U.H. Tp(hrs)=      0.79

     Unit Hyd Qpeak  (cms)=     0.537

     PEAK FLOW       (cms)=     0.286 (i)
     TIME TO PEAK    (hrs)=     2.467
     RUNOFF VOLUME    (mm)=    22.613
     TOTAL RAINFALL   (mm)=    73.591
     RUNOFF COEFFICIENT    =     0.307

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

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--------------------
| CALIB            |
| STANDHYD (  0003)|   Area    (ha)=      3.20
|ID= 1 DT= 1.0 min |   Total Imp(%)=     59.00   Dir. Conn.(%)=   0.00
--------------------

                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          1.89            1.31
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        146.06           20.00
     Mannings n           =         0.013           0.250

     Max.Eff.Inten.(mm/hr)=        207.54          165.69
               over (min)            5.00            7.00
     Storage Coeff.  (min)=          2.39 (ii)       6.20 (ii)
     Unit Hyd. Tpeak (min)=          5.00            7.00
     Unit Hyd. peak  (cms)=          0.36            0.17
                                                     *TOTALS*
     PEAK FLOW       (cms)=          0.00            0.47          0.473 (iii)
     TIME TO PEAK    (hrs)=          1.37            1.43           1.43
     RUNOFF VOLUME    (mm)=         71.59           35.56          35.56
     TOTAL RAINFALL   (mm)=         73.59           73.59          73.59
     RUNOFF COEFFICIENT    =         0.97            0.48           0.48

***** 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 (  0004)|   Area    (ha)=      2.70
|ID= 1 DT= 1.0 min |   Total Imp(%)=     73.50   Dir. Conn.(%)=  73.50
--------------------

                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          1.98            0.72
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        134.16           20.00
```

Conservative Model Output (Chicago)

Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)	=	207.54	33.22
over (min)		5.00	5.00
Storage Coeff. (min)	=	2.28 (ii)	4.59 (ii)
Unit Hyd. Tpeak (min)	=	5.00	5.00
Unit Hyd. peak (cms)	=	0.35	0.24
			TOTALS
PEAK FLOW (cms)	=	0.93	0.06	0.980 (iii)
TIME TO PEAK (hrs)	=	1.37	1.40	1.37
RUNOFF VOLUME (mm)	=	71.59	19.19	57.71
TOTAL RAINFALL (mm)	=	73.59	73.59	73.59
RUNOFF COEFFICIENT	=	0.97	0.26	0.78

(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 (0010)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.473	1.43	35.56
+ ID2= 2 (0004):	2.70	0.980	1.37	57.71
ID = 3 (0010):	5.90	1.360	1.38	45.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)				
3 + 2 = 1	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	1.360	1.38	45.70
+ ID2= 2 (0008):	11.10	0.286	2.47	22.61
ID = 1 (0010):	17.00	1.375	1.38	30.62

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)				
1 + 2 = 3	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	1.375	1.38	30.62
+ ID2= 2 (0009):	18.79	2.818	1.38	39.97
ID = 3 (0011):	35.79	4.193	1.38	35.53

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB

Conservative Model Output (Chicago)

STANDHYD (0013)	Area (ha)= 6.58
ID= 1 DT= 1.0 min	Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		207.54	46.57	
over (min)		5.00	9.00	
Storage Coeff. (min)=		2.97 (ii)	8.38 (ii)	
Unit Hyd. Tpeak (min)=		5.00	9.00	
Unit Hyd. peak (cms)=		0.31	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.98	0.32	1.164 (iii)
TIME TO PEAK	(hrs)=	1.37	1.47	1.38
RUNOFF VOLUME	(mm)=	71.59	22.12	38.84
TOTAL RAINFALL	(mm)=	73.59	73.59	73.59
RUNOFF COEFFICIENT	=	0.97	0.30	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 (0012)		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		35.79	4.193	1.38	35.53
+ ID2= 2 (0013):		6.58	1.164	1.38	38.84
ID = 3 (0012):		42.37	5.357	1.38	36.04

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)		OUTFLOW	STORAGE		OUTFLOW	STORAGE
IN= 2---> OUT= 1		(cms)	(ha.m.)		(cms)	(ha.m.)
DT= 1.0 min		0.0000	0.0000		0.0001	5.0000

		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0012)		42.370	5.357	1.38	36.04
OUTFLOW: ID= 1 (0014)		42.370	0.000	8.88	0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=450.00
MAXIMUM STORAGE USED (ha.m.)= 1.5271

Conservative Model Output (Chicago)

```
V    V   I    SSSSS  U   U    A    L
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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ec53f352-3f9b-4085-a13c-ddc482b25d3a\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ec53f352-3f9b-4085-a13c-ddc482b25d3a\scen

DATE: 03/29/2018 TIME: 10:20:12

USER:

COMMENTS: Timmins Regional

****
** Run 07 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\321a918a-b405-4c12-8798-665daffe2fc8\d1773588
Ptotal=193.00 mm	Comments: Timmins Storm Event

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
1.00	15.00	4.00	3.00	7.00	43.00	10.00	13.00
2.00	20.00	5.00	5.00	8.00	20.00	11.00	13.00
3.00	10.00	6.00	20.00	9.00	23.00	12.00	8.00

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

Conservative Model Output (Chicago)

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	15.00	3.017	3.00	6.017	43.00	9.02	13.00
0.033	15.00	3.033	3.00	6.033	43.00	9.03	13.00
0.050	15.00	3.050	3.00	6.050	43.00	9.05	13.00
0.067	15.00	3.067	3.00	6.067	43.00	9.07	13.00
0.083	15.00	3.083	3.00	6.083	43.00	9.08	13.00
0.100	15.00	3.100	3.00	6.100	43.00	9.10	13.00
0.117	15.00	3.117	3.00	6.117	43.00	9.12	13.00
0.133	15.00	3.133	3.00	6.133	43.00	9.13	13.00
0.150	15.00	3.150	3.00	6.150	43.00	9.15	13.00
0.167	15.00	3.167	3.00	6.167	43.00	9.17	13.00
0.183	15.00	3.183	3.00	6.183	43.00	9.18	13.00
0.200	15.00	3.200	3.00	6.200	43.00	9.20	13.00
0.217	15.00	3.217	3.00	6.217	43.00	9.22	13.00
0.233	15.00	3.233	3.00	6.233	43.00	9.23	13.00
0.250	15.00	3.250	3.00	6.250	43.00	9.25	13.00
0.267	15.00	3.267	3.00	6.267	43.00	9.27	13.00
0.283	15.00	3.283	3.00	6.283	43.00	9.28	13.00
0.300	15.00	3.300	3.00	6.300	43.00	9.30	13.00
0.317	15.00	3.317	3.00	6.317	43.00	9.32	13.00
0.333	15.00	3.333	3.00	6.333	43.00	9.33	13.00
0.350	15.00	3.350	3.00	6.350	43.00	9.35	13.00
0.367	15.00	3.367	3.00	6.367	43.00	9.37	13.00
0.383	15.00	3.383	3.00	6.383	43.00	9.38	13.00
0.400	15.00	3.400	3.00	6.400	43.00	9.40	13.00
0.417	15.00	3.417	3.00	6.417	43.00	9.42	13.00
0.433	15.00	3.433	3.00	6.433	43.00	9.43	13.00
0.450	15.00	3.450	3.00	6.450	43.00	9.45	13.00
0.467	15.00	3.467	3.00	6.467	43.00	9.47	13.00
0.483	15.00	3.483	3.00	6.483	43.00	9.48	13.00
0.500	15.00	3.500	3.00	6.500	43.00	9.50	13.00
0.517	15.00	3.517	3.00	6.517	43.00	9.52	13.00
0.533	15.00	3.533	3.00	6.533	43.00	9.53	13.00
0.550	15.00	3.550	3.00	6.550	43.00	9.55	13.00
0.567	15.00	3.567	3.00	6.567	43.00	9.57	13.00
0.583	15.00	3.583	3.00	6.583	43.00	9.58	13.00
0.600	15.00	3.600	3.00	6.600	43.00	9.60	13.00
0.617	15.00	3.617	3.00	6.617	43.00	9.62	13.00
0.633	15.00	3.633	3.00	6.633	43.00	9.63	13.00
0.650	15.00	3.650	3.00	6.650	43.00	9.65	13.00
0.667	15.00	3.667	3.00	6.667	43.00	9.67	13.00
0.683	15.00	3.683	3.00	6.683	43.00	9.68	13.00
0.700	15.00	3.700	3.00	6.700	43.00	9.70	13.00
0.717	15.00	3.717	3.00	6.717	43.00	9.72	13.00
0.733	15.00	3.733	3.00	6.733	43.00	9.73	13.00
0.750	15.00	3.750	3.00	6.750	43.00	9.75	13.00
0.767	15.00	3.767	3.00	6.767	43.00	9.77	13.00
0.783	15.00	3.783	3.00	6.783	43.00	9.78	13.00
0.800	15.00	3.800	3.00	6.800	43.00	9.80	13.00
0.817	15.00	3.817	3.00	6.817	43.00	9.82	13.00
0.833	15.00	3.833	3.00	6.833	43.00	9.83	13.00
0.850	15.00	3.850	3.00	6.850	43.00	9.85	13.00
0.867	15.00	3.867	3.00	6.867	43.00	9.87	13.00
0.883	15.00	3.883	3.00	6.883	43.00	9.88	13.00
0.900	15.00	3.900	3.00	6.900	43.00	9.90	13.00
0.917	15.00	3.917	3.00	6.917	43.00	9.92	13.00
0.933	15.00	3.933	3.00	6.933	43.00	9.93	13.00

Conservative Model Output (Chicago)

0.950	15.00	3.950	3.00	6.950	43.00	9.95	13.00
0.967	15.00	3.967	3.00	6.967	43.00	9.97	13.00
0.983	15.00	3.983	3.00	6.983	43.00	9.98	13.00
1.000	15.00	4.000	3.00	7.000	42.95	10.00	13.00
1.017	20.00	4.017	5.00	7.017	20.00	10.02	13.00
1.033	20.00	4.033	5.00	7.033	20.00	10.03	13.00
1.050	20.00	4.050	5.00	7.050	20.00	10.05	13.00
1.067	20.00	4.067	5.00	7.067	20.00	10.07	13.00
1.083	20.00	4.083	5.00	7.083	20.00	10.08	13.00
1.100	20.00	4.100	5.00	7.100	20.00	10.10	13.00
1.117	20.00	4.117	5.00	7.117	20.00	10.12	13.00
1.133	20.00	4.133	5.00	7.133	20.00	10.13	13.00
1.150	20.00	4.150	5.00	7.150	20.00	10.15	13.00
1.167	20.00	4.167	5.00	7.167	20.00	10.17	13.00
1.183	20.00	4.183	5.00	7.183	20.00	10.18	13.00
1.200	20.00	4.200	5.00	7.200	20.00	10.20	13.00
1.217	20.00	4.217	5.00	7.217	20.00	10.22	13.00
1.233	20.00	4.233	5.00	7.233	20.00	10.23	13.00
1.250	20.00	4.250	5.00	7.250	20.00	10.25	13.00
1.267	20.00	4.267	5.00	7.267	20.00	10.27	13.00
1.283	20.00	4.283	5.00	7.283	20.00	10.28	13.00
1.300	20.00	4.300	5.00	7.300	20.00	10.30	13.00
1.317	20.00	4.317	5.00	7.317	20.00	10.32	13.00
1.333	20.00	4.333	5.00	7.333	20.00	10.33	13.00
1.350	20.00	4.350	5.00	7.350	20.00	10.35	13.00
1.367	20.00	4.367	5.00	7.367	20.00	10.37	13.00
1.383	20.00	4.383	5.00	7.383	20.00	10.38	13.00
1.400	20.00	4.400	5.00	7.400	20.00	10.40	13.00
1.417	20.00	4.417	5.00	7.417	20.00	10.42	13.00
1.433	20.00	4.433	5.00	7.433	20.00	10.43	13.00
1.450	20.00	4.450	5.00	7.450	20.00	10.45	13.00
1.467	20.00	4.467	5.00	7.467	20.00	10.47	13.00
1.483	20.00	4.483	5.00	7.483	20.00	10.48	13.00
1.500	20.00	4.500	5.00	7.500	20.00	10.50	13.00
1.517	20.00	4.517	5.00	7.517	20.00	10.52	13.00
1.533	20.00	4.533	5.00	7.533	20.00	10.53	13.00
1.550	20.00	4.550	5.00	7.550	20.00	10.55	13.00
1.567	20.00	4.567	5.00	7.567	20.00	10.57	13.00
1.583	20.00	4.583	5.00	7.583	20.00	10.58	13.00
1.600	20.00	4.600	5.00	7.600	20.00	10.60	13.00
1.617	20.00	4.617	5.00	7.617	20.00	10.62	13.00
1.633	20.00	4.633	5.00	7.633	20.00	10.63	13.00
1.650	20.00	4.650	5.00	7.650	20.00	10.65	13.00
1.667	20.00	4.667	5.00	7.667	20.00	10.67	13.00
1.683	20.00	4.683	5.00	7.683	20.00	10.68	13.00
1.700	20.00	4.700	5.00	7.700	20.00	10.70	13.00
1.717	20.00	4.717	5.00	7.717	20.00	10.72	13.00
1.733	20.00	4.733	5.00	7.733	20.00	10.73	13.00
1.750	20.00	4.750	5.00	7.750	20.00	10.75	13.00
1.767	20.00	4.767	5.00	7.767	20.00	10.77	13.00
1.783	20.00	4.783	5.00	7.783	20.00	10.78	13.00
1.800	20.00	4.800	5.00	7.800	20.00	10.80	13.00
1.817	20.00	4.817	5.00	7.817	20.00	10.82	13.00
1.833	20.00	4.833	5.00	7.833	20.00	10.83	13.00
1.850	20.00	4.850	5.00	7.850	20.00	10.85	13.00
1.867	20.00	4.867	5.00	7.867	20.00	10.87	13.00
1.883	20.00	4.883	5.00	7.883	20.00	10.88	13.00
1.900	20.00	4.900	5.00	7.900	20.00	10.90	13.00
1.917	20.00	4.917	5.00	7.917	20.00	10.92	13.00
1.933	20.00	4.933	5.00	7.933	20.00	10.93	13.00
1.950	20.00	4.950	5.00	7.950	20.00	10.95	13.00
1.967	20.00	4.967	5.00	7.967	20.00	10.97	13.00
1.983	20.00	4.983	5.00	7.983	20.00	10.98	13.00

2.000	20.00	5.000	5.01	8.000	20.01	11.00	13.00
2.017	10.00	5.017	20.00	8.017	23.00	11.02	8.00
2.033	10.00	5.033	20.00	8.033	23.00	11.03	8.00
2.050	10.00	5.050	20.00	8.050	23.00	11.05	8.00
2.067	10.00	5.067	20.00	8.067	23.00	11.07	8.00
2.083	10.00	5.083	20.00	8.083	23.00	11.08	8.00
2.100	10.00	5.100	20.00	8.100	23.00	11.10	8.00
2.117	10.00	5.117	20.00	8.117	23.00	11.12	8.00
2.133	10.00	5.133	20.00	8.133	23.00	11.13	8.00
2.150	10.00	5.150	20.00	8.150	23.00	11.15	8.00
2.167	10.00	5.167	20.00	8.167	23.00	11.17	8.00
2.183	10.00	5.183	20.00	8.183	23.00	11.18	8.00
2.200	10.00	5.200	20.00	8.200	23.00	11.20	8.00
2.217	10.00	5.217	20.00	8.217	23.00	11.22	8.00
2.233	10.00	5.233	20.00	8.233	23.00	11.23	8.00
2.250	10.00	5.250	20.00	8.250	23.00	11.25	8.00
2.267	10.00	5.267	20.00	8.267	23.00	11.27	8.00
2.283	10.00	5.283	20.00	8.283	23.00	11.28	8.00
2.300	10.00	5.300	20.00	8.300	23.00	11.30	8.00
2.317	10.00	5.317	20.00	8.317	23.00	11.32	8.00
2.333	10.00	5.333	20.00	8.333	23.00	11.33	8.00
2.350	10.00	5.350	20.00	8.350	23.00	11.35	8.00
2.367	10.00	5.367	20.00	8.367	23.00	11.37	8.00
2.383	10.00	5.383	20.00	8.383	23.00	11.38	8.00
2.400	10.00	5.400	20.00	8.400	23.00	11.40	8.00
2.417	10.00	5.417	20.00	8.417	23.00	11.42	8.00
2.433	10.00	5.433	20.00	8.433	23.00	11.43	8.00
2.450	10.00	5.450	20.00	8.450	23.00	11.45	8.00
2.467	10.00	5.467	20.00	8.467	23.00	11.47	8.00
2.483	10.00	5.483	20.00	8.483	23.00	11.48	8.00
2.500	10.00	5.500	20.00	8.500	23.00	11.50	8.00
2.517	10.00	5.517	20.00	8.517	23.00	11.52	8.00
2.533	10.00	5.533	20.00	8.533	23.00	11.53	8.00
2.550	10.00	5.550	20.00	8.550	23.00	11.55	8.00
2.567	10.00	5.567	20.00	8.567	23.00	11.57	8.00
2.583	10.00	5.583	20.00	8.583	23.00	11.58	8.00
2.600	10.00	5.600	20.00	8.600	23.00	11.60	8.00
2.617	10.00	5.617	20.00	8.617	23.00	11.62	8.00
2.633	10.00	5.633	20.00	8.633	23.00	11.63	8.00
2.650	10.00	5.650	20.00	8.650	23.00	11.65	8.00
2.667	10.00	5.667	20.00	8.667	23.00	11.67	8.00
2.683	10.00	5.683	20.00	8.683	23.00	11.68	8.00
2.700	10.00	5.700	20.00	8.700	23.00	11.70	8.00
2.717	10.00	5.717	20.00	8.717	23.00	11.72	8.00
2.733	10.00	5.733	20.00	8.733	23.00	11.73	8.00
2.750	10.00	5.750	20.00	8.750	23.00	11.75	8.00
2.767	10.00	5.767	20.00	8.767	23.00	11.77	8.00
2.783	10.00	5.783	20.00	8.783	23.00	11.78	8.00
2.800	10.00	5.800	20.00	8.800	23.00	11.80	8.00
2.817	10.00	5.817	20.00	8.817	23.00	11.82	8.00
2.833	10.00	5.833	20.00	8.833	23.00	11.83	8.00
2.850	10.00	5.850	20.00	8.850	23.00	11.85	8.00
2.867	10.00	5.867	20.00	8.867	23.00	11.87	8.00
2.883	10.00	5.883	20.00	8.883	23.00	11.88	8.00
2.900	10.00	5.900	20.00	8.900	23.00	11.90	8.00
2.917	10.00	5.917	20.00	8.917	23.00	11.92	8.00
2.933	10.00	5.933	20.00	8.933	23.00	11.93	8.00
2.950	10.00	5.950	20.00	8.950	23.00	11.95	8.00
2.967	10.00	5.967	20.00	8.967	23.00	11.97	8.00
2.983	10.00	5.983	20.00	8.983	23.00	11.98	8.00
3.000	10.00	6.000	20.03	9.000	22.98	12.00	8.00

Unit Hyd Qpeak (cms)= 0.656

Conservative Model Output (Chicago)

```
     PEAK FLOW       (cms)=     0.628 (i)
     TIME TO PEAK    (hrs)=     7.167
     RUNOFF VOLUME    (mm)=   123.183
     TOTAL RAINFALL   (mm)=   193.000
     RUNOFF COEFFICIENT   =     0.638

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

-------------------------------------------------------------------------------
--------------------
| CALIB             |
| STANDHYD (  0002)|   Area    (ha)=      4.32
|ID= 1 DT= 1.0 min |   Total Imp(%)=     59.00   Dir. Conn.(%)=   0.00
--------------------
                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          2.55            1.77
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        169.71           20.00
     Mannings n           =         0.013           0.250

     Max.Eff.Inten.(mm/hr)=         43.00           88.41
               over (min)           5.00           10.00
     Storage Coeff.  (min)=          4.92 (ii)       9.81 (ii)
     Unit Hyd. Tpeak (min)=          5.00           10.00
     Unit Hyd. peak  (cms)=          0.24            0.11
                                                   *TOTALS*
     PEAK FLOW       (cms)=          0.00            0.43          0.427 (iii)
     TIME TO PEAK    (hrs)=          6.33            7.00           7.00
     RUNOFF VOLUME    (mm)=        191.00          138.46         138.47
     TOTAL RAINFALL   (mm)=        193.00          193.00         193.00
     RUNOFF COEFFICIENT   =          0.99            0.72           0.72

***** 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)=      6.57
|ID= 1 DT= 1.0 min |   Total Imp(%)=     73.50   Dir. Conn.(%)=  73.50
--------------------
                                IMPERVIOUS      PERVIOUS (i)
     Surface Area     (ha)=          4.83            1.74
     Dep. Storage     (mm)=          2.00            5.00
     Average Slope     (%)=          1.00            2.00
     Length            (m)=        209.28           10.00
     Mannings n           =         0.013           0.250

     Max.Eff.Inten.(mm/hr)=         43.00           26.38
               over (min)           6.00            9.00
     Storage Coeff.  (min)=          5.58 (ii)       8.44 (ii)
     Unit Hyd. Tpeak (min)=          6.00            9.00
     Unit Hyd. peak  (cms)=          0.20            0.13
                                                   *TOTALS*
     PEAK FLOW       (cms)=          0.58            0.12          0.701 (iii)
```

Conservative Model Output (Chicago)

TIME TO PEAK (hrs)=	6.98	7.00	7.00
RUNOFF VOLUME (mm)=	190.99	96.96	166.08
TOTAL RAINFALL (mm)=	193.00	193.00	193.00
RUNOFF COEFFICIENT =	0.99	0.50	0.86

(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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	6.57	0.701	7.00	166.08
	+ ID2= 2 (0002):	4.32	0.427	7.00	138.47
	ID = 3 (0009):	10.89	1.128	7.00	155.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0009):	10.89	1.128	7.00	155.13
	+ ID2= 2 (0007):	7.90	0.628	7.17	123.18
	ID = 1 (0009):	18.79	1.731	7.00	141.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008)				
ID= 1 DT= 1.0 min	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.645 (i)
TIME TO PEAK (hrs)= 7.533
RUNOFF VOLUME (mm)= 109.824
TOTAL RAINFALL (mm)= 193.000
RUNOFF COEFFICIENT = 0.569

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

CALIB STANDHYD (0003)				
ID= 1 DT= 1.0 min	Area (ha)=	3.20		
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	1.89	1.31

Conservative Model Output (Chicago)

Dep. Storage	(mm)=	2.00		5.00	
Average Slope	(%)=	1.00		2.00	
Length	(m)=	146.06		20.00	
Mannings n	=	0.013		0.250	
Max.Eff.Inten.	(mm/hr)=	43.00		88.41	
over	(min)	5.00		10.00	
Storage Coeff.	(min)=	4.49	(ii)	9.39	(ii)
Unit Hyd. Tpeak	(min)=	5.00		10.00	
Unit Hyd. peak	(cms)=	0.25		0.12	
					TOTALS
PEAK FLOW	(cms)=	0.00		0.32	0.317 (iii)
TIME TO PEAK	(hrs)=	6.28		7.00	7.00
RUNOFF VOLUME	(mm)=	191.00		138.46	138.47
TOTAL RAINFALL	(mm)=	193.00		193.00	193.00
RUNOFF COEFFICIENT	=	0.99		0.72	0.72

***** 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 (0004)	Area	(ha)=	2.70		
ID= 1 DT= 1.0 min	Total Imp	(%)=	73.50	Dir. Conn.(%)=	73.50

		IMPERVIOUS		PERVIOUS (i)	
Surface Area	(ha)=	1.98		0.72	
Dep. Storage	(mm)=	2.00		5.00	
Average Slope	(%)=	1.00		2.00	
Length	(m)=	134.16		20.00	
Mannings n	=	0.013		0.250	
Max.Eff.Inten.	(mm/hr)=	43.00		26.38	
over	(min)	5.00		9.00	
Storage Coeff.	(min)=	4.27	(ii)	8.61	(ii)
Unit Hyd. Tpeak	(min)=	5.00		9.00	
Unit Hyd. peak	(cms)=	0.25		0.13	
					TOTALS
PEAK FLOW	(cms)=	0.24		0.05	0.288 (iii)
TIME TO PEAK	(hrs)=	6.98		7.00	7.00
RUNOFF VOLUME	(mm)=	190.99		96.96	166.08
TOTAL RAINFALL	(mm)=	193.00		193.00	193.00
RUNOFF COEFFICIENT	=	0.99		0.50	0.86

(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 (0010)				
1 + 2 = 3	AREA	QPEAK	TPEAK	R.V.

Conservative Model Output (Chicago)

	(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):	3.20	0.317	7.00	138.47
+ ID2= 2 (0004):	2.70	0.288	7.00	166.08
ID = 3 (0010):	5.90	0.605	7.00	151.10

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	0.605	7.00	151.10
+ ID2= 2 (0008):	11.10	0.645	7.53	109.82
ID = 1 (0010):	17.00	1.136	7.02	124.15

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	1.136	7.02	124.15
+ ID2= 2 (0009):	18.79	1.731	7.00	141.70
ID = 3 (0011):	35.79	2.865	7.02	133.36

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013) ID= 1 DT= 1.0 min	Area (ha)= 6.58 Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		43.00	34.08	
over (min)		6.00	15.00	
Storage Coeff. (min)=		5.58 (ii)	14.71 (ii)	
Unit Hyd. Tpeak (min)=		6.00	15.00	
Unit Hyd. peak (cms)=		0.20	0.08	
				TOTALS
PEAK FLOW	(cms)=	0.27	0.32	0.589 (iii)
TIME TO PEAK	(hrs)=	6.98	7.03	7.00
RUNOFF VOLUME	(mm)=	190.99	105.75	134.57
TOTAL RAINFALL	(mm)=	193.00	193.00	193.00
RUNOFF COEFFICIENT	=	0.99	0.55	0.70

(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 (0012)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0011):	35.79	2.865	7.02	133.36
	+ ID2= 2 (0013):	6.58	0.589	7.00	134.57
	ID = 3 (0012):	42.37	3.453	7.00	133.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)					
IN= 2---> OUT= 1					
DT= 1.0 min	OUTFLOW	STORAGE	OUTFLOW	STORAGE	
	(cms)	(ha.m.)	(cms)	(ha.m.)	
	0.0000	0.0000	0.0001	5.0000	

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0012)	42.370	3.453	7.00	133.55
OUTFLOW: ID= 1 (0014)	42.370	0.000	16.55	0.01

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=573.00
MAXIMUM STORAGE USED (ha.m.)= 5.6582

FINISH

Conservative Model Output (SCS)

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================================================================================
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       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ac885
5c6-d05a-48af-b984-b7776778b9f4\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ac885
5c6-d05a-48af-b984-b7776778b9f4\scen

DATE: 03/29/2018                                TIME: 03:42:04

USER:

COMMENTS: SCS 2 year
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  ************************************
  ** Run 01                         **
  ************************************


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|    READ STORM    |    Filename: C:\Users\bpowers\AppD
|                  |              ata\Local\Temp\
|                  |              47d29410-34f5-48cf-9093-3a26fcec05c9\0015c6a4
| Ptotal= 44.20 mm |    Comments: 5yrSCS
--------------------
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	0.88	12.75	6.36	19.00	0.80
0.50	0.49	6.75	0.88	13.00	3.27	19.25	0.80
0.75	0.49	7.00	0.88	13.25	3.27	19.50	0.80
1.00	0.49	7.25	0.88	13.50	0.62	19.75	0.80
1.25	0.49	7.50	0.88	13.75	0.62	20.00	0.80
1.50	0.49	7.75	0.88	14.00	3.62	20.25	0.80
1.75	0.49	8.00	0.88	14.25	3.62	20.50	0.53
2.00	0.49	8.25	0.88	14.50	1.33	20.75	0.53

Conservative Model Output (SCS)

2.25	0.49	8.50	1.19	14.75	1.33	21.00	0.53
2.50	0.57	8.75	1.19	15.00	1.33	21.25	0.53
2.75	0.57	9.00	1.19	15.25	1.33	21.50	0.53
3.00	0.57	9.25	1.19	15.50	1.33	21.75	0.53
3.25	0.57	9.50	1.41	15.75	1.33	22.00	0.53
3.50	0.57	9.75	1.41	16.00	1.33	22.25	0.53
3.75	0.57	10.00	1.59	16.25	1.33	22.50	0.53
4.00	0.57	10.25	1.59	16.50	0.80	22.75	0.53
4.25	0.57	10.50	2.03	16.75	0.80	23.00	0.53
4.50	0.71	10.75	2.03	17.00	0.80	23.25	0.53
4.75	0.71	11.00	2.74	17.25	0.80	23.50	0.53
5.00	0.71	11.25	2.74	17.50	0.80	23.75	0.53
5.25	0.71	11.50	4.24	17.75	0.80	24.00	0.53
5.50	0.71	11.75	4.24	18.00	0.80	24.25	0.53
5.75	0.71	12.00	18.39	18.25	0.80		
6.00	0.71	12.25	48.80	18.50	0.80		
6.25	0.71	12.50	6.36	18.75	0.80		

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	0.71	12.150	48.80	18.22	0.80
0.033	0.00	6.100	0.71	12.167	48.80	18.23	0.80
0.050	0.00	6.117	0.71	12.183	48.80	18.25	0.80
0.067	0.00	6.133	0.71	12.200	48.80	18.27	0.80
0.083	0.00	6.150	0.71	12.217	48.80	18.28	0.80
0.100	0.00	6.167	0.71	12.233	48.80	18.30	0.80
0.117	0.00	6.183	0.71	12.250	48.80	18.32	0.80
0.133	0.00	6.200	0.71	12.267	6.40	18.33	0.80
0.150	0.00	6.217	0.71	12.283	6.36	18.35	0.80
0.167	0.00	6.233	0.71	12.300	6.36	18.37	0.80
0.183	0.00	6.250	0.71	12.317	6.36	18.38	0.80
0.200	0.00	6.267	0.88	12.333	6.36	18.40	0.80
0.217	0.00	6.283	0.88	12.350	6.36	18.42	0.80
0.233	0.00	6.300	0.88	12.367	6.36	18.43	0.80
0.250	0.00	6.317	0.88	12.383	6.36	18.45	0.80
0.267	0.49	6.333	0.88	12.400	6.36	18.47	0.80
0.283	0.49	6.350	0.88	12.417	6.36	18.48	0.80
0.300	0.49	6.367	0.88	12.433	6.36	18.50	0.80
0.317	0.49	6.383	0.88	12.450	6.36	18.52	0.80
0.333	0.49	6.400	0.88	12.467	6.36	18.53	0.80
0.350	0.49	6.417	0.88	12.483	6.36	18.55	0.80
0.367	0.49	6.433	0.88	12.500	6.36	18.57	0.80
0.383	0.49	6.450	0.88	12.517	6.36	18.58	0.80
0.400	0.49	6.467	0.88	12.533	6.36	18.60	0.80
0.417	0.49	6.483	0.88	12.550	6.36	18.62	0.80
0.433	0.49	6.500	0.88	12.567	6.36	18.63	0.80
0.450	0.49	6.517	0.88	12.583	6.36	18.65	0.80
0.467	0.49	6.533	0.88	12.600	6.36	18.67	0.80
0.483	0.49	6.550	0.88	12.617	6.36	18.68	0.80
0.500	0.49	6.567	0.88	12.633	6.36	18.70	0.80
0.517	0.49	6.583	0.88	12.650	6.36	18.72	0.80

Conservative Model Output (SCS)

0.533	0.49	6.600	0.88	12.667	6.36	18.73	0.80
0.550	0.49	6.617	0.88	12.683	6.36	18.75	0.80
0.567	0.49	6.633	0.88	12.700	6.36	18.77	0.80
0.583	0.49	6.650	0.88	12.717	6.36	18.78	0.80
0.600	0.49	6.667	0.88	12.733	6.36	18.80	0.80
0.617	0.49	6.683	0.88	12.750	6.36	18.82	0.80
0.633	0.49	6.700	0.88	12.767	3.28	18.83	0.80
0.650	0.49	6.717	0.88	12.783	3.27	18.85	0.80
0.667	0.49	6.733	0.88	12.800	3.27	18.87	0.80
0.683	0.49	6.750	0.88	12.817	3.27	18.88	0.80
0.700	0.49	6.767	0.88	12.833	3.27	18.90	0.80
0.717	0.49	6.783	0.88	12.850	3.27	18.92	0.80
0.733	0.49	6.800	0.88	12.867	3.27	18.93	0.80
0.750	0.49	6.817	0.88	12.883	3.27	18.95	0.80
0.767	0.49	6.833	0.88	12.900	3.27	18.97	0.80
0.783	0.49	6.850	0.88	12.917	3.27	18.98	0.80
0.800	0.49	6.867	0.88	12.933	3.27	19.00	0.80
0.817	0.49	6.883	0.88	12.950	3.27	19.02	0.80
0.833	0.49	6.900	0.88	12.967	3.27	19.03	0.80
0.850	0.49	6.917	0.88	12.983	3.27	19.05	0.80
0.867	0.49	6.933	0.88	13.000	3.27	19.07	0.80
0.883	0.49	6.950	0.88	13.017	3.27	19.08	0.80
0.900	0.49	6.967	0.88	13.033	3.27	19.10	0.80
0.917	0.49	6.983	0.88	13.050	3.27	19.12	0.80
0.933	0.49	7.000	0.88	13.067	3.27	19.13	0.80
0.950	0.49	7.017	0.88	13.083	3.27	19.15	0.80
0.967	0.49	7.033	0.88	13.100	3.27	19.17	0.80
0.983	0.49	7.050	0.88	13.117	3.27	19.18	0.80
1.000	0.49	7.067	0.88	13.133	3.27	19.20	0.80
1.017	0.49	7.083	0.88	13.150	3.27	19.22	0.80
1.033	0.49	7.100	0.88	13.167	3.27	19.23	0.80
1.050	0.49	7.117	0.88	13.183	3.27	19.25	0.80
1.067	0.49	7.133	0.88	13.200	3.27	19.27	0.80
1.083	0.49	7.150	0.88	13.217	3.27	19.28	0.80
1.100	0.49	7.167	0.88	13.233	3.27	19.30	0.80
1.117	0.49	7.183	0.88	13.250	3.27	19.32	0.80
1.133	0.49	7.200	0.88	13.267	0.62	19.33	0.80
1.150	0.49	7.217	0.88	13.283	0.62	19.35	0.80
1.167	0.49	7.233	0.88	13.300	0.62	19.37	0.80
1.183	0.49	7.250	0.88	13.317	0.62	19.38	0.80
1.200	0.49	7.267	0.88	13.333	0.62	19.40	0.80
1.217	0.49	7.283	0.88	13.350	0.62	19.42	0.80
1.233	0.49	7.300	0.88	13.367	0.62	19.43	0.80
1.250	0.49	7.317	0.88	13.383	0.62	19.45	0.80
1.267	0.49	7.333	0.88	13.400	0.62	19.47	0.80
1.283	0.49	7.350	0.88	13.417	0.62	19.48	0.80
1.300	0.49	7.367	0.88	13.433	0.62	19.50	0.80
1.317	0.49	7.383	0.88	13.450	0.62	19.52	0.80
1.333	0.49	7.400	0.88	13.467	0.62	19.53	0.80
1.350	0.49	7.417	0.88	13.483	0.62	19.55	0.80
1.367	0.49	7.433	0.88	13.500	0.62	19.57	0.80
1.383	0.49	7.450	0.88	13.517	0.62	19.58	0.80
1.400	0.49	7.467	0.88	13.533	0.62	19.60	0.80
1.417	0.49	7.483	0.88	13.550	0.62	19.62	0.80
1.433	0.49	7.500	0.88	13.567	0.62	19.63	0.80
1.450	0.49	7.517	0.88	13.583	0.62	19.65	0.80
1.467	0.49	7.533	0.88	13.600	0.62	19.67	0.80
1.483	0.49	7.550	0.88	13.617	0.62	19.68	0.80
1.500	0.49	7.567	0.88	13.633	0.62	19.70	0.80
1.517	0.49	7.583	0.88	13.650	0.62	19.72	0.80
1.533	0.49	7.600	0.88	13.667	0.62	19.73	0.80
1.550	0.49	7.617	0.88	13.683	0.62	19.75	0.80
1.567	0.49	7.633	0.88	13.700	0.62	19.77	0.80

Conservative Model Output (SCS)

1.583	0.49	7.650	0.88	13.717	0.62	19.78	0.80
1.600	0.49	7.667	0.88	13.733	0.62	19.80	0.80
1.617	0.49	7.683	0.88	13.750	0.62	19.82	0.80
1.633	0.49	7.700	0.88	13.767	3.62	19.83	0.80
1.650	0.49	7.717	0.88	13.783	3.62	19.85	0.80
1.667	0.49	7.733	0.88	13.800	3.62	19.87	0.80
1.683	0.49	7.750	0.88	13.817	3.62	19.88	0.80
1.700	0.49	7.767	0.88	13.833	3.62	19.90	0.80
1.717	0.49	7.783	0.88	13.850	3.62	19.92	0.80
1.733	0.49	7.800	0.88	13.867	3.62	19.93	0.80
1.750	0.49	7.817	0.88	13.883	3.62	19.95	0.80
1.767	0.49	7.833	0.88	13.900	3.62	19.97	0.80
1.783	0.49	7.850	0.88	13.917	3.62	19.98	0.80
1.800	0.49	7.867	0.88	13.933	3.62	20.00	0.80
1.817	0.49	7.883	0.88	13.950	3.62	20.02	0.80
1.833	0.49	7.900	0.88	13.967	3.62	20.03	0.80
1.850	0.49	7.917	0.88	13.983	3.62	20.05	0.80
1.867	0.49	7.933	0.88	14.000	3.62	20.07	0.80
1.883	0.49	7.950	0.88	14.017	3.62	20.08	0.80
1.900	0.49	7.967	0.88	14.033	3.62	20.10	0.80
1.917	0.49	7.983	0.88	14.050	3.62	20.12	0.80
1.933	0.49	8.000	0.88	14.067	3.62	20.13	0.80
1.950	0.49	8.017	0.88	14.083	3.62	20.15	0.80
1.967	0.49	8.033	0.88	14.100	3.62	20.17	0.80
1.983	0.49	8.050	0.88	14.117	3.62	20.18	0.80
2.000	0.49	8.067	0.88	14.133	3.62	20.20	0.80
2.017	0.49	8.083	0.88	14.150	3.62	20.22	0.80
2.033	0.49	8.100	0.88	14.167	3.62	20.23	0.80
2.050	0.49	8.117	0.88	14.183	3.62	20.25	0.80
2.067	0.49	8.133	0.88	14.200	3.62	20.27	0.53
2.083	0.49	8.150	0.88	14.217	3.62	20.28	0.53
2.100	0.49	8.167	0.88	14.233	3.62	20.30	0.53
2.117	0.49	8.183	0.88	14.250	3.62	20.32	0.53
2.133	0.49	8.200	0.88	14.267	1.33	20.33	0.53
2.150	0.49	8.217	0.88	14.283	1.33	20.35	0.53
2.167	0.49	8.233	0.88	14.300	1.33	20.37	0.53
2.183	0.49	8.250	0.88	14.317	1.33	20.38	0.53
2.200	0.49	8.267	1.19	14.333	1.33	20.40	0.53
2.217	0.49	8.283	1.19	14.350	1.33	20.42	0.53
2.233	0.49	8.300	1.19	14.367	1.33	20.43	0.53
2.250	0.49	8.317	1.19	14.383	1.33	20.45	0.53
2.267	0.57	8.333	1.19	14.400	1.33	20.47	0.53
2.283	0.57	8.350	1.19	14.417	1.33	20.48	0.53
2.300	0.57	8.367	1.19	14.433	1.33	20.50	0.53
2.317	0.57	8.383	1.19	14.450	1.33	20.52	0.53
2.333	0.57	8.400	1.19	14.467	1.33	20.53	0.53
2.350	0.57	8.417	1.19	14.483	1.33	20.55	0.53
2.367	0.57	8.433	1.19	14.500	1.33	20.57	0.53
2.383	0.57	8.450	1.19	14.517	1.33	20.58	0.53
2.400	0.57	8.467	1.19	14.533	1.33	20.60	0.53
2.417	0.57	8.483	1.19	14.550	1.33	20.62	0.53
2.433	0.57	8.500	1.19	14.567	1.33	20.63	0.53
2.450	0.57	8.517	1.19	14.583	1.33	20.65	0.53
2.467	0.57	8.533	1.19	14.600	1.33	20.67	0.53
2.483	0.57	8.550	1.19	14.617	1.33	20.68	0.53
2.500	0.57	8.567	1.19	14.633	1.33	20.70	0.53
2.517	0.57	8.583	1.19	14.650	1.33	20.72	0.53
2.533	0.57	8.600	1.19	14.667	1.33	20.73	0.53
2.550	0.57	8.617	1.19	14.683	1.33	20.75	0.53
2.567	0.57	8.633	1.19	14.700	1.33	20.77	0.53
2.583	0.57	8.650	1.19	14.717	1.33	20.78	0.53
2.600	0.57	8.667	1.19	14.733	1.33	20.80	0.53
2.617	0.57	8.683	1.19	14.750	1.33	20.82	0.53

Conservative Model Output (SCS)

2.633	0.57	8.700	1.19	14.767	1.33	20.83	0.53
2.650	0.57	8.717	1.19	14.783	1.33	20.85	0.53
2.667	0.57	8.733	1.19	14.800	1.33	20.87	0.53
2.683	0.57	8.750	1.19	14.817	1.33	20.88	0.53
2.700	0.57	8.767	1.19	14.833	1.33	20.90	0.53
2.717	0.57	8.783	1.19	14.850	1.33	20.92	0.53
2.733	0.57	8.800	1.19	14.867	1.33	20.93	0.53
2.750	0.57	8.817	1.19	14.883	1.33	20.95	0.53
2.767	0.57	8.833	1.19	14.900	1.33	20.97	0.53
2.783	0.57	8.850	1.19	14.917	1.33	20.98	0.53
2.800	0.57	8.867	1.19	14.933	1.33	21.00	0.53
2.817	0.57	8.883	1.19	14.950	1.33	21.02	0.53
2.833	0.57	8.900	1.19	14.967	1.33	21.03	0.53
2.850	0.57	8.917	1.19	14.983	1.33	21.05	0.53
2.867	0.57	8.933	1.19	15.000	1.33	21.07	0.53
2.883	0.57	8.950	1.19	15.017	1.33	21.08	0.53
2.900	0.57	8.967	1.19	15.033	1.33	21.10	0.53
2.917	0.57	8.983	1.19	15.050	1.33	21.12	0.53
2.933	0.57	9.000	1.19	15.067	1.33	21.13	0.53
2.950	0.57	9.017	1.19	15.083	1.33	21.15	0.53
2.967	0.57	9.033	1.19	15.100	1.33	21.17	0.53
2.983	0.57	9.050	1.19	15.117	1.33	21.18	0.53
3.000	0.57	9.067	1.19	15.133	1.33	21.20	0.53
3.017	0.57	9.083	1.19	15.150	1.33	21.22	0.53
3.033	0.57	9.100	1.19	15.167	1.33	21.23	0.53
3.050	0.57	9.117	1.19	15.183	1.33	21.25	0.53
3.067	0.57	9.133	1.19	15.200	1.33	21.27	0.53
3.083	0.57	9.150	1.19	15.217	1.33	21.28	0.53
3.100	0.57	9.167	1.19	15.233	1.33	21.30	0.53
3.117	0.57	9.183	1.19	15.250	1.33	21.32	0.53
3.133	0.57	9.200	1.19	15.267	1.33	21.33	0.53
3.150	0.57	9.217	1.19	15.283	1.33	21.35	0.53
3.167	0.57	9.233	1.19	15.300	1.33	21.37	0.53
3.183	0.57	9.250	1.19	15.317	1.33	21.38	0.53
3.200	0.57	9.267	1.41	15.333	1.33	21.40	0.53
3.217	0.57	9.283	1.41	15.350	1.33	21.42	0.53
3.233	0.57	9.300	1.41	15.367	1.33	21.43	0.53
3.250	0.57	9.317	1.41	15.383	1.33	21.45	0.53
3.267	0.57	9.333	1.41	15.400	1.33	21.47	0.53
3.283	0.57	9.350	1.41	15.417	1.33	21.48	0.53
3.300	0.57	9.367	1.41	15.433	1.33	21.50	0.53
3.317	0.57	9.383	1.41	15.450	1.33	21.52	0.53
3.333	0.57	9.400	1.41	15.467	1.33	21.53	0.53
3.350	0.57	9.417	1.41	15.483	1.33	21.55	0.53
3.367	0.57	9.433	1.41	15.500	1.33	21.57	0.53
3.383	0.57	9.450	1.41	15.517	1.33	21.58	0.53
3.400	0.57	9.467	1.41	15.533	1.33	21.60	0.53
3.417	0.57	9.483	1.41	15.550	1.33	21.62	0.53
3.433	0.57	9.500	1.41	15.567	1.33	21.63	0.53
3.450	0.57	9.517	1.41	15.583	1.33	21.65	0.53
3.467	0.57	9.533	1.41	15.600	1.33	21.67	0.53
3.483	0.57	9.550	1.41	15.617	1.33	21.68	0.53
3.500	0.57	9.567	1.41	15.633	1.33	21.70	0.53
3.517	0.57	9.583	1.41	15.650	1.33	21.72	0.53
3.533	0.57	9.600	1.41	15.667	1.33	21.73	0.53
3.550	0.57	9.617	1.41	15.683	1.33	21.75	0.53
3.567	0.57	9.633	1.41	15.700	1.33	21.77	0.53
3.583	0.57	9.650	1.41	15.717	1.33	21.78	0.53
3.600	0.57	9.667	1.41	15.733	1.33	21.80	0.53
3.617	0.57	9.683	1.41	15.750	1.33	21.82	0.53
3.633	0.57	9.700	1.41	15.767	1.33	21.83	0.53
3.650	0.57	9.717	1.41	15.783	1.33	21.85	0.53
3.667	0.57	9.733	1.41	15.800	1.33	21.87	0.53

Conservative Model Output (SCS)

3.683	0.57	9.750	1.41	15.817	1.33	21.88	0.53
3.700	0.57	9.767	1.59	15.833	1.33	21.90	0.53
3.717	0.57	9.783	1.59	15.850	1.33	21.92	0.53
3.733	0.57	9.800	1.59	15.867	1.33	21.93	0.53
3.750	0.57	9.817	1.59	15.883	1.33	21.95	0.53
3.767	0.57	9.833	1.59	15.900	1.33	21.97	0.53
3.783	0.57	9.850	1.59	15.917	1.33	21.98	0.53
3.800	0.57	9.867	1.59	15.933	1.33	22.00	0.53
3.817	0.57	9.883	1.59	15.950	1.33	22.02	0.53
3.833	0.57	9.900	1.59	15.967	1.33	22.03	0.53
3.850	0.57	9.917	1.59	15.983	1.33	22.05	0.53
3.867	0.57	9.933	1.59	16.000	1.33	22.07	0.53
3.883	0.57	9.950	1.59	16.017	1.33	22.08	0.53
3.900	0.57	9.967	1.59	16.033	1.33	22.10	0.53
3.917	0.57	9.983	1.59	16.050	1.33	22.12	0.53
3.933	0.57	10.000	1.59	16.067	1.33	22.13	0.53
3.950	0.57	10.017	1.59	16.083	1.33	22.15	0.53
3.967	0.57	10.033	1.59	16.100	1.33	22.17	0.53
3.983	0.57	10.050	1.59	16.117	1.33	22.18	0.53
4.000	0.57	10.067	1.59	16.133	1.33	22.20	0.53
4.017	0.57	10.083	1.59	16.150	1.33	22.22	0.53
4.033	0.57	10.100	1.59	16.167	1.33	22.23	0.53
4.050	0.57	10.117	1.59	16.183	1.33	22.25	0.53
4.067	0.57	10.133	1.59	16.200	1.33	22.27	0.53
4.083	0.57	10.150	1.59	16.217	1.33	22.28	0.53
4.100	0.57	10.167	1.59	16.233	1.33	22.30	0.53
4.117	0.57	10.183	1.59	16.250	1.33	22.32	0.53
4.133	0.57	10.200	1.59	16.267	0.80	22.33	0.53
4.150	0.57	10.217	1.59	16.283	0.80	22.35	0.53
4.167	0.57	10.233	1.59	16.300	0.80	22.37	0.53
4.183	0.57	10.250	1.59	16.317	0.80	22.38	0.53
4.200	0.57	10.267	2.03	16.333	0.80	22.40	0.53
4.217	0.57	10.283	2.03	16.350	0.80	22.42	0.53
4.233	0.57	10.300	2.03	16.367	0.80	22.43	0.53
4.250	0.57	10.317	2.03	16.383	0.80	22.45	0.53
4.267	0.71	10.333	2.03	16.400	0.80	22.47	0.53
4.283	0.71	10.350	2.03	16.417	0.80	22.48	0.53
4.300	0.71	10.367	2.03	16.433	0.80	22.50	0.53
4.317	0.71	10.383	2.03	16.450	0.80	22.52	0.53
4.333	0.71	10.400	2.03	16.467	0.80	22.53	0.53
4.350	0.71	10.417	2.03	16.483	0.80	22.55	0.53
4.367	0.71	10.433	2.03	16.500	0.80	22.57	0.53
4.383	0.71	10.450	2.03	16.517	0.80	22.58	0.53
4.400	0.71	10.467	2.03	16.533	0.80	22.60	0.53
4.417	0.71	10.483	2.03	16.550	0.80	22.62	0.53
4.433	0.71	10.500	2.03	16.567	0.80	22.63	0.53
4.450	0.71	10.517	2.03	16.583	0.80	22.65	0.53
4.467	0.71	10.533	2.03	16.600	0.80	22.67	0.53
4.483	0.71	10.550	2.03	16.617	0.80	22.68	0.53
4.500	0.71	10.567	2.03	16.633	0.80	22.70	0.53
4.517	0.71	10.583	2.03	16.650	0.80	22.72	0.53
4.533	0.71	10.600	2.03	16.667	0.80	22.73	0.53
4.550	0.71	10.617	2.03	16.683	0.80	22.75	0.53
4.567	0.71	10.633	2.03	16.700	0.80	22.77	0.53
4.583	0.71	10.650	2.03	16.717	0.80	22.78	0.53
4.600	0.71	10.667	2.03	16.733	0.80	22.80	0.53
4.617	0.71	10.683	2.03	16.750	0.80	22.82	0.53
4.633	0.71	10.700	2.03	16.767	0.80	22.83	0.53
4.650	0.71	10.717	2.03	16.783	0.80	22.85	0.53
4.667	0.71	10.733	2.03	16.800	0.80	22.87	0.53
4.683	0.71	10.750	2.03	16.817	0.80	22.88	0.53
4.700	0.71	10.767	2.74	16.833	0.80	22.90	0.53
4.717	0.71	10.783	2.74	16.850	0.80	22.92	0.53

4.733	0.71	10.800	2.74	16.867	0.80	22.93	0.53
4.750	0.71	10.817	2.74	16.883	0.80	22.95	0.53
4.767	0.71	10.833	2.74	16.900	0.80	22.97	0.53
4.783	0.71	10.850	2.74	16.917	0.80	22.98	0.53
4.800	0.71	10.867	2.74	16.933	0.80	23.00	0.53
4.817	0.71	10.883	2.74	16.950	0.80	23.02	0.53
4.833	0.71	10.900	2.74	16.967	0.80	23.03	0.53
4.850	0.71	10.917	2.74	16.983	0.80	23.05	0.53
4.867	0.71	10.933	2.74	17.000	0.80	23.07	0.53
4.883	0.71	10.950	2.74	17.017	0.80	23.08	0.53
4.900	0.71	10.967	2.74	17.033	0.80	23.10	0.53
4.917	0.71	10.983	2.74	17.050	0.80	23.12	0.53
4.933	0.71	11.000	2.74	17.067	0.80	23.13	0.53
4.950	0.71	11.017	2.74	17.083	0.80	23.15	0.53
4.967	0.71	11.033	2.74	17.100	0.80	23.17	0.53
4.983	0.71	11.050	2.74	17.117	0.80	23.18	0.53
5.000	0.71	11.067	2.74	17.133	0.80	23.20	0.53
5.017	0.71	11.083	2.74	17.150	0.80	23.22	0.53
5.033	0.71	11.100	2.74	17.167	0.80	23.23	0.53
5.050	0.71	11.117	2.74	17.183	0.80	23.25	0.53
5.067	0.71	11.133	2.74	17.200	0.80	23.27	0.53
5.083	0.71	11.150	2.74	17.217	0.80	23.28	0.53
5.100	0.71	11.167	2.74	17.233	0.80	23.30	0.53
5.117	0.71	11.183	2.74	17.250	0.80	23.32	0.53
5.133	0.71	11.200	2.74	17.267	0.80	23.33	0.53
5.150	0.71	11.217	2.74	17.283	0.80	23.35	0.53
5.167	0.71	11.233	2.74	17.300	0.80	23.37	0.53
5.183	0.71	11.250	2.74	17.317	0.80	23.38	0.53
5.200	0.71	11.267	4.24	17.333	0.80	23.40	0.53
5.217	0.71	11.283	4.24	17.350	0.80	23.42	0.53
5.233	0.71	11.300	4.24	17.367	0.80	23.43	0.53
5.250	0.71	11.317	4.24	17.383	0.80	23.45	0.53
5.267	0.71	11.333	4.24	17.400	0.80	23.47	0.53
5.283	0.71	11.350	4.24	17.417	0.80	23.48	0.53
5.300	0.71	11.367	4.24	17.433	0.80	23.50	0.53
5.317	0.71	11.383	4.24	17.450	0.80	23.52	0.53
5.333	0.71	11.400	4.24	17.467	0.80	23.53	0.53
5.350	0.71	11.417	4.24	17.483	0.80	23.55	0.53
5.367	0.71	11.433	4.24	17.500	0.80	23.57	0.53
5.383	0.71	11.450	4.24	17.517	0.80	23.58	0.53
5.400	0.71	11.467	4.24	17.533	0.80	23.60	0.53
5.417	0.71	11.483	4.24	17.550	0.80	23.62	0.53
5.433	0.71	11.500	4.24	17.567	0.80	23.63	0.53
5.450	0.71	11.517	4.24	17.583	0.80	23.65	0.53
5.467	0.71	11.533	4.24	17.600	0.80	23.67	0.53
5.483	0.71	11.550	4.24	17.617	0.80	23.68	0.53
5.500	0.71	11.567	4.24	17.633	0.80	23.70	0.53
5.517	0.71	11.583	4.24	17.650	0.80	23.72	0.53
5.533	0.71	11.600	4.24	17.667	0.80	23.73	0.53
5.550	0.71	11.617	4.24	17.683	0.80	23.75	0.53
5.567	0.71	11.633	4.24	17.700	0.80	23.77	0.53
5.583	0.71	11.650	4.24	17.717	0.80	23.78	0.53
5.600	0.71	11.667	4.24	17.733	0.80	23.80	0.53
5.617	0.71	11.683	4.24	17.750	0.80	23.82	0.53
5.633	0.71	11.700	4.24	17.767	0.80	23.83	0.53
5.650	0.71	11.717	4.24	17.783	0.80	23.85	0.53
5.667	0.71	11.733	4.24	17.800	0.80	23.87	0.53
5.683	0.71	11.750	4.24	17.817	0.80	23.88	0.53
5.700	0.71	11.767	18.38	17.833	0.80	23.90	0.53
5.717	0.71	11.783	18.39	17.850	0.80	23.92	0.53
5.733	0.71	11.800	18.39	17.867	0.80	23.93	0.53
5.750	0.71	11.817	18.39	17.883	0.80	23.95	0.53
5.767	0.71	11.833	18.39	17.900	0.80	23.97	0.53

5.783	0.71	11.850	18.39	17.917	0.80	23.98	0.53
5.800	0.71	11.867	18.39	17.933	0.80	24.00	0.53
5.817	0.71	11.883	18.39	17.950	0.80	24.02	0.53
5.833	0.71	11.900	18.39	17.967	0.80	24.03	0.53
5.850	0.71	11.917	18.39	17.983	0.80	24.05	0.53
5.867	0.71	11.933	18.39	18.000	0.80	24.07	0.53
5.883	0.71	11.950	18.39	18.017	0.80	24.08	0.53
5.900	0.71	11.967	18.39	18.033	0.80	24.10	0.53
5.917	0.71	11.983	18.39	18.050	0.80	24.12	0.53
5.933	0.71	12.000	18.39	18.067	0.80	24.13	0.53
5.950	0.71	12.017	48.78	18.083	0.80	24.15	0.53
5.967	0.71	12.033	48.80	18.100	0.80	24.17	0.53
5.983	0.71	12.050	48.80	18.117	0.80	24.18	0.53
6.000	0.71	12.067	48.80	18.133	0.80	24.20	0.53
6.017	0.71	12.083	48.80	18.150	0.80	24.22	0.53
6.033	0.71	12.100	48.80	18.167	0.80	24.23	0.53
6.050	0.71	12.117	48.80	18.183	0.80	24.25	0.53
6.067	0.71	12.133	48.80	18.200	0.80		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.111 (i)
TIME TO PEAK (hrs)= 12.650
RUNOFF VOLUME (mm)= 8.007
TOTAL RAINFALL (mm)= 44.200
RUNOFF COEFFICIENT = 0.181

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

CALIB
STANDHYD (0001)
ID= 1 DT= 1.0 min

Area (ha)= 6.57
Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	1.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		48.80	9.51	
over (min)		5.00	9.00	
Storage Coeff. (min)=		5.30 (ii)	8.02 (ii)	
Unit Hyd. Tpeak (min)=		5.00	9.00	
Unit Hyd. peak (cms)=		0.22	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.62	0.03	0.647 (iii)
TIME TO PEAK	(hrs)=	12.25	12.32	12.25
RUNOFF VOLUME	(mm)=	43.06	7.08	33.53
TOTAL RAINFALL	(mm)=	44.20	44.20	44.20
RUNOFF COEFFICIENT	=	0.97	0.16	0.76

(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.

Conservative Model Output (SCS)

CALIB					
STANDHYD (0002)	Area (ha)=	4.32			
ID= 1 DT= 1.0 min	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		48.80	50.63	
over (min)		5.00	11.00	
Storage Coeff. (min)=		4.68 (ii)	10.79 (ii)	
Unit Hyd. Tpeak (min)=		5.00	11.00	
Unit Hyd. peak (cms)=		0.27	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.17	0.169 (iii)
TIME TO PEAK	(hrs)=	12.22	12.33	12.33
RUNOFF VOLUME	(mm)=	42.07	15.43	15.43
TOTAL RAINFALL	(mm)=	44.20	44.20	44.20
RUNOFF COEFFICIENT	=	0.95	0.35	0.35

***** 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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		6.57	0.647	12.25	33.53
+ ID2= 2 (0002):		4.32	0.169	12.33	15.43
ID = 3 (0009):		10.89	0.796	12.27	26.35

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0009):		10.89	0.796	12.27	26.35
+ ID2= 2 (0007):		7.90	0.111	12.65	8.01
ID = 1 (0009):		18.79	0.849	12.27	19.75

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB					
NASHYD (0008)	Area	(ha)=	11.10	Curve Number	(CN)= 66.4
ID= 1 DT= 1.0 min	Ia	(mm)=	7.20	# of Linear Res.	(N)= 3.00

Conservative Model Output (SCS)

U.H. Tp(hrs)= 0.79

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.080 (i)
TIME TO PEAK (hrs)= 13.067
RUNOFF VOLUME (mm)= 5.887
TOTAL RAINFALL (mm)= 44.200
RUNOFF COEFFICIENT = 0.133

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

CALIB	
STANDHYD (0003)	Area (ha)= 3.20
ID= 1 DT= 1.0 min	Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		48.80	50.63	
over (min)		5.00	11.00	
Storage Coeff. (min)=		4.27 (ii)	10.39 (ii)	
Unit Hyd. Tpeak (min)=		5.00	11.00	
Unit Hyd. peak (cms)=		0.29	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.13	0.127 (iii)
TIME TO PEAK	(hrs)=	12.20	12.33	12.33
RUNOFF VOLUME	(mm)=	42.07	15.43	15.43
TOTAL RAINFALL	(mm)=	44.20	44.20	44.20
RUNOFF COEFFICIENT	=	0.95	0.35	0.35

***** 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 (0004)	Area (ha)= 2.70
ID= 1 DT= 1.0 min	Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.98	0.72
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	134.16	20.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		48.80	9.51
over (min)		5.00	9.00
Storage Coeff. (min)=		4.06 (ii)	8.19 (ii)
Unit Hyd. Tpeak (min)=		5.00	9.00

Conservative Model Output (SCS)

				TOTALS
Unit Hyd. peak	(cms)=	0.26	0.13	
PEAK FLOW	(cms)=	0.26	0.01	0.274 (iii)
TIME TO PEAK	(hrs)=	12.25	12.32	12.25
RUNOFF VOLUME	(mm)=	42.06	7.08	32.79
TOTAL RAINFALL	(mm)=	44.20	44.20	44.20
RUNOFF COEFFICIENT	=	0.95	0.16	0.74

(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 (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.127	12.33	15.43
+ ID2= 2 (0004):	2.70	0.274	12.25	32.79
ID = 3 (0010):	5.90	0.386	12.27	23.38

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	0.386	12.27	23.38
+ ID2= 2 (0008):	11.10	0.080	13.07	5.89
ID = 1 (0010):	17.00	0.406	12.27	13.48

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	0.406	12.27	13.48
+ ID2= 2 (0009):	18.79	0.849	12.27	19.75
ID = 3 (0011):	35.79	1.255	12.27	16.77

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0013)
ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.92	3.66
Dep. Storage	(mm)=	2.00	5.00

Conservative Model Output (SCS)

Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		48.80	12.62	
over (min)		5.00	19.00	
Storage Coeff. (min)=		5.30 (ii)	18.90 (ii)	
Unit Hyd. Tpeak (min)=		5.00	19.00	
Unit Hyd. peak (cms)=		0.22	0.06	
				TOTALS
PEAK FLOW	(cms)=	0.28	0.07	0.323 (iii)
TIME TO PEAK	(hrs)=	12.25	12.47	12.25
RUNOFF VOLUME	(mm)=	42.06	8.45	19.81
TOTAL RAINFALL	(mm)=	44.20	44.20	44.20
RUNOFF COEFFICIENT	=	0.95	0.19	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 (0012)		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		35.79	1.255	12.27	16.77
+ ID2= 2 (0013):		6.58	0.323	12.25	19.81
ID = 3 (0012):		42.37	1.577	12.27	17.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)	OUTFLOW	STORAGE	OUTFLOW	STORAGE
IN= 2---> OUT= 1	(cms)	(ha.m.)	(cms)	(ha.m.)
DT= 1.0 min	0.0000	0.0000	0.0001	5.0000

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0012)	42.370	1.577	12.27	17.24
OUTFLOW: ID= 1 (0014)	42.370	0.000	27.87	0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=936.00
MAXIMUM STORAGE USED (ha.m.)= 0.7304

```
V    V   I    SSSSS  U   U    A    L
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
```

Conservative Model Output (SCS)

```
 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)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\71b9e384-43b7-4adb-925c-9c9b99c8bcb1\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\71b9e384-43b7-4adb-925c-9c9b99c8bcb1\scen

DATE: 03/29/2018 TIME: 03:42:04

USER:

COMMENTS: SCS 5 year

****
** Run 02 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\47d29410-34f5-48cf-9093-3a26fcec05c9\9fcaaa85
Ptotal= 64.60 mm	Comments: 10yrSCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	1.29	12.75	9.30	19.00	1.16
0.50	0.71	6.75	1.29	13.00	4.78	19.25	1.16
0.75	0.71	7.00	1.29	13.25	4.78	19.50	1.16
1.00	0.71	7.25	1.29	13.50	0.90	19.75	1.16
1.25	0.71	7.50	1.29	13.75	0.90	20.00	1.16
1.50	0.71	7.75	1.29	14.00	5.30	20.25	1.16
1.75	0.71	8.00	1.29	14.25	5.30	20.50	0.77
2.00	0.71	8.25	1.29	14.50	1.94	20.75	0.77
2.25	0.71	8.50	1.74	14.75	1.94	21.00	0.77
2.50	0.84	8.75	1.74	15.00	1.94	21.25	0.77
2.75	0.84	9.00	1.74	15.25	1.94	21.50	0.77
3.00	0.84	9.25	1.74	15.50	1.94	21.75	0.77
3.25	0.84	9.50	2.07	15.75	1.94	22.00	0.77
3.50	0.84	9.75	2.07	16.00	1.94	22.25	0.77
3.75	0.84	10.00	2.33	16.25	1.94	22.50	0.77
4.00	0.84	10.25	2.33	16.50	1.16	22.75	0.77
4.25	0.84	10.50	2.97	16.75	1.16	23.00	0.77

Conservative Model Output (SCS)

4.50	1.03	10.75	2.97	17.00	1.16	23.25	0.77
4.75	1.03	11.00	4.01	17.25	1.16	23.50	0.77
5.00	1.03	11.25	4.01	17.50	1.16	23.75	0.77
5.25	1.03	11.50	6.20	17.75	1.16	24.00	0.77
5.50	1.03	11.75	6.20	18.00	1.16	24.25	0.77
5.75	1.03	12.00	26.87	18.25	1.16		
6.00	1.03	12.25	71.32	18.50	1.16		
6.25	1.03	12.50	9.30	18.75	1.16		

CALIB
NASHYD (0007)
ID= 1 DT= 1.0 min

Area (ha)= 7.90 Curve Number (CN)= 72.6
Ia (mm)= 6.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.46

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	1.03	12.150	71.32	18.22	1.16
0.033	0.00	6.100	1.03	12.167	71.32	18.23	1.16
0.050	0.00	6.117	1.03	12.183	71.32	18.25	1.16
0.067	0.00	6.133	1.03	12.200	71.32	18.27	1.16
0.083	0.00	6.150	1.03	12.217	71.32	18.28	1.16
0.100	0.00	6.167	1.03	12.233	71.32	18.30	1.16
0.117	0.00	6.183	1.03	12.250	71.32	18.32	1.16
0.133	0.00	6.200	1.03	12.267	9.36	18.33	1.16
0.150	0.00	6.217	1.03	12.283	9.30	18.35	1.16
0.167	0.00	6.233	1.03	12.300	9.30	18.37	1.16
0.183	0.00	6.250	1.03	12.317	9.30	18.38	1.16
0.200	0.00	6.267	1.29	12.333	9.30	18.40	1.16
0.217	0.00	6.283	1.29	12.350	9.30	18.42	1.16
0.233	0.00	6.300	1.29	12.367	9.30	18.43	1.16
0.250	0.00	6.317	1.29	12.383	9.30	18.45	1.16
0.267	0.71	6.333	1.29	12.400	9.30	18.47	1.16
0.283	0.71	6.350	1.29	12.417	9.30	18.48	1.16
0.300	0.71	6.367	1.29	12.433	9.30	18.50	1.16
0.317	0.71	6.383	1.29	12.450	9.30	18.52	1.16
0.333	0.71	6.400	1.29	12.467	9.30	18.53	1.16
0.350	0.71	6.417	1.29	12.483	9.30	18.55	1.16
0.367	0.71	6.433	1.29	12.500	9.30	18.57	1.16
0.383	0.71	6.450	1.29	12.517	9.30	18.58	1.16
0.400	0.71	6.467	1.29	12.533	9.30	18.60	1.16
0.417	0.71	6.483	1.29	12.550	9.30	18.62	1.16
0.433	0.71	6.500	1.29	12.567	9.30	18.63	1.16
0.450	0.71	6.517	1.29	12.583	9.30	18.65	1.16
0.467	0.71	6.533	1.29	12.600	9.30	18.67	1.16
0.483	0.71	6.550	1.29	12.617	9.30	18.68	1.16
0.500	0.71	6.567	1.29	12.633	9.30	18.70	1.16
0.517	0.71	6.583	1.29	12.650	9.30	18.72	1.16
0.533	0.71	6.600	1.29	12.667	9.30	18.73	1.16
0.550	0.71	6.617	1.29	12.683	9.30	18.75	1.16
0.567	0.71	6.633	1.29	12.700	9.30	18.77	1.16
0.583	0.71	6.650	1.29	12.717	9.30	18.78	1.16
0.600	0.71	6.667	1.29	12.733	9.30	18.80	1.16
0.617	0.71	6.683	1.29	12.750	9.30	18.82	1.16
0.633	0.71	6.700	1.29	12.767	4.78	18.83	1.16
0.650	0.71	6.717	1.29	12.783	4.78	18.85	1.16
0.667	0.71	6.733	1.29	12.800	4.78	18.87	1.16

Conservative Model Output (SCS)

0.683	0.71	6.750	1.29	12.817	4.78	18.88	1.16
0.700	0.71	6.767	1.29	12.833	4.78	18.90	1.16
0.717	0.71	6.783	1.29	12.850	4.78	18.92	1.16
0.733	0.71	6.800	1.29	12.867	4.78	18.93	1.16
0.750	0.71	6.817	1.29	12.883	4.78	18.95	1.16
0.767	0.71	6.833	1.29	12.900	4.78	18.97	1.16
0.783	0.71	6.850	1.29	12.917	4.78	18.98	1.16
0.800	0.71	6.867	1.29	12.933	4.78	19.00	1.16
0.817	0.71	6.883	1.29	12.950	4.78	19.02	1.16
0.833	0.71	6.900	1.29	12.967	4.78	19.03	1.16
0.850	0.71	6.917	1.29	12.983	4.78	19.05	1.16
0.867	0.71	6.933	1.29	13.000	4.78	19.07	1.16
0.883	0.71	6.950	1.29	13.017	4.78	19.08	1.16
0.900	0.71	6.967	1.29	13.033	4.78	19.10	1.16
0.917	0.71	6.983	1.29	13.050	4.78	19.12	1.16
0.933	0.71	7.000	1.29	13.067	4.78	19.13	1.16
0.950	0.71	7.017	1.29	13.083	4.78	19.15	1.16
0.967	0.71	7.033	1.29	13.100	4.78	19.17	1.16
0.983	0.71	7.050	1.29	13.117	4.78	19.18	1.16
1.000	0.71	7.067	1.29	13.133	4.78	19.20	1.16
1.017	0.71	7.083	1.29	13.150	4.78	19.22	1.16
1.033	0.71	7.100	1.29	13.167	4.78	19.23	1.16
1.050	0.71	7.117	1.29	13.183	4.78	19.25	1.16
1.067	0.71	7.133	1.29	13.200	4.78	19.27	1.16
1.083	0.71	7.150	1.29	13.217	4.78	19.28	1.16
1.100	0.71	7.167	1.29	13.233	4.78	19.30	1.16
1.117	0.71	7.183	1.29	13.250	4.78	19.32	1.16
1.133	0.71	7.200	1.29	13.267	0.91	19.33	1.16
1.150	0.71	7.217	1.29	13.283	0.90	19.35	1.16
1.167	0.71	7.233	1.29	13.300	0.90	19.37	1.16
1.183	0.71	7.250	1.29	13.317	0.90	19.38	1.16
1.200	0.71	7.267	1.29	13.333	0.90	19.40	1.16
1.217	0.71	7.283	1.29	13.350	0.90	19.42	1.16
1.233	0.71	7.300	1.29	13.367	0.90	19.43	1.16
1.250	0.71	7.317	1.29	13.383	0.90	19.45	1.16
1.267	0.71	7.333	1.29	13.400	0.90	19.47	1.16
1.283	0.71	7.350	1.29	13.417	0.90	19.48	1.16
1.300	0.71	7.367	1.29	13.433	0.90	19.50	1.16
1.317	0.71	7.383	1.29	13.450	0.90	19.52	1.16
1.333	0.71	7.400	1.29	13.467	0.90	19.53	1.16
1.350	0.71	7.417	1.29	13.483	0.90	19.55	1.16
1.367	0.71	7.433	1.29	13.500	0.90	19.57	1.16
1.383	0.71	7.450	1.29	13.517	0.90	19.58	1.16
1.400	0.71	7.467	1.29	13.533	0.90	19.60	1.16
1.417	0.71	7.483	1.29	13.550	0.90	19.62	1.16
1.433	0.71	7.500	1.29	13.567	0.90	19.63	1.16
1.450	0.71	7.517	1.29	13.583	0.90	19.65	1.16
1.467	0.71	7.533	1.29	13.600	0.90	19.67	1.16
1.483	0.71	7.550	1.29	13.617	0.90	19.68	1.16
1.500	0.71	7.567	1.29	13.633	0.90	19.70	1.16
1.517	0.71	7.583	1.29	13.650	0.90	19.72	1.16
1.533	0.71	7.600	1.29	13.667	0.90	19.73	1.16
1.550	0.71	7.617	1.29	13.683	0.90	19.75	1.16
1.567	0.71	7.633	1.29	13.700	0.90	19.77	1.16
1.583	0.71	7.650	1.29	13.717	0.90	19.78	1.16
1.600	0.71	7.667	1.29	13.733	0.90	19.80	1.16
1.617	0.71	7.683	1.29	13.750	0.90	19.82	1.16
1.633	0.71	7.700	1.29	13.767	5.29	19.83	1.16
1.650	0.71	7.717	1.29	13.783	5.30	19.85	1.16
1.667	0.71	7.733	1.29	13.800	5.30	19.87	1.16
1.683	0.71	7.750	1.29	13.817	5.30	19.88	1.16
1.700	0.71	7.767	1.29	13.833	5.30	19.90	1.16
1.717	0.71	7.783	1.29	13.850	5.30	19.92	1.16

Conservative Model Output (SCS)

1.733	0.71	7.800	1.29	13.867	5.30	19.93	1.16
1.750	0.71	7.817	1.29	13.883	5.30	19.95	1.16
1.767	0.71	7.833	1.29	13.900	5.30	19.97	1.16
1.783	0.71	7.850	1.29	13.917	5.30	19.98	1.16
1.800	0.71	7.867	1.29	13.933	5.30	20.00	1.16
1.817	0.71	7.883	1.29	13.950	5.30	20.02	1.16
1.833	0.71	7.900	1.29	13.967	5.30	20.03	1.16
1.850	0.71	7.917	1.29	13.983	5.30	20.05	1.16
1.867	0.71	7.933	1.29	14.000	5.30	20.07	1.16
1.883	0.71	7.950	1.29	14.017	5.30	20.08	1.16
1.900	0.71	7.967	1.29	14.033	5.30	20.10	1.16
1.917	0.71	7.983	1.29	14.050	5.30	20.12	1.16
1.933	0.71	8.000	1.29	14.067	5.30	20.13	1.16
1.950	0.71	8.017	1.29	14.083	5.30	20.15	1.16
1.967	0.71	8.033	1.29	14.100	5.30	20.17	1.16
1.983	0.71	8.050	1.29	14.117	5.30	20.18	1.16
2.000	0.71	8.067	1.29	14.133	5.30	20.20	1.16
2.017	0.71	8.083	1.29	14.150	5.30	20.22	1.16
2.033	0.71	8.100	1.29	14.167	5.30	20.23	1.16
2.050	0.71	8.117	1.29	14.183	5.30	20.25	1.16
2.067	0.71	8.133	1.29	14.200	5.30	20.27	0.78
2.083	0.71	8.150	1.29	14.217	5.30	20.28	0.78
2.100	0.71	8.167	1.29	14.233	5.30	20.30	0.78
2.117	0.71	8.183	1.29	14.250	5.30	20.32	0.78
2.133	0.71	8.200	1.29	14.267	1.95	20.33	0.78
2.150	0.71	8.217	1.29	14.283	1.94	20.35	0.78
2.167	0.71	8.233	1.29	14.300	1.94	20.37	0.78
2.183	0.71	8.250	1.29	14.317	1.94	20.38	0.78
2.200	0.71	8.267	1.74	14.333	1.94	20.40	0.78
2.217	0.71	8.283	1.74	14.350	1.94	20.42	0.78
2.233	0.71	8.300	1.74	14.367	1.94	20.43	0.78
2.250	0.71	8.317	1.74	14.383	1.94	20.45	0.78
2.267	0.84	8.333	1.74	14.400	1.94	20.47	0.78
2.283	0.84	8.350	1.74	14.417	1.94	20.48	0.78
2.300	0.84	8.367	1.74	14.433	1.94	20.50	0.78
2.317	0.84	8.383	1.74	14.450	1.94	20.52	0.78
2.333	0.84	8.400	1.74	14.467	1.94	20.53	0.78
2.350	0.84	8.417	1.74	14.483	1.94	20.55	0.78
2.367	0.84	8.433	1.74	14.500	1.94	20.57	0.78
2.383	0.84	8.450	1.74	14.517	1.94	20.58	0.78
2.400	0.84	8.467	1.74	14.533	1.94	20.60	0.78
2.417	0.84	8.483	1.74	14.550	1.94	20.62	0.78
2.433	0.84	8.500	1.74	14.567	1.94	20.63	0.78
2.450	0.84	8.517	1.74	14.583	1.94	20.65	0.78
2.467	0.84	8.533	1.74	14.600	1.94	20.67	0.78
2.483	0.84	8.550	1.74	14.617	1.94	20.68	0.78
2.500	0.84	8.567	1.74	14.633	1.94	20.70	0.78
2.517	0.84	8.583	1.74	14.650	1.94	20.72	0.78
2.533	0.84	8.600	1.74	14.667	1.94	20.73	0.78
2.550	0.84	8.617	1.74	14.683	1.94	20.75	0.78
2.567	0.84	8.633	1.74	14.700	1.94	20.77	0.78
2.583	0.84	8.650	1.74	14.717	1.94	20.78	0.78
2.600	0.84	8.667	1.74	14.733	1.94	20.80	0.78
2.617	0.84	8.683	1.74	14.750	1.94	20.82	0.78
2.633	0.84	8.700	1.74	14.767	1.94	20.83	0.78
2.650	0.84	8.717	1.74	14.783	1.94	20.85	0.78
2.667	0.84	8.733	1.74	14.800	1.94	20.87	0.78
2.683	0.84	8.750	1.74	14.817	1.94	20.88	0.78
2.700	0.84	8.767	1.74	14.833	1.94	20.90	0.78
2.717	0.84	8.783	1.74	14.850	1.94	20.92	0.78
2.733	0.84	8.800	1.74	14.867	1.94	20.93	0.78
2.750	0.84	8.817	1.74	14.883	1.94	20.95	0.78
2.767	0.84	8.833	1.74	14.900	1.94	20.97	0.78

Conservative Model Output (SCS)

2.783	0.84	8.850	1.74	14.917	1.94	20.98	0.78
2.800	0.84	8.867	1.74	14.933	1.94	21.00	0.78
2.817	0.84	8.883	1.74	14.950	1.94	21.02	0.78
2.833	0.84	8.900	1.74	14.967	1.94	21.03	0.78
2.850	0.84	8.917	1.74	14.983	1.94	21.05	0.78
2.867	0.84	8.933	1.74	15.000	1.94	21.07	0.78
2.883	0.84	8.950	1.74	15.017	1.94	21.08	0.78
2.900	0.84	8.967	1.74	15.033	1.94	21.10	0.78
2.917	0.84	8.983	1.74	15.050	1.94	21.12	0.78
2.933	0.84	9.000	1.74	15.067	1.94	21.13	0.78
2.950	0.84	9.017	1.74	15.083	1.94	21.15	0.78
2.967	0.84	9.033	1.74	15.100	1.94	21.17	0.78
2.983	0.84	9.050	1.74	15.117	1.94	21.18	0.78
3.000	0.84	9.067	1.74	15.133	1.94	21.20	0.78
3.017	0.84	9.083	1.74	15.150	1.94	21.22	0.78
3.033	0.84	9.100	1.74	15.167	1.94	21.23	0.78
3.050	0.84	9.117	1.74	15.183	1.94	21.25	0.78
3.067	0.84	9.133	1.74	15.200	1.94	21.27	0.78
3.083	0.84	9.150	1.74	15.217	1.94	21.28	0.78
3.100	0.84	9.167	1.74	15.233	1.94	21.30	0.78
3.117	0.84	9.183	1.74	15.250	1.94	21.32	0.78
3.133	0.84	9.200	1.74	15.267	1.94	21.33	0.78
3.150	0.84	9.217	1.74	15.283	1.94	21.35	0.78
3.167	0.84	9.233	1.74	15.300	1.94	21.37	0.78
3.183	0.84	9.250	1.74	15.317	1.94	21.38	0.78
3.200	0.84	9.267	2.07	15.333	1.94	21.40	0.78
3.217	0.84	9.283	2.07	15.350	1.94	21.42	0.78
3.233	0.84	9.300	2.07	15.367	1.94	21.43	0.78
3.250	0.84	9.317	2.07	15.383	1.94	21.45	0.78
3.267	0.84	9.333	2.07	15.400	1.94	21.47	0.78
3.283	0.84	9.350	2.07	15.417	1.94	21.48	0.78
3.300	0.84	9.367	2.07	15.433	1.94	21.50	0.78
3.317	0.84	9.383	2.07	15.450	1.94	21.52	0.78
3.333	0.84	9.400	2.07	15.467	1.94	21.53	0.78
3.350	0.84	9.417	2.07	15.483	1.94	21.55	0.78
3.367	0.84	9.433	2.07	15.500	1.94	21.57	0.78
3.383	0.84	9.450	2.07	15.517	1.94	21.58	0.78
3.400	0.84	9.467	2.07	15.533	1.94	21.60	0.78
3.417	0.84	9.483	2.07	15.550	1.94	21.62	0.78
3.433	0.84	9.500	2.07	15.567	1.94	21.63	0.78
3.450	0.84	9.517	2.07	15.583	1.94	21.65	0.78
3.467	0.84	9.533	2.07	15.600	1.94	21.67	0.78
3.483	0.84	9.550	2.07	15.617	1.94	21.68	0.78
3.500	0.84	9.567	2.07	15.633	1.94	21.70	0.78
3.517	0.84	9.583	2.07	15.650	1.94	21.72	0.78
3.533	0.84	9.600	2.07	15.667	1.94	21.73	0.78
3.550	0.84	9.617	2.07	15.683	1.94	21.75	0.78
3.567	0.84	9.633	2.07	15.700	1.94	21.77	0.78
3.583	0.84	9.650	2.07	15.717	1.94	21.78	0.78
3.600	0.84	9.667	2.07	15.733	1.94	21.80	0.78
3.617	0.84	9.683	2.07	15.750	1.94	21.82	0.78
3.633	0.84	9.700	2.07	15.767	1.94	21.83	0.78
3.650	0.84	9.717	2.07	15.783	1.94	21.85	0.78
3.667	0.84	9.733	2.07	15.800	1.94	21.87	0.78
3.683	0.84	9.750	2.07	15.817	1.94	21.88	0.78
3.700	0.84	9.767	2.33	15.833	1.94	21.90	0.78
3.717	0.84	9.783	2.33	15.850	1.94	21.92	0.78
3.733	0.84	9.800	2.33	15.867	1.94	21.93	0.78
3.750	0.84	9.817	2.33	15.883	1.94	21.95	0.78
3.767	0.84	9.833	2.33	15.900	1.94	21.97	0.78
3.783	0.84	9.850	2.33	15.917	1.94	21.98	0.78
3.800	0.84	9.867	2.33	15.933	1.94	22.00	0.78
3.817	0.84	9.883	2.33	15.950	1.94	22.02	0.78

Conservative Model Output (SCS)

3.833	0.84	9.900	2.33	15.967	1.94	22.03	0.78
3.850	0.84	9.917	2.33	15.983	1.94	22.05	0.78
3.867	0.84	9.933	2.33	16.000	1.94	22.07	0.78
3.883	0.84	9.950	2.33	16.017	1.94	22.08	0.78
3.900	0.84	9.967	2.33	16.033	1.94	22.10	0.78
3.917	0.84	9.983	2.33	16.050	1.94	22.12	0.78
3.933	0.84	10.000	2.33	16.067	1.94	22.13	0.78
3.950	0.84	10.017	2.33	16.083	1.94	22.15	0.78
3.967	0.84	10.033	2.33	16.100	1.94	22.17	0.78
3.983	0.84	10.050	2.33	16.117	1.94	22.18	0.78
4.000	0.84	10.067	2.33	16.133	1.94	22.20	0.78
4.017	0.84	10.083	2.33	16.150	1.94	22.22	0.78
4.033	0.84	10.100	2.33	16.167	1.94	22.23	0.78
4.050	0.84	10.117	2.33	16.183	1.94	22.25	0.78
4.067	0.84	10.133	2.33	16.200	1.94	22.27	0.78
4.083	0.84	10.150	2.33	16.217	1.94	22.28	0.78
4.100	0.84	10.167	2.33	16.233	1.94	22.30	0.78
4.117	0.84	10.183	2.33	16.250	1.94	22.32	0.78
4.133	0.84	10.200	2.33	16.267	1.17	22.33	0.78
4.150	0.84	10.217	2.33	16.283	1.16	22.35	0.78
4.167	0.84	10.233	2.33	16.300	1.16	22.37	0.78
4.183	0.84	10.250	2.33	16.317	1.16	22.38	0.78
4.200	0.84	10.267	2.97	16.333	1.16	22.40	0.78
4.217	0.84	10.283	2.97	16.350	1.16	22.42	0.78
4.233	0.84	10.300	2.97	16.367	1.16	22.43	0.78
4.250	0.84	10.317	2.97	16.383	1.16	22.45	0.78
4.267	1.03	10.333	2.97	16.400	1.16	22.47	0.78
4.283	1.03	10.350	2.97	16.417	1.16	22.48	0.78
4.300	1.03	10.367	2.97	16.433	1.16	22.50	0.78
4.317	1.03	10.383	2.97	16.450	1.16	22.52	0.78
4.333	1.03	10.400	2.97	16.467	1.16	22.53	0.78
4.350	1.03	10.417	2.97	16.483	1.16	22.55	0.78
4.367	1.03	10.433	2.97	16.500	1.16	22.57	0.78
4.383	1.03	10.450	2.97	16.517	1.16	22.58	0.78
4.400	1.03	10.467	2.97	16.533	1.16	22.60	0.78
4.417	1.03	10.483	2.97	16.550	1.16	22.62	0.78
4.433	1.03	10.500	2.97	16.567	1.16	22.63	0.78
4.450	1.03	10.517	2.97	16.583	1.16	22.65	0.78
4.467	1.03	10.533	2.97	16.600	1.16	22.67	0.78
4.483	1.03	10.550	2.97	16.617	1.16	22.68	0.78
4.500	1.03	10.567	2.97	16.633	1.16	22.70	0.78
4.517	1.03	10.583	2.97	16.650	1.16	22.72	0.78
4.533	1.03	10.600	2.97	16.667	1.16	22.73	0.78
4.550	1.03	10.617	2.97	16.683	1.16	22.75	0.78
4.567	1.03	10.633	2.97	16.700	1.16	22.77	0.78
4.583	1.03	10.650	2.97	16.717	1.16	22.78	0.78
4.600	1.03	10.667	2.97	16.733	1.16	22.80	0.78
4.617	1.03	10.683	2.97	16.750	1.16	22.82	0.78
4.633	1.03	10.700	2.97	16.767	1.16	22.83	0.78
4.650	1.03	10.717	2.97	16.783	1.16	22.85	0.78
4.667	1.03	10.733	2.97	16.800	1.16	22.87	0.78
4.683	1.03	10.750	2.97	16.817	1.16	22.88	0.78
4.700	1.03	10.767	4.01	16.833	1.16	22.90	0.78
4.717	1.03	10.783	4.01	16.850	1.16	22.92	0.78
4.733	1.03	10.800	4.01	16.867	1.16	22.93	0.78
4.750	1.03	10.817	4.01	16.883	1.16	22.95	0.78
4.767	1.03	10.833	4.01	16.900	1.16	22.97	0.78
4.783	1.03	10.850	4.01	16.917	1.16	22.98	0.78
4.800	1.03	10.867	4.01	16.933	1.16	23.00	0.78
4.817	1.03	10.883	4.01	16.950	1.16	23.02	0.78
4.833	1.03	10.900	4.01	16.967	1.16	23.03	0.78
4.850	1.03	10.917	4.01	16.983	1.16	23.05	0.78
4.867	1.03	10.933	4.01	17.000	1.16	23.07	0.78

Conservative Model Output (SCS)

4.883	1.03	10.950	4.01	17.017	1.16	23.08	0.78
4.900	1.03	10.967	4.01	17.033	1.16	23.10	0.78
4.917	1.03	10.983	4.01	17.050	1.16	23.12	0.78
4.933	1.03	11.000	4.01	17.067	1.16	23.13	0.78
4.950	1.03	11.017	4.01	17.083	1.16	23.15	0.78
4.967	1.03	11.033	4.01	17.100	1.16	23.17	0.78
4.983	1.03	11.050	4.01	17.117	1.16	23.18	0.78
5.000	1.03	11.067	4.01	17.133	1.16	23.20	0.78
5.017	1.03	11.083	4.01	17.150	1.16	23.22	0.78
5.033	1.03	11.100	4.01	17.167	1.16	23.23	0.78
5.050	1.03	11.117	4.01	17.183	1.16	23.25	0.78
5.067	1.03	11.133	4.01	17.200	1.16	23.27	0.78
5.083	1.03	11.150	4.01	17.217	1.16	23.28	0.78
5.100	1.03	11.167	4.01	17.233	1.16	23.30	0.78
5.117	1.03	11.183	4.01	17.250	1.16	23.32	0.78
5.133	1.03	11.200	4.01	17.267	1.16	23.33	0.78
5.150	1.03	11.217	4.01	17.283	1.16	23.35	0.78
5.167	1.03	11.233	4.01	17.300	1.16	23.37	0.78
5.183	1.03	11.250	4.01	17.317	1.16	23.38	0.78
5.200	1.03	11.267	6.20	17.333	1.16	23.40	0.78
5.217	1.03	11.283	6.20	17.350	1.16	23.42	0.78
5.233	1.03	11.300	6.20	17.367	1.16	23.43	0.78
5.250	1.03	11.317	6.20	17.383	1.16	23.45	0.78
5.267	1.03	11.333	6.20	17.400	1.16	23.47	0.78
5.283	1.03	11.350	6.20	17.417	1.16	23.48	0.78
5.300	1.03	11.367	6.20	17.433	1.16	23.50	0.78
5.317	1.03	11.383	6.20	17.450	1.16	23.52	0.78
5.333	1.03	11.400	6.20	17.467	1.16	23.53	0.78
5.350	1.03	11.417	6.20	17.483	1.16	23.55	0.78
5.367	1.03	11.433	6.20	17.500	1.16	23.57	0.78
5.383	1.03	11.450	6.20	17.517	1.16	23.58	0.78
5.400	1.03	11.467	6.20	17.533	1.16	23.60	0.78
5.417	1.03	11.483	6.20	17.550	1.16	23.62	0.78
5.433	1.03	11.500	6.20	17.567	1.16	23.63	0.78
5.450	1.03	11.517	6.20	17.583	1.16	23.65	0.78
5.467	1.03	11.533	6.20	17.600	1.16	23.67	0.78
5.483	1.03	11.550	6.20	17.617	1.16	23.68	0.78
5.500	1.03	11.567	6.20	17.633	1.16	23.70	0.78
5.517	1.03	11.583	6.20	17.650	1.16	23.72	0.78
5.533	1.03	11.600	6.20	17.667	1.16	23.73	0.78
5.550	1.03	11.617	6.20	17.683	1.16	23.75	0.78
5.567	1.03	11.633	6.20	17.700	1.16	23.77	0.78
5.583	1.03	11.650	6.20	17.717	1.16	23.78	0.78
5.600	1.03	11.667	6.20	17.733	1.16	23.80	0.78
5.617	1.03	11.683	6.20	17.750	1.16	23.82	0.78
5.633	1.03	11.700	6.20	17.767	1.16	23.83	0.78
5.650	1.03	11.717	6.20	17.783	1.16	23.85	0.78
5.667	1.03	11.733	6.20	17.800	1.16	23.87	0.78
5.683	1.03	11.750	6.20	17.817	1.16	23.88	0.78
5.700	1.03	11.767	26.86	17.833	1.16	23.90	0.78
5.717	1.03	11.783	26.87	17.850	1.16	23.92	0.78
5.733	1.03	11.800	26.87	17.867	1.16	23.93	0.78
5.750	1.03	11.817	26.87	17.883	1.16	23.95	0.78
5.767	1.03	11.833	26.87	17.900	1.16	23.97	0.78
5.783	1.03	11.850	26.87	17.917	1.16	23.98	0.78
5.800	1.03	11.867	26.87	17.933	1.16	24.00	0.78
5.817	1.03	11.883	26.87	17.950	1.16	24.02	0.78
5.833	1.03	11.900	26.87	17.967	1.16	24.03	0.78
5.850	1.03	11.917	26.87	17.983	1.16	24.05	0.78
5.867	1.03	11.933	26.87	18.000	1.16	24.07	0.78
5.883	1.03	11.950	26.87	18.017	1.16	24.08	0.78
5.900	1.03	11.967	26.87	18.033	1.16	24.10	0.78
5.917	1.03	11.983	26.87	18.050	1.16	24.12	0.78

5.933	1.03	12.000	26.87	18.067	1.16	24.13	0.78
5.950	1.03	12.017	71.29	18.083	1.16	24.15	0.78
5.967	1.03	12.033	71.32	18.100	1.16	24.17	0.78
5.983	1.03	12.050	71.32	18.117	1.16	24.18	0.78
6.000	1.03	12.067	71.32	18.133	1.16	24.20	0.78
6.017	1.03	12.083	71.32	18.150	1.16	24.22	0.78
6.033	1.03	12.100	71.32	18.167	1.16	24.23	0.78
6.050	1.03	12.117	71.32	18.183	1.16	24.25	0.78
6.067	1.03	12.133	71.32	18.200	1.16		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.238 (i)
TIME TO PEAK (hrs)= 12.633
RUNOFF VOLUME (mm)= 17.006
TOTAL RAINFALL (mm)= 64.603
RUNOFF COEFFICIENT = 0.263

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

CALIB STANDHYD (0001)	Area (ha)= 6.57		
ID= 1 DT= 1.0 min	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	1.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		71.32	20.11	
over (min)		5.00	7.00	
Storage Coeff. (min)=		4.56 (ii)	6.89 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.24	0.16	
				TOTALS
PEAK FLOW (cms)=		0.92	0.08	0.994 (iii)
TIME TO PEAK (hrs)=		12.25	12.28	12.25
RUNOFF VOLUME (mm)=		63.40	14.96	50.57
TOTAL RAINFALL (mm)=		64.60	64.60	64.60
RUNOFF COEFFICIENT =		0.98	0.23	0.78

(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 (0002)	Area (ha)= 4.32		
ID= 1 DT= 1.0 min	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	2.55	1.77
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	169.71	20.00

Conservative Model Output (SCS)

Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)	=	71.32	94.44	
over (min)		5.00	9.00	
Storage Coeff. (min)	=	4.02 (ii)	8.78 (ii)	
Unit Hyd. Tpeak (min)	=	5.00	9.00	
Unit Hyd. peak (cms)	=	0.28	0.13	
				TOTALS
PEAK FLOW (cms)	=	0.00	0.35	0.351 (iii)
TIME TO PEAK (hrs)	=	12.23	12.30	12.30
RUNOFF VOLUME (mm)	=	62.41	28.86	28.86
TOTAL RAINFALL (mm)	=	64.60	64.60	64.60
RUNOFF COEFFICIENT	=	0.97	0.45	0.45

***** 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 (0009)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):	6.57	0.994	12.25	50.57
+ ID2= 2 (0002):	4.32	0.351	12.30	28.86
ID = 3 (0009):	10.89	1.324	12.25	41.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0009):	10.89	1.324	12.25	41.96
+ ID2= 2 (0007):	7.90	0.238	12.63	17.01
ID = 1 (0009):	18.79	1.444	12.27	33.54

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
NASHYD (0008)
ID= 1 DT= 1.0 min

Area (ha)	=	11.10	Curve Number (CN)= 66.4
Ia (mm)	=	7.20	# of Linear Res.(N)= 3.00
U.H. Tp(hrs)	=	0.79	
Unit Hyd Qpeak (cms)	=	0.537	
PEAK FLOW (cms)	=	0.180 (i)	
TIME TO PEAK (hrs)	=	13.033	
RUNOFF VOLUME (mm)	=	13.078	
TOTAL RAINFALL (mm)	=	64.603	
RUNOFF COEFFICIENT	=	0.202	

Conservative Model Output (SCS)

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min	Area (ha)= 3.20	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	71.32	94.44	
over	(min)	5.00	9.00	
Storage Coeff.	(min)=	3.67 (ii)	8.44 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	9.00	
Unit Hyd. peak	(cms)=	0.30	0.13	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.26	0.264 (iii)
TIME TO PEAK	(hrs)=	12.22	12.30	12.30
RUNOFF VOLUME	(mm)=	62.41	28.86	28.86
TOTAL RAINFALL	(mm)=	64.60	64.60	64.60
RUNOFF COEFFICIENT	=	0.97	0.45	0.45

***** 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 (0004) ID= 1 DT= 1.0 min	Area (ha)= 2.70	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	71.32	20.11	
over	(min)	5.00	8.00	
Storage Coeff.	(min)=	3.49 (ii)	7.03 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	8.00	
Unit Hyd. peak	(cms)=	0.28	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.39	0.03	0.416 (iii)
TIME TO PEAK	(hrs)=	12.25	12.30	12.25
RUNOFF VOLUME	(mm)=	62.40	14.96	49.83
TOTAL RAINFALL	(mm)=	64.60	64.60	64.60
RUNOFF COEFFICIENT	=	0.97	0.23	0.77

Conservative Model Output (SCS)

(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 (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.264	12.30	28.86
+ ID2= 2 (0004):	2.70	0.416	12.25	49.83
ID = 3 (0010):	5.90	0.665	12.27	38.46

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	0.665	12.27	38.46
+ ID2= 2 (0008):	11.10	0.180	13.03	13.08
ID = 1 (0010):	17.00	0.717	12.27	24.85

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0010):	17.00	0.717	12.27	24.85
+ ID2= 2 (0009):	18.79	1.444	12.27	33.54
ID = 3 (0011):	35.79	2.161	12.27	29.41

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013) ID= 1 DT= 1.0 min	Area (ha)= 6.58 Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

	IMPERVIOUS	PERVIOUS (i)
Surface Area (ha)=	2.92	3.66
Dep. Storage (mm)=	2.00	5.00
Average Slope (%)=	1.00	2.00
Length (m)=	209.44	30.00
Mannings n =	0.013	0.250
Max.Eff.Inten.(mm/hr)=	71.32	27.85
over (min)	5.00	13.00
Storage Coeff. (min)=	4.56 (ii)	12.85 (ii)
Unit Hyd. Tpeak (min)=	5.00	13.00
Unit Hyd. peak (cms)=	0.24	0.09

Conservative Model Output (SCS)

				TOTALS
PEAK FLOW	(cms)=	0.42	0.17	0.563 (iii)
TIME TO PEAK	(hrs)=	12.25	12.37	12.27
RUNOFF VOLUME	(mm)=	62.41	17.39	32.61
TOTAL RAINFALL	(mm)=	64.60	64.60	64.60
RUNOFF COEFFICIENT	=	0.97	0.27	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 (0012)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	35.79	2.161	12.27	29.41
+ ID2= 2 (0013):	6.58	0.563	12.27	32.61
ID = 3 (0012):	42.37	2.724	12.27	29.91

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)
IN= 2---> OUT= 1
DT= 1.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0001	5.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0012)	42.370	2.724	12.27	29.91
OUTFLOW: ID= 1 (0014)	42.370	0.000	27.93	0.00

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=940.00
MAXIMUM STORAGE USED (ha.m.)= 1.2671

```
V    V   I    SSSSS  U   U    A    L
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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Conservative Model Output (SCS)
***** D E T A I L E D O U T P U T *****

Input filename: C:\Program Files (x86)\VH Suite 4.0\VO2\voin.dat

Output filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\556d3ab3-57db-49bf-856c-2e5fa0af2e80\scen
Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\556d3ab3-57db-49bf-856c-2e5fa0af2e80\scen

DATE: 03/29/2018 TIME: 03:42:04

USER:

COMMENTS: SCS 10 yr

****
** Run 03 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\47d29410-34f5-48cf-9093-3a26fcec05c9\79767444
Ptotal= 78.10 mm	Comments: 25yrSCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	1.56	12.75	11.25	19.00	1.41
0.50	0.86	6.75	1.56	13.00	5.78	19.25	1.41
0.75	0.86	7.00	1.56	13.25	5.78	19.50	1.41
1.00	0.86	7.25	1.56	13.50	1.09	19.75	1.41
1.25	0.86	7.50	1.56	13.75	1.09	20.00	1.41
1.50	0.86	7.75	1.56	14.00	6.40	20.25	1.41
1.75	0.86	8.00	1.56	14.25	6.40	20.50	0.94
2.00	0.86	8.25	1.56	14.50	2.34	20.75	0.94
2.25	0.86	8.50	2.11	14.75	2.34	21.00	0.94
2.50	1.01	8.75	2.11	15.00	2.34	21.25	0.94
2.75	1.01	9.00	2.11	15.25	2.34	21.50	0.94
3.00	1.01	9.25	2.11	15.50	2.34	21.75	0.94
3.25	1.01	9.50	2.50	15.75	2.34	22.00	0.94
3.50	1.01	9.75	2.50	16.00	2.34	22.25	0.94
3.75	1.01	10.00	2.81	16.25	2.34	22.50	0.94
4.00	1.01	10.25	2.81	16.50	1.41	22.75	0.94
4.25	1.01	10.50	3.59	16.75	1.41	23.00	0.94
4.50	1.25	10.75	3.59	17.00	1.41	23.25	0.94
4.75	1.25	11.00	4.84	17.25	1.41	23.50	0.94
5.00	1.25	11.25	4.84	17.50	1.41	23.75	0.94
5.25	1.25	11.50	7.50	17.75	1.41	24.00	0.94
5.50	1.25	11.75	7.50	18.00	1.41	24.25	0.94
5.75	1.25	12.00	32.49	18.25	1.41		
6.00	1.25	12.25	86.22	18.50	1.41		
6.25	1.25	12.50	11.25	18.75	1.41		

CALIB NASHYD (0007) ID= 1 DT= 1.0 min					
	Area	(ha)=	7.90	Curve Number	(CN)= 72.6
	Ia	(mm)=	6.50	# of Linear Res.	(N)= 3.00
	U.H. Tp	(hrs)=	0.46		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	1.25	12.150	86.22	18.22	1.41
0.033	0.00	6.100	1.25	12.167	86.22	18.23	1.41
0.050	0.00	6.117	1.25	12.183	86.22	18.25	1.41
0.067	0.00	6.133	1.25	12.200	86.22	18.27	1.41
0.083	0.00	6.150	1.25	12.217	86.22	18.28	1.41
0.100	0.00	6.167	1.25	12.233	86.22	18.30	1.41
0.117	0.00	6.183	1.25	12.250	86.22	18.32	1.41
0.133	0.00	6.200	1.25	12.267	11.32	18.33	1.41
0.150	0.00	6.217	1.25	12.283	11.25	18.35	1.41
0.167	0.00	6.233	1.25	12.300	11.25	18.37	1.41
0.183	0.00	6.250	1.25	12.317	11.25	18.38	1.41
0.200	0.00	6.267	1.56	12.333	11.25	18.40	1.41
0.217	0.00	6.283	1.56	12.350	11.25	18.42	1.41
0.233	0.00	6.300	1.56	12.367	11.25	18.43	1.41
0.250	0.00	6.317	1.56	12.383	11.25	18.45	1.41
0.267	0.86	6.333	1.56	12.400	11.25	18.47	1.41
0.283	0.86	6.350	1.56	12.417	11.25	18.48	1.41
0.300	0.86	6.367	1.56	12.433	11.25	18.50	1.41
0.317	0.86	6.383	1.56	12.450	11.25	18.52	1.41
0.333	0.86	6.400	1.56	12.467	11.25	18.53	1.41
0.350	0.86	6.417	1.56	12.483	11.25	18.55	1.41
0.367	0.86	6.433	1.56	12.500	11.25	18.57	1.41
0.383	0.86	6.450	1.56	12.517	11.25	18.58	1.41
0.400	0.86	6.467	1.56	12.533	11.25	18.60	1.41
0.417	0.86	6.483	1.56	12.550	11.25	18.62	1.41
0.433	0.86	6.500	1.56	12.567	11.25	18.63	1.41
0.450	0.86	6.517	1.56	12.583	11.25	18.65	1.41
0.467	0.86	6.533	1.56	12.600	11.25	18.67	1.41
0.483	0.86	6.550	1.56	12.617	11.25	18.68	1.41
0.500	0.86	6.567	1.56	12.633	11.25	18.70	1.41
0.517	0.86	6.583	1.56	12.650	11.25	18.72	1.41
0.533	0.86	6.600	1.56	12.667	11.25	18.73	1.41
0.550	0.86	6.617	1.56	12.683	11.25	18.75	1.41
0.567	0.86	6.633	1.56	12.700	11.25	18.77	1.41
0.583	0.86	6.650	1.56	12.717	11.25	18.78	1.41
0.600	0.86	6.667	1.56	12.733	11.25	18.80	1.41
0.617	0.86	6.683	1.56	12.750	11.25	18.82	1.41
0.633	0.86	6.700	1.56	12.767	5.79	18.83	1.41
0.650	0.86	6.717	1.56	12.783	5.78	18.85	1.41
0.667	0.86	6.733	1.56	12.800	5.78	18.87	1.41
0.683	0.86	6.750	1.56	12.817	5.78	18.88	1.41
0.700	0.86	6.767	1.56	12.833	5.78	18.90	1.41
0.717	0.86	6.783	1.56	12.850	5.78	18.92	1.41
0.733	0.86	6.800	1.56	12.867	5.78	18.93	1.41
0.750	0.86	6.817	1.56	12.883	5.78	18.95	1.41
0.767	0.86	6.833	1.56	12.900	5.78	18.97	1.41
0.783	0.86	6.850	1.56	12.917	5.78	18.98	1.41
0.800	0.86	6.867	1.56	12.933	5.78	19.00	1.41
0.817	0.86	6.883	1.56	12.950	5.78	19.02	1.41

Conservative Model Output (SCS)

0.833	0.86	6.900	1.56	12.967	5.78	19.03	1.41
0.850	0.86	6.917	1.56	12.983	5.78	19.05	1.41
0.867	0.86	6.933	1.56	13.000	5.78	19.07	1.41
0.883	0.86	6.950	1.56	13.017	5.78	19.08	1.41
0.900	0.86	6.967	1.56	13.033	5.78	19.10	1.41
0.917	0.86	6.983	1.56	13.050	5.78	19.12	1.41
0.933	0.86	7.000	1.56	13.067	5.78	19.13	1.41
0.950	0.86	7.017	1.56	13.083	5.78	19.15	1.41
0.967	0.86	7.033	1.56	13.100	5.78	19.17	1.41
0.983	0.86	7.050	1.56	13.117	5.78	19.18	1.41
1.000	0.86	7.067	1.56	13.133	5.78	19.20	1.41
1.017	0.86	7.083	1.56	13.150	5.78	19.22	1.41
1.033	0.86	7.100	1.56	13.167	5.78	19.23	1.41
1.050	0.86	7.117	1.56	13.183	5.78	19.25	1.41
1.067	0.86	7.133	1.56	13.200	5.78	19.27	1.41
1.083	0.86	7.150	1.56	13.217	5.78	19.28	1.41
1.100	0.86	7.167	1.56	13.233	5.78	19.30	1.41
1.117	0.86	7.183	1.56	13.250	5.78	19.32	1.41
1.133	0.86	7.200	1.56	13.267	1.10	19.33	1.41
1.150	0.86	7.217	1.56	13.283	1.09	19.35	1.41
1.167	0.86	7.233	1.56	13.300	1.09	19.37	1.41
1.183	0.86	7.250	1.56	13.317	1.09	19.38	1.41
1.200	0.86	7.267	1.56	13.333	1.09	19.40	1.41
1.217	0.86	7.283	1.56	13.350	1.09	19.42	1.41
1.233	0.86	7.300	1.56	13.367	1.09	19.43	1.41
1.250	0.86	7.317	1.56	13.383	1.09	19.45	1.41
1.267	0.86	7.333	1.56	13.400	1.09	19.47	1.41
1.283	0.86	7.350	1.56	13.417	1.09	19.48	1.41
1.300	0.86	7.367	1.56	13.433	1.09	19.50	1.41
1.317	0.86	7.383	1.56	13.450	1.09	19.52	1.41
1.333	0.86	7.400	1.56	13.467	1.09	19.53	1.41
1.350	0.86	7.417	1.56	13.483	1.09	19.55	1.41
1.367	0.86	7.433	1.56	13.500	1.09	19.57	1.41
1.383	0.86	7.450	1.56	13.517	1.09	19.58	1.41
1.400	0.86	7.467	1.56	13.533	1.09	19.60	1.41
1.417	0.86	7.483	1.56	13.550	1.09	19.62	1.41
1.433	0.86	7.500	1.56	13.567	1.09	19.63	1.41
1.450	0.86	7.517	1.56	13.583	1.09	19.65	1.41
1.467	0.86	7.533	1.56	13.600	1.09	19.67	1.41
1.483	0.86	7.550	1.56	13.617	1.09	19.68	1.41
1.500	0.86	7.567	1.56	13.633	1.09	19.70	1.41
1.517	0.86	7.583	1.56	13.650	1.09	19.72	1.41
1.533	0.86	7.600	1.56	13.667	1.09	19.73	1.41
1.550	0.86	7.617	1.56	13.683	1.09	19.75	1.41
1.567	0.86	7.633	1.56	13.700	1.09	19.77	1.41
1.583	0.86	7.650	1.56	13.717	1.09	19.78	1.41
1.600	0.86	7.667	1.56	13.733	1.09	19.80	1.41
1.617	0.86	7.683	1.56	13.750	1.09	19.82	1.41
1.633	0.86	7.700	1.56	13.767	6.39	19.83	1.41
1.650	0.86	7.717	1.56	13.783	6.40	19.85	1.41
1.667	0.86	7.733	1.56	13.800	6.40	19.87	1.41
1.683	0.86	7.750	1.56	13.817	6.40	19.88	1.41
1.700	0.86	7.767	1.56	13.833	6.40	19.90	1.41
1.717	0.86	7.783	1.56	13.850	6.40	19.92	1.41
1.733	0.86	7.800	1.56	13.867	6.40	19.93	1.41
1.750	0.86	7.817	1.56	13.883	6.40	19.95	1.41
1.767	0.86	7.833	1.56	13.900	6.40	19.97	1.41
1.783	0.86	7.850	1.56	13.917	6.40	19.98	1.41
1.800	0.86	7.867	1.56	13.933	6.40	20.00	1.41
1.817	0.86	7.883	1.56	13.950	6.40	20.02	1.41
1.833	0.86	7.900	1.56	13.967	6.40	20.03	1.41
1.850	0.86	7.917	1.56	13.983	6.40	20.05	1.41
1.867	0.86	7.933	1.56	14.000	6.40	20.07	1.41

1.883	0.86	7.950	1.56	14.017	6.40	20.08	1.41
1.900	0.86	7.967	1.56	14.033	6.40	20.10	1.41
1.917	0.86	7.983	1.56	14.050	6.40	20.12	1.41
1.933	0.86	8.000	1.56	14.067	6.40	20.13	1.41
1.950	0.86	8.017	1.56	14.083	6.40	20.15	1.41
1.967	0.86	8.033	1.56	14.100	6.40	20.17	1.41
1.983	0.86	8.050	1.56	14.117	6.40	20.18	1.41
2.000	0.86	8.067	1.56	14.133	6.40	20.20	1.41
2.017	0.86	8.083	1.56	14.150	6.40	20.22	1.41
2.033	0.86	8.100	1.56	14.167	6.40	20.23	1.41
2.050	0.86	8.117	1.56	14.183	6.40	20.25	1.41
2.067	0.86	8.133	1.56	14.200	6.40	20.27	0.94
2.083	0.86	8.150	1.56	14.217	6.40	20.28	0.94
2.100	0.86	8.167	1.56	14.233	6.40	20.30	0.94
2.117	0.86	8.183	1.56	14.250	6.40	20.32	0.94
2.133	0.86	8.200	1.56	14.267	2.35	20.33	0.94
2.150	0.86	8.217	1.56	14.283	2.34	20.35	0.94
2.167	0.86	8.233	1.56	14.300	2.34	20.37	0.94
2.183	0.86	8.250	1.56	14.317	2.34	20.38	0.94
2.200	0.86	8.267	2.11	14.333	2.34	20.40	0.94
2.217	0.86	8.283	2.11	14.350	2.34	20.42	0.94
2.233	0.86	8.300	2.11	14.367	2.34	20.43	0.94
2.250	0.86	8.317	2.11	14.383	2.34	20.45	0.94
2.267	1.01	8.333	2.11	14.400	2.34	20.47	0.94
2.283	1.01	8.350	2.11	14.417	2.34	20.48	0.94
2.300	1.01	8.367	2.11	14.433	2.34	20.50	0.94
2.317	1.01	8.383	2.11	14.450	2.34	20.52	0.94
2.333	1.01	8.400	2.11	14.467	2.34	20.53	0.94
2.350	1.01	8.417	2.11	14.483	2.34	20.55	0.94
2.367	1.01	8.433	2.11	14.500	2.34	20.57	0.94
2.383	1.01	8.450	2.11	14.517	2.34	20.58	0.94
2.400	1.01	8.467	2.11	14.533	2.34	20.60	0.94
2.417	1.01	8.483	2.11	14.550	2.34	20.62	0.94
2.433	1.01	8.500	2.11	14.567	2.34	20.63	0.94
2.450	1.01	8.517	2.11	14.583	2.34	20.65	0.94
2.467	1.01	8.533	2.11	14.600	2.34	20.67	0.94
2.483	1.01	8.550	2.11	14.617	2.34	20.68	0.94
2.500	1.01	8.567	2.11	14.633	2.34	20.70	0.94
2.517	1.01	8.583	2.11	14.650	2.34	20.72	0.94
2.533	1.01	8.600	2.11	14.667	2.34	20.73	0.94
2.550	1.01	8.617	2.11	14.683	2.34	20.75	0.94
2.567	1.01	8.633	2.11	14.700	2.34	20.77	0.94
2.583	1.01	8.650	2.11	14.717	2.34	20.78	0.94
2.600	1.01	8.667	2.11	14.733	2.34	20.80	0.94
2.617	1.01	8.683	2.11	14.750	2.34	20.82	0.94
2.633	1.01	8.700	2.11	14.767	2.34	20.83	0.94
2.650	1.01	8.717	2.11	14.783	2.34	20.85	0.94
2.667	1.01	8.733	2.11	14.800	2.34	20.87	0.94
2.683	1.01	8.750	2.11	14.817	2.34	20.88	0.94
2.700	1.01	8.767	2.11	14.833	2.34	20.90	0.94
2.717	1.01	8.783	2.11	14.850	2.34	20.92	0.94
2.733	1.01	8.800	2.11	14.867	2.34	20.93	0.94
2.750	1.01	8.817	2.11	14.883	2.34	20.95	0.94
2.767	1.01	8.833	2.11	14.900	2.34	20.97	0.94
2.783	1.01	8.850	2.11	14.917	2.34	20.98	0.94
2.800	1.01	8.867	2.11	14.933	2.34	21.00	0.94
2.817	1.01	8.883	2.11	14.950	2.34	21.02	0.94
2.833	1.01	8.900	2.11	14.967	2.34	21.03	0.94
2.850	1.01	8.917	2.11	14.983	2.34	21.05	0.94
2.867	1.01	8.933	2.11	15.000	2.34	21.07	0.94
2.883	1.01	8.950	2.11	15.017	2.34	21.08	0.94
2.900	1.01	8.967	2.11	15.033	2.34	21.10	0.94
2.917	1.01	8.983	2.11	15.050	2.34	21.12	0.94

2.933	1.01	9.000	2.11	15.067	2.34	21.13	0.94
2.950	1.01	9.017	2.11	15.083	2.34	21.15	0.94
2.967	1.01	9.033	2.11	15.100	2.34	21.17	0.94
2.983	1.01	9.050	2.11	15.117	2.34	21.18	0.94
3.000	1.01	9.067	2.11	15.133	2.34	21.20	0.94
3.017	1.01	9.083	2.11	15.150	2.34	21.22	0.94
3.033	1.01	9.100	2.11	15.167	2.34	21.23	0.94
3.050	1.01	9.117	2.11	15.183	2.34	21.25	0.94
3.067	1.01	9.133	2.11	15.200	2.34	21.27	0.94
3.083	1.01	9.150	2.11	15.217	2.34	21.28	0.94
3.100	1.01	9.167	2.11	15.233	2.34	21.30	0.94
3.117	1.01	9.183	2.11	15.250	2.34	21.32	0.94
3.133	1.01	9.200	2.11	15.267	2.34	21.33	0.94
3.150	1.01	9.217	2.11	15.283	2.34	21.35	0.94
3.167	1.01	9.233	2.11	15.300	2.34	21.37	0.94
3.183	1.01	9.250	2.11	15.317	2.34	21.38	0.94
3.200	1.01	9.267	2.50	15.333	2.34	21.40	0.94
3.217	1.01	9.283	2.50	15.350	2.34	21.42	0.94
3.233	1.01	9.300	2.50	15.367	2.34	21.43	0.94
3.250	1.01	9.317	2.50	15.383	2.34	21.45	0.94
3.267	1.01	9.333	2.50	15.400	2.34	21.47	0.94
3.283	1.01	9.350	2.50	15.417	2.34	21.48	0.94
3.300	1.01	9.367	2.50	15.433	2.34	21.50	0.94
3.317	1.01	9.383	2.50	15.450	2.34	21.52	0.94
3.333	1.01	9.400	2.50	15.467	2.34	21.53	0.94
3.350	1.01	9.417	2.50	15.483	2.34	21.55	0.94
3.367	1.01	9.433	2.50	15.500	2.34	21.57	0.94
3.383	1.01	9.450	2.50	15.517	2.34	21.58	0.94
3.400	1.01	9.467	2.50	15.533	2.34	21.60	0.94
3.417	1.01	9.483	2.50	15.550	2.34	21.62	0.94
3.433	1.01	9.500	2.50	15.567	2.34	21.63	0.94
3.450	1.01	9.517	2.50	15.583	2.34	21.65	0.94
3.467	1.01	9.533	2.50	15.600	2.34	21.67	0.94
3.483	1.01	9.550	2.50	15.617	2.34	21.68	0.94
3.500	1.01	9.567	2.50	15.633	2.34	21.70	0.94
3.517	1.01	9.583	2.50	15.650	2.34	21.72	0.94
3.533	1.01	9.600	2.50	15.667	2.34	21.73	0.94
3.550	1.01	9.617	2.50	15.683	2.34	21.75	0.94
3.567	1.01	9.633	2.50	15.700	2.34	21.77	0.94
3.583	1.01	9.650	2.50	15.717	2.34	21.78	0.94
3.600	1.01	9.667	2.50	15.733	2.34	21.80	0.94
3.617	1.01	9.683	2.50	15.750	2.34	21.82	0.94
3.633	1.01	9.700	2.50	15.767	2.34	21.83	0.94
3.650	1.01	9.717	2.50	15.783	2.34	21.85	0.94
3.667	1.01	9.733	2.50	15.800	2.34	21.87	0.94
3.683	1.01	9.750	2.50	15.817	2.34	21.88	0.94
3.700	1.01	9.767	2.81	15.833	2.34	21.90	0.94
3.717	1.01	9.783	2.81	15.850	2.34	21.92	0.94
3.733	1.01	9.800	2.81	15.867	2.34	21.93	0.94
3.750	1.01	9.817	2.81	15.883	2.34	21.95	0.94
3.767	1.01	9.833	2.81	15.900	2.34	21.97	0.94
3.783	1.01	9.850	2.81	15.917	2.34	21.98	0.94
3.800	1.01	9.867	2.81	15.933	2.34	22.00	0.94
3.817	1.01	9.883	2.81	15.950	2.34	22.02	0.94
3.833	1.01	9.900	2.81	15.967	2.34	22.03	0.94
3.850	1.01	9.917	2.81	15.983	2.34	22.05	0.94
3.867	1.01	9.933	2.81	16.000	2.34	22.07	0.94
3.883	1.01	9.950	2.81	16.017	2.34	22.08	0.94
3.900	1.01	9.967	2.81	16.033	2.34	22.10	0.94
3.917	1.01	9.983	2.81	16.050	2.34	22.12	0.94
3.933	1.01	10.000	2.81	16.067	2.34	22.13	0.94
3.950	1.01	10.017	2.81	16.083	2.34	22.15	0.94
3.967	1.01	10.033	2.81	16.100	2.34	22.17	0.94

Conservative Model Output (SCS)

3.983	1.01	10.050	2.81	16.117	2.34	22.18	0.94
4.000	1.01	10.067	2.81	16.133	2.34	22.20	0.94
4.017	1.01	10.083	2.81	16.150	2.34	22.22	0.94
4.033	1.01	10.100	2.81	16.167	2.34	22.23	0.94
4.050	1.01	10.117	2.81	16.183	2.34	22.25	0.94
4.067	1.01	10.133	2.81	16.200	2.34	22.27	0.94
4.083	1.01	10.150	2.81	16.217	2.34	22.28	0.94
4.100	1.01	10.167	2.81	16.233	2.34	22.30	0.94
4.117	1.01	10.183	2.81	16.250	2.34	22.32	0.94
4.133	1.01	10.200	2.81	16.267	1.41	22.33	0.94
4.150	1.01	10.217	2.81	16.283	1.41	22.35	0.94
4.167	1.01	10.233	2.81	16.300	1.41	22.37	0.94
4.183	1.01	10.250	2.81	16.317	1.41	22.38	0.94
4.200	1.01	10.267	3.59	16.333	1.41	22.40	0.94
4.217	1.01	10.283	3.59	16.350	1.41	22.42	0.94
4.233	1.01	10.300	3.59	16.367	1.41	22.43	0.94
4.250	1.01	10.317	3.59	16.383	1.41	22.45	0.94
4.267	1.25	10.333	3.59	16.400	1.41	22.47	0.94
4.283	1.25	10.350	3.59	16.417	1.41	22.48	0.94
4.300	1.25	10.367	3.59	16.433	1.41	22.50	0.94
4.317	1.25	10.383	3.59	16.450	1.41	22.52	0.94
4.333	1.25	10.400	3.59	16.467	1.41	22.53	0.94
4.350	1.25	10.417	3.59	16.483	1.41	22.55	0.94
4.367	1.25	10.433	3.59	16.500	1.41	22.57	0.94
4.383	1.25	10.450	3.59	16.517	1.41	22.58	0.94
4.400	1.25	10.467	3.59	16.533	1.41	22.60	0.94
4.417	1.25	10.483	3.59	16.550	1.41	22.62	0.94
4.433	1.25	10.500	3.59	16.567	1.41	22.63	0.94
4.450	1.25	10.517	3.59	16.583	1.41	22.65	0.94
4.467	1.25	10.533	3.59	16.600	1.41	22.67	0.94
4.483	1.25	10.550	3.59	16.617	1.41	22.68	0.94
4.500	1.25	10.567	3.59	16.633	1.41	22.70	0.94
4.517	1.25	10.583	3.59	16.650	1.41	22.72	0.94
4.533	1.25	10.600	3.59	16.667	1.41	22.73	0.94
4.550	1.25	10.617	3.59	16.683	1.41	22.75	0.94
4.567	1.25	10.633	3.59	16.700	1.41	22.77	0.94
4.583	1.25	10.650	3.59	16.717	1.41	22.78	0.94
4.600	1.25	10.667	3.59	16.733	1.41	22.80	0.94
4.617	1.25	10.683	3.59	16.750	1.41	22.82	0.94
4.633	1.25	10.700	3.59	16.767	1.41	22.83	0.94
4.650	1.25	10.717	3.59	16.783	1.41	22.85	0.94
4.667	1.25	10.733	3.59	16.800	1.41	22.87	0.94
4.683	1.25	10.750	3.59	16.817	1.41	22.88	0.94
4.700	1.25	10.767	4.84	16.833	1.41	22.90	0.94
4.717	1.25	10.783	4.84	16.850	1.41	22.92	0.94
4.733	1.25	10.800	4.84	16.867	1.41	22.93	0.94
4.750	1.25	10.817	4.84	16.883	1.41	22.95	0.94
4.767	1.25	10.833	4.84	16.900	1.41	22.97	0.94
4.783	1.25	10.850	4.84	16.917	1.41	22.98	0.94
4.800	1.25	10.867	4.84	16.933	1.41	23.00	0.94
4.817	1.25	10.883	4.84	16.950	1.41	23.02	0.94
4.833	1.25	10.900	4.84	16.967	1.41	23.03	0.94
4.850	1.25	10.917	4.84	16.983	1.41	23.05	0.94
4.867	1.25	10.933	4.84	17.000	1.41	23.07	0.94
4.883	1.25	10.950	4.84	17.017	1.41	23.08	0.94
4.900	1.25	10.967	4.84	17.033	1.41	23.10	0.94
4.917	1.25	10.983	4.84	17.050	1.41	23.12	0.94
4.933	1.25	11.000	4.84	17.067	1.41	23.13	0.94
4.950	1.25	11.017	4.84	17.083	1.41	23.15	0.94
4.967	1.25	11.033	4.84	17.100	1.41	23.17	0.94
4.983	1.25	11.050	4.84	17.117	1.41	23.18	0.94
5.000	1.25	11.067	4.84	17.133	1.41	23.20	0.94
5.017	1.25	11.083	4.84	17.150	1.41	23.22	0.94

Conservative Model Output (SCS)

5.033	1.25	11.100	4.84	17.167	1.41	23.23	0.94
5.050	1.25	11.117	4.84	17.183	1.41	23.25	0.94
5.067	1.25	11.133	4.84	17.200	1.41	23.27	0.94
5.083	1.25	11.150	4.84	17.217	1.41	23.28	0.94
5.100	1.25	11.167	4.84	17.233	1.41	23.30	0.94
5.117	1.25	11.183	4.84	17.250	1.41	23.32	0.94
5.133	1.25	11.200	4.84	17.267	1.41	23.33	0.94
5.150	1.25	11.217	4.84	17.283	1.41	23.35	0.94
5.167	1.25	11.233	4.84	17.300	1.41	23.37	0.94
5.183	1.25	11.250	4.84	17.317	1.41	23.38	0.94
5.200	1.25	11.267	7.50	17.333	1.41	23.40	0.94
5.217	1.25	11.283	7.50	17.350	1.41	23.42	0.94
5.233	1.25	11.300	7.50	17.367	1.41	23.43	0.94
5.250	1.25	11.317	7.50	17.383	1.41	23.45	0.94
5.267	1.25	11.333	7.50	17.400	1.41	23.47	0.94
5.283	1.25	11.350	7.50	17.417	1.41	23.48	0.94
5.300	1.25	11.367	7.50	17.433	1.41	23.50	0.94
5.317	1.25	11.383	7.50	17.450	1.41	23.52	0.94
5.333	1.25	11.400	7.50	17.467	1.41	23.53	0.94
5.350	1.25	11.417	7.50	17.483	1.41	23.55	0.94
5.367	1.25	11.433	7.50	17.500	1.41	23.57	0.94
5.383	1.25	11.450	7.50	17.517	1.41	23.58	0.94
5.400	1.25	11.467	7.50	17.533	1.41	23.60	0.94
5.417	1.25	11.483	7.50	17.550	1.41	23.62	0.94
5.433	1.25	11.500	7.50	17.567	1.41	23.63	0.94
5.450	1.25	11.517	7.50	17.583	1.41	23.65	0.94
5.467	1.25	11.533	7.50	17.600	1.41	23.67	0.94
5.483	1.25	11.550	7.50	17.617	1.41	23.68	0.94
5.500	1.25	11.567	7.50	17.633	1.41	23.70	0.94
5.517	1.25	11.583	7.50	17.650	1.41	23.72	0.94
5.533	1.25	11.600	7.50	17.667	1.41	23.73	0.94
5.550	1.25	11.617	7.50	17.683	1.41	23.75	0.94
5.567	1.25	11.633	7.50	17.700	1.41	23.77	0.94
5.583	1.25	11.650	7.50	17.717	1.41	23.78	0.94
5.600	1.25	11.667	7.50	17.733	1.41	23.80	0.94
5.617	1.25	11.683	7.50	17.750	1.41	23.82	0.94
5.633	1.25	11.700	7.50	17.767	1.41	23.83	0.94
5.650	1.25	11.717	7.50	17.783	1.41	23.85	0.94
5.667	1.25	11.733	7.50	17.800	1.41	23.87	0.94
5.683	1.25	11.750	7.50	17.817	1.41	23.88	0.94
5.700	1.25	11.767	32.48	17.833	1.41	23.90	0.94
5.717	1.25	11.783	32.49	17.850	1.41	23.92	0.94
5.733	1.25	11.800	32.49	17.867	1.41	23.93	0.94
5.750	1.25	11.817	32.49	17.883	1.41	23.95	0.94
5.767	1.25	11.833	32.49	17.900	1.41	23.97	0.94
5.783	1.25	11.850	32.49	17.917	1.41	23.98	0.94
5.800	1.25	11.867	32.49	17.933	1.41	24.00	0.94
5.817	1.25	11.883	32.49	17.950	1.41	24.02	0.94
5.833	1.25	11.900	32.49	17.967	1.41	24.03	0.94
5.850	1.25	11.917	32.49	17.983	1.41	24.05	0.94
5.867	1.25	11.933	32.49	18.000	1.41	24.07	0.94
5.883	1.25	11.950	32.49	18.017	1.41	24.08	0.94
5.900	1.25	11.967	32.49	18.033	1.41	24.10	0.94
5.917	1.25	11.983	32.49	18.050	1.41	24.12	0.94
5.933	1.25	12.000	32.49	18.067	1.41	24.13	0.94
5.950	1.25	12.017	86.18	18.083	1.41	24.15	0.94
5.967	1.25	12.033	86.22	18.100	1.41	24.17	0.94
5.983	1.25	12.050	86.22	18.117	1.41	24.18	0.94
6.000	1.25	12.067	86.22	18.133	1.41	24.20	0.94
6.017	1.25	12.083	86.22	18.150	1.41	24.22	0.94
6.033	1.25	12.100	86.22	18.167	1.41	24.23	0.94
6.050	1.25	12.117	86.22	18.183	1.41	24.25	0.94
6.067	1.25	12.133	86.22	18.200	1.41		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.336 (i)
TIME TO PEAK (hrs)= 12.617
RUNOFF VOLUME (mm)= 24.048
TOTAL RAINFALL (mm)= 78.102
RUNOFF COEFFICIENT = 0.308

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

CALIB	
STANDHYD (0001)	Area (ha)= 6.57
ID= 1 DT= 1.0 min	Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	1.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		86.22	28.64	
over (min)		5.00	7.00	
Storage Coeff.	(min)=	4.22 (ii)	6.39 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	7.00	
Unit Hyd. peak	(cms)=	0.25	0.17	
				TOTALS
PEAK FLOW	(cms)=	1.12	0.12	1.231 (iii)
TIME TO PEAK	(hrs)=	12.25	12.28	12.25
RUNOFF VOLUME	(mm)=	76.87	21.29	62.14
TOTAL RAINFALL	(mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT	=	0.98	0.27	0.80

(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 (0002)	Area (ha)= 4.32
ID= 1 DT= 1.0 min	Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		86.22	126.56	
over (min)		5.00	8.00	
Storage Coeff.	(min)=	3.72 (ii)	7.96 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	8.00	
Unit Hyd. peak	(cms)=	0.29	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.49	0.495 (iii)

Conservative Model Output (SCS)

TIME TO PEAK (hrs)=	12.23	12.28	12.28
RUNOFF VOLUME (mm)=	75.87	38.78	38.79
TOTAL RAINFALL (mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT =	0.97	0.50	0.50

***** 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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0001):	6.57	1.231	12.25	62.14
	+ ID2= 2 (0002):	4.32	0.495	12.28	38.79
	ID = 3 (0009):	10.89	1.707	12.25	52.88

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0009):	10.89	1.707	12.25	52.88
	+ ID2= 2 (0007):	7.90	0.336	12.62	24.05
	ID = 1 (0009):	18.79	1.879	12.27	43.52

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008)					
ID= 1 DT= 1.0 min	Area (ha)=	11.10	Curve Number (CN)=	66.4	
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.79			

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)=	0.259	(i)
TIME TO PEAK (hrs)=	13.017	
RUNOFF VOLUME (mm)=	18.880	
TOTAL RAINFALL (mm)=	78.102	
RUNOFF COEFFICIENT =	0.242	

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

CALIB STANDHYD (0003)					
ID= 1 DT= 1.0 min	Area (ha)=	3.20			
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00	

Conservative Model Output (SCS)

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		86.22	126.56	
over (min)		5.00	8.00	
Storage Coeff. (min)=		3.40 (ii)	7.64 (ii)	
Unit Hyd. Tpeak (min)=		5.00	8.00	
Unit Hyd. peak (cms)=		0.31	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.37	0.371 (iii)
TIME TO PEAK	(hrs)=	12.22	12.28	12.28
RUNOFF VOLUME	(mm)=	75.87	38.78	38.79
TOTAL RAINFALL	(mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT	=	0.97	0.50	0.50

***** 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 (0004)	Area (ha)=	2.70			
ID= 1 DT= 1.0 min	Total Imp(%)=	73.50	Dir. Conn.(%)=	73.50	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		86.22	28.64	
over (min)		5.00	7.00	
Storage Coeff. (min)=		3.23 (ii)	6.52 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.30	0.17	
				TOTALS
PEAK FLOW	(cms)=	0.47	0.05	0.515 (iii)
TIME TO PEAK	(hrs)=	12.25	12.28	12.25
RUNOFF VOLUME	(mm)=	75.87	21.29	61.40
TOTAL RAINFALL	(mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT	=	0.97	0.27	0.79

(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 (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0003):		3.20	0.371	12.28	38.79
+ ID2= 2 (0004):		2.70	0.515	12.25	61.40
ID = 3 (0010):		5.90	0.872	12.25	49.14

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0010):		5.90	0.872	12.25	49.14
+ ID2= 2 (0008):		11.10	0.259	13.02	18.88
ID = 1 (0010):		17.00	0.949	12.27	33.42

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0010):		17.00	0.949	12.27	33.42
+ ID2= 2 (0009):		18.79	1.879	12.27	43.52
ID = 3 (0011):		35.79	2.828	12.27	38.72

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013) ID= 1 DT= 1.0 min	Area (ha)= 6.58	Total Imp(%)= 44.40	Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		86.22	39.17	
over (min)		5.00	12.00	
Storage Coeff.	(min)=	4.22 (ii)	11.91 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	12.00	
Unit Hyd. peak	(cms)=	0.25	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.52	0.26	0.732 (iii)
TIME TO PEAK	(hrs)=	12.25	12.35	12.27
RUNOFF VOLUME	(mm)=	75.86	24.45	41.83
TOTAL RAINFALL	(mm)=	78.10	78.10	78.10
RUNOFF COEFFICIENT	=	0.97	0.31	0.54

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

```
                        Conservative Model Output (SCS)
          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  (  0012)|
|   1 +  2 =  3    |          AREA      QPEAK      TPEAK       R.V.
--------------------          (ha)      (cms)      (hrs)       (mm)
       ID1= 1 (  0011):     35.79      2.828      12.27      38.72
     + ID2= 2 (  0013):      6.58      0.732      12.27      41.83
       ================================================================
       ID = 3 (  0012):     42.37      3.560      12.27      39.20

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW       STORAGE   |     OUTFLOW        STORAGE
--------------------         (cms)       (ha.m.)   |    (cms)          (ha.m.)
                             0.0000       0.0000   |      0.0001         5.0000

                                    AREA       QPEAK       TPEAK       R.V.
                                    (ha)       (cms)       (hrs)       (mm)
   INFLOW : ID= 2 (  0012)        42.370       3.560       12.27      39.20
   OUTFLOW: ID= 1 (  0014)        42.370       0.000       28.00       0.01

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                  TIME SHIFT OF PEAK FLOW          (min)=944.00
                  MAXIMUM  STORAGE   USED        (ha.m.)=  1.6609

--------------------------------------------------------------------------------
================================================================================
========================

       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\4c1e6
883-4992-4c69-aecc-26cd243b3226\scen
  Summary filename:
```

Conservative Model Output (SCS)
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\4c1e6883-4992-4c69-aecc-26cd243b3226\scen

DATE: 03/29/2018 TIME: 03:42:04

USER:

COMMENTS: SCS 25 year

****
** Run 04 **
****

READ STORM | Filename: C:\Users\bpowers\AppData\Local\Temp\47d29410-34f5-48cf-9093-3a26fcec05c9\44e43aad
Ptotal= 95.20 mm | Comments: 50yrSCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	1.90	12.75	13.71	19.00	1.71
0.50	1.05	6.75	1.90	13.00	7.04	19.25	1.71
0.75	1.05	7.00	1.90	13.25	7.04	19.50	1.71
1.00	1.05	7.25	1.90	13.50	1.33	19.75	1.71
1.25	1.05	7.50	1.90	13.75	1.33	20.00	1.71
1.50	1.05	7.75	1.90	14.00	7.81	20.25	1.71
1.75	1.05	8.00	1.90	14.25	7.81	20.50	1.14
2.00	1.05	8.25	1.90	14.50	2.86	20.75	1.14
2.25	1.05	8.50	2.57	14.75	2.86	21.00	1.14
2.50	1.24	8.75	2.57	15.00	2.86	21.25	1.14
2.75	1.24	9.00	2.57	15.25	2.86	21.50	1.14
3.00	1.24	9.25	2.57	15.50	2.86	21.75	1.14
3.25	1.24	9.50	3.05	15.75	2.86	22.00	1.14
3.50	1.24	9.75	3.05	16.00	2.86	22.25	1.14
3.75	1.24	10.00	3.43	16.25	2.86	22.50	1.14
4.00	1.24	10.25	3.43	16.50	1.71	22.75	1.14
4.25	1.24	10.50	4.38	16.75	1.71	23.00	1.14
4.50	1.52	10.75	4.38	17.00	1.71	23.25	1.14
4.75	1.52	11.00	5.90	17.25	1.71	23.50	1.14
5.00	1.52	11.25	5.90	17.50	1.71	23.75	1.14
5.25	1.52	11.50	9.14	17.75	1.71	24.00	1.14
5.50	1.52	11.75	9.14	18.00	1.71	24.25	1.14
5.75	1.52	12.00	39.60	18.25	1.71		
6.00	1.52	12.25	105.10	18.50	1.71		
6.25	1.52	12.50	13.71	18.75	1.71		

CALIB
NASHYD (0007) | Area (ha)= 7.90 Curve Number (CN)= 72.6
ID= 1 DT= 1.0 min | Ia (mm)= 6.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.46

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 MIN. TIME STEP.

Conservative Model Output (SCS)

---- TRANSFORMED HYETOGRAPH ----

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.017	0.00	6.083	1.52	12.150	105.10	18.22	1.71
0.033	0.00	6.100	1.52	12.167	105.10	18.23	1.71
0.050	0.00	6.117	1.52	12.183	105.10	18.25	1.71
0.067	0.00	6.133	1.52	12.200	105.10	18.27	1.71
0.083	0.00	6.150	1.52	12.217	105.10	18.28	1.71
0.100	0.00	6.167	1.52	12.233	105.10	18.30	1.71
0.117	0.00	6.183	1.52	12.250	105.10	18.32	1.71
0.133	0.00	6.200	1.52	12.267	13.79	18.33	1.71
0.150	0.00	6.217	1.52	12.283	13.71	18.35	1.71
0.167	0.00	6.233	1.52	12.300	13.71	18.37	1.71
0.183	0.00	6.250	1.52	12.317	13.71	18.38	1.71
0.200	0.00	6.267	1.90	12.333	13.71	18.40	1.71
0.217	0.00	6.283	1.90	12.350	13.71	18.42	1.71
0.233	0.00	6.300	1.90	12.367	13.71	18.43	1.71
0.250	0.00	6.317	1.90	12.383	13.71	18.45	1.71
0.267	1.05	6.333	1.90	12.400	13.71	18.47	1.71
0.283	1.05	6.350	1.90	12.417	13.71	18.48	1.71
0.300	1.05	6.367	1.90	12.433	13.71	18.50	1.71
0.317	1.05	6.383	1.90	12.450	13.71	18.52	1.71
0.333	1.05	6.400	1.90	12.467	13.71	18.53	1.71
0.350	1.05	6.417	1.90	12.483	13.71	18.55	1.71
0.367	1.05	6.433	1.90	12.500	13.71	18.57	1.71
0.383	1.05	6.450	1.90	12.517	13.71	18.58	1.71
0.400	1.05	6.467	1.90	12.533	13.71	18.60	1.71
0.417	1.05	6.483	1.90	12.550	13.71	18.62	1.71
0.433	1.05	6.500	1.90	12.567	13.71	18.63	1.71
0.450	1.05	6.517	1.90	12.583	13.71	18.65	1.71
0.467	1.05	6.533	1.90	12.600	13.71	18.67	1.71
0.483	1.05	6.550	1.90	12.617	13.71	18.68	1.71
0.500	1.05	6.567	1.90	12.633	13.71	18.70	1.71
0.517	1.05	6.583	1.90	12.650	13.71	18.72	1.71
0.533	1.05	6.600	1.90	12.667	13.71	18.73	1.71
0.550	1.05	6.617	1.90	12.683	13.71	18.75	1.71
0.567	1.05	6.633	1.90	12.700	13.71	18.77	1.71
0.583	1.05	6.650	1.90	12.717	13.71	18.78	1.71
0.600	1.05	6.667	1.90	12.733	13.71	18.80	1.71
0.617	1.05	6.683	1.90	12.750	13.71	18.82	1.71
0.633	1.05	6.700	1.90	12.767	7.05	18.83	1.71
0.650	1.05	6.717	1.90	12.783	7.04	18.85	1.71
0.667	1.05	6.733	1.90	12.800	7.04	18.87	1.71
0.683	1.05	6.750	1.90	12.817	7.04	18.88	1.71
0.700	1.05	6.767	1.90	12.833	7.04	18.90	1.71
0.717	1.05	6.783	1.90	12.850	7.04	18.92	1.71
0.733	1.05	6.800	1.90	12.867	7.04	18.93	1.71
0.750	1.05	6.817	1.90	12.883	7.04	18.95	1.71
0.767	1.05	6.833	1.90	12.900	7.04	18.97	1.71
0.783	1.05	6.850	1.90	12.917	7.04	18.98	1.71
0.800	1.05	6.867	1.90	12.933	7.04	19.00	1.71
0.817	1.05	6.883	1.90	12.950	7.04	19.02	1.71
0.833	1.05	6.900	1.90	12.967	7.04	19.03	1.71
0.850	1.05	6.917	1.90	12.983	7.04	19.05	1.71
0.867	1.05	6.933	1.90	13.000	7.04	19.07	1.71
0.883	1.05	6.950	1.90	13.017	7.04	19.08	1.71
0.900	1.05	6.967	1.90	13.033	7.04	19.10	1.71
0.917	1.05	6.983	1.90	13.050	7.04	19.12	1.71
0.933	1.05	7.000	1.90	13.067	7.04	19.13	1.71
0.950	1.05	7.017	1.90	13.083	7.04	19.15	1.71
0.967	1.05	7.033	1.90	13.100	7.04	19.17	1.71

Conservative Model Output (SCS)

0.983	1.05	7.050	1.90	13.117	7.04	19.18	1.71
1.000	1.05	7.067	1.90	13.133	7.04	19.20	1.71
1.017	1.05	7.083	1.90	13.150	7.04	19.22	1.71
1.033	1.05	7.100	1.90	13.167	7.04	19.23	1.71
1.050	1.05	7.117	1.90	13.183	7.04	19.25	1.71
1.067	1.05	7.133	1.90	13.200	7.04	19.27	1.71
1.083	1.05	7.150	1.90	13.217	7.04	19.28	1.71
1.100	1.05	7.167	1.90	13.233	7.04	19.30	1.71
1.117	1.05	7.183	1.90	13.250	7.04	19.32	1.71
1.133	1.05	7.200	1.90	13.267	1.34	19.33	1.71
1.150	1.05	7.217	1.90	13.283	1.33	19.35	1.71
1.167	1.05	7.233	1.90	13.300	1.33	19.37	1.71
1.183	1.05	7.250	1.90	13.317	1.33	19.38	1.71
1.200	1.05	7.267	1.90	13.333	1.33	19.40	1.71
1.217	1.05	7.283	1.90	13.350	1.33	19.42	1.71
1.233	1.05	7.300	1.90	13.367	1.33	19.43	1.71
1.250	1.05	7.317	1.90	13.383	1.33	19.45	1.71
1.267	1.05	7.333	1.90	13.400	1.33	19.47	1.71
1.283	1.05	7.350	1.90	13.417	1.33	19.48	1.71
1.300	1.05	7.367	1.90	13.433	1.33	19.50	1.71
1.317	1.05	7.383	1.90	13.450	1.33	19.52	1.71
1.333	1.05	7.400	1.90	13.467	1.33	19.53	1.71
1.350	1.05	7.417	1.90	13.483	1.33	19.55	1.71
1.367	1.05	7.433	1.90	13.500	1.33	19.57	1.71
1.383	1.05	7.450	1.90	13.517	1.33	19.58	1.71
1.400	1.05	7.467	1.90	13.533	1.33	19.60	1.71
1.417	1.05	7.483	1.90	13.550	1.33	19.62	1.71
1.433	1.05	7.500	1.90	13.567	1.33	19.63	1.71
1.450	1.05	7.517	1.90	13.583	1.33	19.65	1.71
1.467	1.05	7.533	1.90	13.600	1.33	19.67	1.71
1.483	1.05	7.550	1.90	13.617	1.33	19.68	1.71
1.500	1.05	7.567	1.90	13.633	1.33	19.70	1.71
1.517	1.05	7.583	1.90	13.650	1.33	19.72	1.71
1.533	1.05	7.600	1.90	13.667	1.33	19.73	1.71
1.550	1.05	7.617	1.90	13.683	1.33	19.75	1.71
1.567	1.05	7.633	1.90	13.700	1.33	19.77	1.71
1.583	1.05	7.650	1.90	13.717	1.33	19.78	1.71
1.600	1.05	7.667	1.90	13.733	1.33	19.80	1.71
1.617	1.05	7.683	1.90	13.750	1.33	19.82	1.71
1.633	1.05	7.700	1.90	13.767	7.79	19.83	1.71
1.650	1.05	7.717	1.90	13.783	7.81	19.85	1.71
1.667	1.05	7.733	1.90	13.800	7.81	19.87	1.71
1.683	1.05	7.750	1.90	13.817	7.81	19.88	1.71
1.700	1.05	7.767	1.90	13.833	7.81	19.90	1.71
1.717	1.05	7.783	1.90	13.850	7.81	19.92	1.71
1.733	1.05	7.800	1.90	13.867	7.81	19.93	1.71
1.750	1.05	7.817	1.90	13.883	7.81	19.95	1.71
1.767	1.05	7.833	1.90	13.900	7.81	19.97	1.71
1.783	1.05	7.850	1.90	13.917	7.81	19.98	1.71
1.800	1.05	7.867	1.90	13.933	7.81	20.00	1.71
1.817	1.05	7.883	1.90	13.950	7.81	20.02	1.71
1.833	1.05	7.900	1.90	13.967	7.81	20.03	1.71
1.850	1.05	7.917	1.90	13.983	7.81	20.05	1.71
1.867	1.05	7.933	1.90	14.000	7.81	20.07	1.71
1.883	1.05	7.950	1.90	14.017	7.81	20.08	1.71
1.900	1.05	7.967	1.90	14.033	7.81	20.10	1.71
1.917	1.05	7.983	1.90	14.050	7.81	20.12	1.71
1.933	1.05	8.000	1.90	14.067	7.81	20.13	1.71
1.950	1.05	8.017	1.90	14.083	7.81	20.15	1.71
1.967	1.05	8.033	1.90	14.100	7.81	20.17	1.71
1.983	1.05	8.050	1.90	14.117	7.81	20.18	1.71
2.000	1.05	8.067	1.90	14.133	7.81	20.20	1.71
2.017	1.05	8.083	1.90	14.150	7.81	20.22	1.71

Conservative Model Output (SCS)

2.033	1.05	8.100	1.90	14.167	7.81	20.23	1.71
2.050	1.05	8.117	1.90	14.183	7.81	20.25	1.71
2.067	1.05	8.133	1.90	14.200	7.81	20.27	1.15
2.083	1.05	8.150	1.90	14.217	7.81	20.28	1.14
2.100	1.05	8.167	1.90	14.233	7.81	20.30	1.14
2.117	1.05	8.183	1.90	14.250	7.81	20.32	1.14
2.133	1.05	8.200	1.90	14.267	2.87	20.33	1.14
2.150	1.05	8.217	1.90	14.283	2.86	20.35	1.14
2.167	1.05	8.233	1.90	14.300	2.86	20.37	1.14
2.183	1.05	8.250	1.91	14.317	2.86	20.38	1.14
2.200	1.05	8.267	2.57	14.333	2.86	20.40	1.14
2.217	1.05	8.283	2.57	14.350	2.86	20.42	1.14
2.233	1.05	8.300	2.57	14.367	2.86	20.43	1.14
2.250	1.05	8.317	2.57	14.383	2.86	20.45	1.14
2.267	1.24	8.333	2.57	14.400	2.86	20.47	1.14
2.283	1.24	8.350	2.57	14.417	2.86	20.48	1.14
2.300	1.24	8.367	2.57	14.433	2.86	20.50	1.14
2.317	1.24	8.383	2.57	14.450	2.86	20.52	1.14
2.333	1.24	8.400	2.57	14.467	2.86	20.53	1.14
2.350	1.24	8.417	2.57	14.483	2.86	20.55	1.14
2.367	1.24	8.433	2.57	14.500	2.86	20.57	1.14
2.383	1.24	8.450	2.57	14.517	2.86	20.58	1.14
2.400	1.24	8.467	2.57	14.533	2.86	20.60	1.14
2.417	1.24	8.483	2.57	14.550	2.86	20.62	1.14
2.433	1.24	8.500	2.57	14.567	2.86	20.63	1.14
2.450	1.24	8.517	2.57	14.583	2.86	20.65	1.14
2.467	1.24	8.533	2.57	14.600	2.86	20.67	1.14
2.483	1.24	8.550	2.57	14.617	2.86	20.68	1.14
2.500	1.24	8.567	2.57	14.633	2.86	20.70	1.14
2.517	1.24	8.583	2.57	14.650	2.86	20.72	1.14
2.533	1.24	8.600	2.57	14.667	2.86	20.73	1.14
2.550	1.24	8.617	2.57	14.683	2.86	20.75	1.14
2.567	1.24	8.633	2.57	14.700	2.86	20.77	1.14
2.583	1.24	8.650	2.57	14.717	2.86	20.78	1.14
2.600	1.24	8.667	2.57	14.733	2.86	20.80	1.14
2.617	1.24	8.683	2.57	14.750	2.86	20.82	1.14
2.633	1.24	8.700	2.57	14.767	2.86	20.83	1.14
2.650	1.24	8.717	2.57	14.783	2.86	20.85	1.14
2.667	1.24	8.733	2.57	14.800	2.86	20.87	1.14
2.683	1.24	8.750	2.57	14.817	2.86	20.88	1.14
2.700	1.24	8.767	2.57	14.833	2.86	20.90	1.14
2.717	1.24	8.783	2.57	14.850	2.86	20.92	1.14
2.733	1.24	8.800	2.57	14.867	2.86	20.93	1.14
2.750	1.24	8.817	2.57	14.883	2.86	20.95	1.14
2.767	1.24	8.833	2.57	14.900	2.86	20.97	1.14
2.783	1.24	8.850	2.57	14.917	2.86	20.98	1.14
2.800	1.24	8.867	2.57	14.933	2.86	21.00	1.14
2.817	1.24	8.883	2.57	14.950	2.86	21.02	1.14
2.833	1.24	8.900	2.57	14.967	2.86	21.03	1.14
2.850	1.24	8.917	2.57	14.983	2.86	21.05	1.14
2.867	1.24	8.933	2.57	15.000	2.86	21.07	1.14
2.883	1.24	8.950	2.57	15.017	2.86	21.08	1.14
2.900	1.24	8.967	2.57	15.033	2.86	21.10	1.14
2.917	1.24	8.983	2.57	15.050	2.86	21.12	1.14
2.933	1.24	9.000	2.57	15.067	2.86	21.13	1.14
2.950	1.24	9.017	2.57	15.083	2.86	21.15	1.14
2.967	1.24	9.033	2.57	15.100	2.86	21.17	1.14
2.983	1.24	9.050	2.57	15.117	2.86	21.18	1.14
3.000	1.24	9.067	2.57	15.133	2.86	21.20	1.14
3.017	1.24	9.083	2.57	15.150	2.86	21.22	1.14
3.033	1.24	9.100	2.57	15.167	2.86	21.23	1.14
3.050	1.24	9.117	2.57	15.183	2.86	21.25	1.14
3.067	1.24	9.133	2.57	15.200	2.86	21.27	1.14

3.083	1.24	9.150	2.57	15.217	2.86	21.28	1.14
3.100	1.24	9.167	2.57	15.233	2.86	21.30	1.14
3.117	1.24	9.183	2.57	15.250	2.86	21.32	1.14
3.133	1.24	9.200	2.57	15.267	2.86	21.33	1.14
3.150	1.24	9.217	2.57	15.283	2.86	21.35	1.14
3.167	1.24	9.233	2.57	15.300	2.86	21.37	1.14
3.183	1.24	9.250	2.57	15.317	2.86	21.38	1.14
3.200	1.24	9.267	3.05	15.333	2.86	21.40	1.14
3.217	1.24	9.283	3.05	15.350	2.86	21.42	1.14
3.233	1.24	9.300	3.05	15.367	2.86	21.43	1.14
3.250	1.24	9.317	3.05	15.383	2.86	21.45	1.14
3.267	1.24	9.333	3.05	15.400	2.86	21.47	1.14
3.283	1.24	9.350	3.05	15.417	2.86	21.48	1.14
3.300	1.24	9.367	3.05	15.433	2.86	21.50	1.14
3.317	1.24	9.383	3.05	15.450	2.86	21.52	1.14
3.333	1.24	9.400	3.05	15.467	2.86	21.53	1.14
3.350	1.24	9.417	3.05	15.483	2.86	21.55	1.14
3.367	1.24	9.433	3.05	15.500	2.86	21.57	1.14
3.383	1.24	9.450	3.05	15.517	2.86	21.58	1.14
3.400	1.24	9.467	3.05	15.533	2.86	21.60	1.14
3.417	1.24	9.483	3.05	15.550	2.86	21.62	1.14
3.433	1.24	9.500	3.05	15.567	2.86	21.63	1.14
3.450	1.24	9.517	3.05	15.583	2.86	21.65	1.14
3.467	1.24	9.533	3.05	15.600	2.86	21.67	1.14
3.483	1.24	9.550	3.05	15.617	2.86	21.68	1.14
3.500	1.24	9.567	3.05	15.633	2.86	21.70	1.14
3.517	1.24	9.583	3.05	15.650	2.86	21.72	1.14
3.533	1.24	9.600	3.05	15.667	2.86	21.73	1.14
3.550	1.24	9.617	3.05	15.683	2.86	21.75	1.14
3.567	1.24	9.633	3.05	15.700	2.86	21.77	1.14
3.583	1.24	9.650	3.05	15.717	2.86	21.78	1.14
3.600	1.24	9.667	3.05	15.733	2.86	21.80	1.14
3.617	1.24	9.683	3.05	15.750	2.86	21.82	1.14
3.633	1.24	9.700	3.05	15.767	2.86	21.83	1.14
3.650	1.24	9.717	3.05	15.783	2.86	21.85	1.14
3.667	1.24	9.733	3.05	15.800	2.86	21.87	1.14
3.683	1.24	9.750	3.05	15.817	2.86	21.88	1.14
3.700	1.24	9.767	3.43	15.833	2.86	21.90	1.14
3.717	1.24	9.783	3.43	15.850	2.86	21.92	1.14
3.733	1.24	9.800	3.43	15.867	2.86	21.93	1.14
3.750	1.24	9.817	3.43	15.883	2.86	21.95	1.14
3.767	1.24	9.833	3.43	15.900	2.86	21.97	1.14
3.783	1.24	9.850	3.43	15.917	2.86	21.98	1.14
3.800	1.24	9.867	3.43	15.933	2.86	22.00	1.14
3.817	1.24	9.883	3.43	15.950	2.86	22.02	1.14
3.833	1.24	9.900	3.43	15.967	2.86	22.03	1.14
3.850	1.24	9.917	3.43	15.983	2.86	22.05	1.14
3.867	1.24	9.933	3.43	16.000	2.86	22.07	1.14
3.883	1.24	9.950	3.43	16.017	2.86	22.08	1.14
3.900	1.24	9.967	3.43	16.033	2.86	22.10	1.14
3.917	1.24	9.983	3.43	16.050	2.86	22.12	1.14
3.933	1.24	10.000	3.43	16.067	2.86	22.13	1.14
3.950	1.24	10.017	3.43	16.083	2.86	22.15	1.14
3.967	1.24	10.033	3.43	16.100	2.86	22.17	1.14
3.983	1.24	10.050	3.43	16.117	2.86	22.18	1.14
4.000	1.24	10.067	3.43	16.133	2.86	22.20	1.14
4.017	1.24	10.083	3.43	16.150	2.86	22.22	1.14
4.033	1.24	10.100	3.43	16.167	2.86	22.23	1.14
4.050	1.24	10.117	3.43	16.183	2.86	22.25	1.14
4.067	1.24	10.133	3.43	16.200	2.86	22.27	1.14
4.083	1.24	10.150	3.43	16.217	2.86	22.28	1.14
4.100	1.24	10.167	3.43	16.233	2.86	22.30	1.14
4.117	1.24	10.183	3.43	16.250	2.86	22.32	1.14

Conservative Model Output (SCS)

4.133	1.24	10.200	3.43	16.267	1.72	22.33	1.14
4.150	1.24	10.217	3.43	16.283	1.71	22.35	1.14
4.167	1.24	10.233	3.43	16.300	1.71	22.37	1.14
4.183	1.24	10.250	3.43	16.317	1.71	22.38	1.14
4.200	1.24	10.267	4.38	16.333	1.71	22.40	1.14
4.217	1.24	10.283	4.38	16.350	1.71	22.42	1.14
4.233	1.24	10.300	4.38	16.367	1.71	22.43	1.14
4.250	1.24	10.317	4.38	16.383	1.71	22.45	1.14
4.267	1.52	10.333	4.38	16.400	1.71	22.47	1.14
4.283	1.52	10.350	4.38	16.417	1.71	22.48	1.14
4.300	1.52	10.367	4.38	16.433	1.71	22.50	1.14
4.317	1.52	10.383	4.38	16.450	1.71	22.52	1.14
4.333	1.52	10.400	4.38	16.467	1.71	22.53	1.14
4.350	1.52	10.417	4.38	16.483	1.71	22.55	1.14
4.367	1.52	10.433	4.38	16.500	1.71	22.57	1.14
4.383	1.52	10.450	4.38	16.517	1.71	22.58	1.14
4.400	1.52	10.467	4.38	16.533	1.71	22.60	1.14
4.417	1.52	10.483	4.38	16.550	1.71	22.62	1.14
4.433	1.52	10.500	4.38	16.567	1.71	22.63	1.14
4.450	1.52	10.517	4.38	16.583	1.71	22.65	1.14
4.467	1.52	10.533	4.38	16.600	1.71	22.67	1.14
4.483	1.52	10.550	4.38	16.617	1.71	22.68	1.14
4.500	1.52	10.567	4.38	16.633	1.71	22.70	1.14
4.517	1.52	10.583	4.38	16.650	1.71	22.72	1.14
4.533	1.52	10.600	4.38	16.667	1.71	22.73	1.14
4.550	1.52	10.617	4.38	16.683	1.71	22.75	1.14
4.567	1.52	10.633	4.38	16.700	1.71	22.77	1.14
4.583	1.52	10.650	4.38	16.717	1.71	22.78	1.14
4.600	1.52	10.667	4.38	16.733	1.71	22.80	1.14
4.617	1.52	10.683	4.38	16.750	1.71	22.82	1.14
4.633	1.52	10.700	4.38	16.767	1.71	22.83	1.14
4.650	1.52	10.717	4.38	16.783	1.71	22.85	1.14
4.667	1.52	10.733	4.38	16.800	1.71	22.87	1.14
4.683	1.52	10.750	4.38	16.817	1.71	22.88	1.14
4.700	1.52	10.767	5.90	16.833	1.71	22.90	1.14
4.717	1.52	10.783	5.90	16.850	1.71	22.92	1.14
4.733	1.52	10.800	5.90	16.867	1.71	22.93	1.14
4.750	1.52	10.817	5.90	16.883	1.71	22.95	1.14
4.767	1.52	10.833	5.90	16.900	1.71	22.97	1.14
4.783	1.52	10.850	5.90	16.917	1.71	22.98	1.14
4.800	1.52	10.867	5.90	16.933	1.71	23.00	1.14
4.817	1.52	10.883	5.90	16.950	1.71	23.02	1.14
4.833	1.52	10.900	5.90	16.967	1.71	23.03	1.14
4.850	1.52	10.917	5.90	16.983	1.71	23.05	1.14
4.867	1.52	10.933	5.90	17.000	1.71	23.07	1.14
4.883	1.52	10.950	5.90	17.017	1.71	23.08	1.14
4.900	1.52	10.967	5.90	17.033	1.71	23.10	1.14
4.917	1.52	10.983	5.90	17.050	1.71	23.12	1.14
4.933	1.52	11.000	5.90	17.067	1.71	23.13	1.14
4.950	1.52	11.017	5.90	17.083	1.71	23.15	1.14
4.967	1.52	11.033	5.90	17.100	1.71	23.17	1.14
4.983	1.52	11.050	5.90	17.117	1.71	23.18	1.14
5.000	1.52	11.067	5.90	17.133	1.71	23.20	1.14
5.017	1.52	11.083	5.90	17.150	1.71	23.22	1.14
5.033	1.52	11.100	5.90	17.167	1.71	23.23	1.14
5.050	1.52	11.117	5.90	17.183	1.71	23.25	1.14
5.067	1.52	11.133	5.90	17.200	1.71	23.27	1.14
5.083	1.52	11.150	5.90	17.217	1.71	23.28	1.14
5.100	1.52	11.167	5.90	17.233	1.71	23.30	1.14
5.117	1.52	11.183	5.90	17.250	1.71	23.32	1.14
5.133	1.52	11.200	5.90	17.267	1.71	23.33	1.14
5.150	1.52	11.217	5.90	17.283	1.71	23.35	1.14
5.167	1.52	11.233	5.90	17.300	1.71	23.37	1.14

5.183	1.52	11.250	5.90	17.317	1.71	23.38	1.14
5.200	1.52	11.267	9.14	17.333	1.71	23.40	1.14
5.217	1.52	11.283	9.14	17.350	1.71	23.42	1.14
5.233	1.52	11.300	9.14	17.367	1.71	23.43	1.14
5.250	1.52	11.317	9.14	17.383	1.71	23.45	1.14
5.267	1.52	11.333	9.14	17.400	1.71	23.47	1.14
5.283	1.52	11.350	9.14	17.417	1.71	23.48	1.14
5.300	1.52	11.367	9.14	17.433	1.71	23.50	1.14
5.317	1.52	11.383	9.14	17.450	1.71	23.52	1.14
5.333	1.52	11.400	9.14	17.467	1.71	23.53	1.14
5.350	1.52	11.417	9.14	17.483	1.71	23.55	1.14
5.367	1.52	11.433	9.14	17.500	1.71	23.57	1.14
5.383	1.52	11.450	9.14	17.517	1.71	23.58	1.14
5.400	1.52	11.467	9.14	17.533	1.71	23.60	1.14
5.417	1.52	11.483	9.14	17.550	1.71	23.62	1.14
5.433	1.52	11.500	9.14	17.567	1.71	23.63	1.14
5.450	1.52	11.517	9.14	17.583	1.71	23.65	1.14
5.467	1.52	11.533	9.14	17.600	1.71	23.67	1.14
5.483	1.52	11.550	9.14	17.617	1.71	23.68	1.14
5.500	1.52	11.567	9.14	17.633	1.71	23.70	1.14
5.517	1.52	11.583	9.14	17.650	1.71	23.72	1.14
5.533	1.52	11.600	9.14	17.667	1.71	23.73	1.14
5.550	1.52	11.617	9.14	17.683	1.71	23.75	1.14
5.567	1.52	11.633	9.14	17.700	1.71	23.77	1.14
5.583	1.52	11.650	9.14	17.717	1.71	23.78	1.14
5.600	1.52	11.667	9.14	17.733	1.71	23.80	1.14
5.617	1.52	11.683	9.14	17.750	1.71	23.82	1.14
5.633	1.52	11.700	9.14	17.767	1.71	23.83	1.14
5.650	1.52	11.717	9.14	17.783	1.71	23.85	1.14
5.667	1.52	11.733	9.14	17.800	1.71	23.87	1.14
5.683	1.52	11.750	9.14	17.817	1.71	23.88	1.14
5.700	1.52	11.767	39.59	17.833	1.71	23.90	1.14
5.717	1.52	11.783	39.60	17.850	1.71	23.92	1.14
5.733	1.52	11.800	39.60	17.867	1.71	23.93	1.14
5.750	1.52	11.817	39.60	17.883	1.71	23.95	1.14
5.767	1.52	11.833	39.60	17.900	1.71	23.97	1.14
5.783	1.52	11.850	39.60	17.917	1.71	23.98	1.14
5.800	1.52	11.867	39.60	17.933	1.71	24.00	1.14
5.817	1.52	11.883	39.60	17.950	1.71	24.02	1.14
5.833	1.52	11.900	39.60	17.967	1.71	24.03	1.14
5.850	1.52	11.917	39.60	17.983	1.71	24.05	1.14
5.867	1.52	11.933	39.60	18.000	1.71	24.07	1.14
5.883	1.52	11.950	39.60	18.017	1.71	24.08	1.14
5.900	1.52	11.967	39.60	18.033	1.71	24.10	1.14
5.917	1.52	11.983	39.60	18.050	1.71	24.12	1.14
5.933	1.52	12.000	39.60	18.067	1.71	24.13	1.14
5.950	1.52	12.017	105.06	18.083	1.71	24.15	1.14
5.967	1.52	12.033	105.10	18.100	1.71	24.17	1.14
5.983	1.52	12.050	105.10	18.117	1.71	24.18	1.14
6.000	1.52	12.067	105.10	18.133	1.71	24.20	1.14
6.017	1.52	12.083	105.10	18.150	1.71	24.22	1.14
6.033	1.52	12.100	105.10	18.167	1.71	24.23	1.14
6.050	1.52	12.117	105.10	18.183	1.71	24.25	1.14
6.067	1.52	12.133	105.10	18.200	1.71		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.474 (i)
TIME TO PEAK (hrs)= 12.617
RUNOFF VOLUME (mm)= 33.892
TOTAL RAINFALL (mm)= 95.200
RUNOFF COEFFICIENT = 0.356

Conservative Model Output (SCS)

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

CALIB STANDHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 6.57	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	1.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		105.10	40.82	
over (min)		5.00	6.00	
Storage Coeff.	(min)=	3.90 (ii)	5.90 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	6.00	
Unit Hyd. peak	(cms)=	0.26	0.19	
				TOTALS
PEAK FLOW	(cms)=	1.37	0.17	1.543 (iii)
TIME TO PEAK	(hrs)=	12.25	12.27	12.25
RUNOFF VOLUME	(mm)=	93.91	30.34	77.07
TOTAL RAINFALL	(mm)=	95.20	95.20	95.20
RUNOFF COEFFICIENT	=	0.99	0.32	0.81

(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 (0002) ID= 1 DT= 1.0 min	Area (ha)= 4.32	Total Imp(%)= 59.00	Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		105.10	169.54	
over (min)		5.00	8.00	
Storage Coeff.	(min)=	3.44 (ii)	7.21 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	8.00	
Unit Hyd. peak	(cms)=	0.30	0.15	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.69	0.685 (iii)
TIME TO PEAK	(hrs)=	12.25	12.28	12.28
RUNOFF VOLUME	(mm)=	92.91	52.18	52.19
TOTAL RAINFALL	(mm)=	95.20	95.20	95.20
RUNOFF COEFFICIENT	=	0.98	0.55	0.55

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:

Conservative Model Output (SCS)
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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		6.57	1.543	12.25	77.07
+ ID2= 2 (0002):		4.32	0.685	12.28	52.19
ID = 3 (0009):		10.89	2.207	12.25	67.20

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0009):		10.89	2.207	12.25	67.20
+ ID2= 2 (0007):		7.90	0.474	12.62	33.89
ID = 1 (0009):		18.79	2.452	12.27	56.87

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min					
	Area (ha)=	11.10	Curve Number (CN)=	66.4	
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00	
	U.H. Tp(hrs)=	0.79			

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.373 (i)
TIME TO PEAK (hrs)= 13.017
RUNOFF VOLUME (mm)= 27.168
TOTAL RAINFALL (mm)= 95.200
RUNOFF COEFFICIENT = 0.285

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min					
	Area (ha)=	3.20			
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	1.89	1.31
Dep. Storage	(mm)=	2.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	146.06	20.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		105.10	169.54
over (min)		5.00	7.00

Conservative Model Output (SCS)

Storage Coeff.	(min)=	3.14 (ii)	6.91 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	7.00	
Unit Hyd. peak	(cms)=	0.32	0.16	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.52	0.519 (iii)
TIME TO PEAK	(hrs)=	12.22	12.27	12.27
RUNOFF VOLUME	(mm)=	92.92	52.19	52.19
TOTAL RAINFALL	(mm)=	95.20	95.20	95.20
RUNOFF COEFFICIENT	=	0.98	0.55	0.55

***** 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 (0004)
ID= 1 DT= 1.0 min

Area (ha)= 2.70
Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	105.10	40.82	
over	(min)	5.00	7.00	
Storage Coeff.	(min)=	2.99 (ii)	6.02 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	7.00	
Unit Hyd. peak	(cms)=	0.31	0.18	
				TOTALS
PEAK FLOW	(cms)=	0.57	0.07	0.641 (iii)
TIME TO PEAK	(hrs)=	12.25	12.28	12.25
RUNOFF VOLUME	(mm)=	92.91	30.34	76.33
TOTAL RAINFALL	(mm)=	95.20	95.20	95.20
RUNOFF COEFFICIENT	=	0.98	0.32	0.80

(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 (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.519	12.27	52.19
+ ID2= 2 (0004):	2.70	0.641	12.25	76.33
ID = 3 (0010):	5.90	1.151	12.25	63.24

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0010):	5.90	1.151	12.25	63.24
	+ ID2= 2 (0008):	11.10	0.373	13.02	27.17
	ID = 1 (0010):	17.00	1.264	12.27	45.18

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0010):	17.00	1.264	12.27	45.18
	+ ID2= 2 (0009):	18.79	2.452	12.27	56.87
	ID = 3 (0011):	35.79	3.716	12.27	51.32

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013) ID= 1 DT= 1.0 min | Area (ha)= 6.58 | Total Imp(%)= 44.40 | Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		105.10	55.14	
over (min)		5.00	12.00	
Storage Coeff. (min)=		3.90 (ii)	11.01 (ii)	
Unit Hyd. Tpeak (min)=		5.00	12.00	
Unit Hyd. peak (cms)=		0.26	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.63	0.37	0.955 (iii)
TIME TO PEAK	(hrs)=	12.25	12.35	12.27
RUNOFF VOLUME	(mm)=	92.90	34.43	54.20
TOTAL RAINFALL	(mm)=	95.20	95.20	95.20
RUNOFF COEFFICIENT	=	0.98	0.36	0.57

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

ADD HYD (0012)

```
                                Conservative Model Output (SCS)
|   1 +  2 =  3    |              AREA      QPEAK       TPEAK        R.V.
--------------------              (ha)      (cms)       (hrs)        (mm)
        ID1= 1 (  0011):         35.79      3.716       12.27       51.32
      + ID2= 2 (  0013):          6.58      0.955       12.27       54.20
        ================================================================
        ID = 3 (  0012):         42.37      4.670       12.27       51.76

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |          OUTFLOW        STORAGE    |     OUTFLOW         STORAGE
--------------------           (cms)        (ha.m.)    |     (cms)          (ha.m.)
                               0.0000        0.0000    |       0.0001         5.0000

                                     AREA        QPEAK        TPEAK        R.V.
                                     (ha)        (cms)        (hrs)        (mm)
   INFLOW : ID= 2 (  0012)         42.370        4.670        12.27       51.76
   OUTFLOW: ID= 1 (  0014)         42.370        0.000        27.90        0.01

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                    TIME SHIFT OF PEAK FLOW          (min)=938.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=  2.1930

--------------------------------------------------------------------------------
================================================================================
========================

        V    V   I    SSSSS  U   U    A    L
        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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ef15b
87c-98a4-46c8-b8a1-4d39983c2dad\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\ef15b
87c-98a4-46c8-b8a1-4d39983c2dad\scen


DATE: 03/29/2018                                TIME: 03:42:04

USER:
```

Conservative Model Output (SCS)

COMMENTS: SCS 50 year

****
** Run 05 **
****

READ STORM | Filename: C:\Users\bpowers\AppData\Local\Temp\47d29410-34f5-48cf-9093-3a26fcec05c9\27db90fd
Ptotal=107.90 mm | Comments: 50yrSCS

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	2.16	12.75	15.54	19.00	1.94
0.50	1.19	6.75	2.16	13.00	7.99	19.25	1.94
0.75	1.19	7.00	2.16	13.25	7.99	19.50	1.94
1.00	1.19	7.25	2.16	13.50	1.51	19.75	1.94
1.25	1.19	7.50	2.16	13.75	1.51	20.00	1.94
1.50	1.19	7.75	2.16	14.00	8.85	20.25	1.94
1.75	1.19	8.00	2.16	14.25	8.85	20.50	1.29
2.00	1.19	8.25	2.16	14.50	3.24	20.75	1.29
2.25	1.19	8.50	2.91	14.75	3.24	21.00	1.29
2.50	1.40	8.75	2.91	15.00	3.24	21.25	1.29
2.75	1.40	9.00	2.91	15.25	3.24	21.50	1.29
3.00	1.40	9.25	2.91	15.50	3.24	21.75	1.29
3.25	1.40	9.50	3.45	15.75	3.24	22.00	1.29
3.50	1.40	9.75	3.45	16.00	3.24	22.25	1.29
3.75	1.40	10.00	3.88	16.25	3.24	22.50	1.29
4.00	1.40	10.25	3.88	16.50	1.94	22.75	1.29
4.25	1.40	10.50	4.96	16.75	1.94	23.00	1.29
4.50	1.73	10.75	4.96	17.00	1.94	23.25	1.29
4.75	1.73	11.00	6.69	17.25	1.94	23.50	1.29
5.00	1.73	11.25	6.69	17.50	1.94	23.75	1.29
5.25	1.73	11.50	10.36	17.75	1.94	24.00	1.29
5.50	1.73	11.75	10.36	18.00	1.94	24.25	1.29
5.75	1.73	12.00	44.89	18.25	1.94		
6.00	1.73	12.25	119.12	18.50	1.94		
6.25	1.73	12.50	15.54	18.75	1.94		

CALIB NASHYD (0007) | ID= 1 DT= 1.0 min

Area (ha)= 7.90 Curve Number (CN)= 72.6
Ia (mm)= 6.50 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.46

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	1.73	12.150	119.12	18.22	1.94
0.033	0.00	6.100	1.73	12.167	119.12	18.23	1.94
0.050	0.00	6.117	1.73	12.183	119.12	18.25	1.94
0.067	0.00	6.133	1.73	12.200	119.12	18.27	1.94

Conservative Model Output (SCS)

0.083	0.00	6.150	1.73	12.217	119.12	18.28	1.94
0.100	0.00	6.167	1.73	12.233	119.12	18.30	1.94
0.117	0.00	6.183	1.73	12.250	119.12	18.32	1.94
0.133	0.00	6.200	1.73	12.267	15.63	18.33	1.94
0.150	0.00	6.217	1.73	12.283	15.54	18.35	1.94
0.167	0.00	6.233	1.73	12.300	15.54	18.37	1.94
0.183	0.00	6.250	1.73	12.317	15.54	18.38	1.94
0.200	0.00	6.267	2.16	12.333	15.54	18.40	1.94
0.217	0.00	6.283	2.16	12.350	15.54	18.42	1.94
0.233	0.00	6.300	2.16	12.367	15.54	18.43	1.94
0.250	0.00	6.317	2.16	12.383	15.54	18.45	1.94
0.267	1.19	6.333	2.16	12.400	15.54	18.47	1.94
0.283	1.19	6.350	2.16	12.417	15.54	18.48	1.94
0.300	1.19	6.367	2.16	12.433	15.54	18.50	1.94
0.317	1.19	6.383	2.16	12.450	15.54	18.52	1.94
0.333	1.19	6.400	2.16	12.467	15.54	18.53	1.94
0.350	1.19	6.417	2.16	12.483	15.54	18.55	1.94
0.367	1.19	6.433	2.16	12.500	15.54	18.57	1.94
0.383	1.19	6.450	2.16	12.517	15.54	18.58	1.94
0.400	1.19	6.467	2.16	12.533	15.54	18.60	1.94
0.417	1.19	6.483	2.16	12.550	15.54	18.62	1.94
0.433	1.19	6.500	2.16	12.567	15.54	18.63	1.94
0.450	1.19	6.517	2.16	12.583	15.54	18.65	1.94
0.467	1.19	6.533	2.16	12.600	15.54	18.67	1.94
0.483	1.19	6.550	2.16	12.617	15.54	18.68	1.94
0.500	1.19	6.567	2.16	12.633	15.54	18.70	1.94
0.517	1.19	6.583	2.16	12.650	15.54	18.72	1.94
0.533	1.19	6.600	2.16	12.667	15.54	18.73	1.94
0.550	1.19	6.617	2.16	12.683	15.54	18.75	1.94
0.567	1.19	6.633	2.16	12.700	15.54	18.77	1.94
0.583	1.19	6.650	2.16	12.717	15.54	18.78	1.94
0.600	1.19	6.667	2.16	12.733	15.54	18.80	1.94
0.617	1.19	6.683	2.16	12.750	15.54	18.82	1.94
0.633	1.19	6.700	2.16	12.767	8.00	18.83	1.94
0.650	1.19	6.717	2.16	12.783	7.99	18.85	1.94
0.667	1.19	6.733	2.16	12.800	7.99	18.87	1.94
0.683	1.19	6.750	2.16	12.817	7.99	18.88	1.94
0.700	1.19	6.767	2.16	12.833	7.99	18.90	1.94
0.717	1.19	6.783	2.16	12.850	7.99	18.92	1.94
0.733	1.19	6.800	2.16	12.867	7.99	18.93	1.94
0.750	1.19	6.817	2.16	12.883	7.99	18.95	1.94
0.767	1.19	6.833	2.16	12.900	7.99	18.97	1.94
0.783	1.19	6.850	2.16	12.917	7.99	18.98	1.94
0.800	1.19	6.867	2.16	12.933	7.99	19.00	1.94
0.817	1.19	6.883	2.16	12.950	7.99	19.02	1.94
0.833	1.19	6.900	2.16	12.967	7.99	19.03	1.94
0.850	1.19	6.917	2.16	12.983	7.99	19.05	1.94
0.867	1.19	6.933	2.16	13.000	7.99	19.07	1.94
0.883	1.19	6.950	2.16	13.017	7.99	19.08	1.94
0.900	1.19	6.967	2.16	13.033	7.99	19.10	1.94
0.917	1.19	6.983	2.16	13.050	7.99	19.12	1.94
0.933	1.19	7.000	2.16	13.067	7.99	19.13	1.94
0.950	1.19	7.017	2.16	13.083	7.99	19.15	1.94
0.967	1.19	7.033	2.16	13.100	7.99	19.17	1.94
0.983	1.19	7.050	2.16	13.117	7.99	19.18	1.94
1.000	1.19	7.067	2.16	13.133	7.99	19.20	1.94
1.017	1.19	7.083	2.16	13.150	7.99	19.22	1.94
1.033	1.19	7.100	2.16	13.167	7.99	19.23	1.94
1.050	1.19	7.117	2.16	13.183	7.99	19.25	1.94
1.067	1.19	7.133	2.16	13.200	7.99	19.27	1.94
1.083	1.19	7.150	2.16	13.217	7.99	19.28	1.94
1.100	1.19	7.167	2.16	13.233	7.99	19.30	1.94
1.117	1.19	7.183	2.16	13.250	7.99	19.32	1.94

Conservative Model Output (SCS)

1.133	1.19	7.200	2.16	13.267	1.52	19.33	1.94
1.150	1.19	7.217	2.16	13.283	1.51	19.35	1.94
1.167	1.19	7.233	2.16	13.300	1.51	19.37	1.94
1.183	1.19	7.250	2.16	13.317	1.51	19.38	1.94
1.200	1.19	7.267	2.16	13.333	1.51	19.40	1.94
1.217	1.19	7.283	2.16	13.350	1.51	19.42	1.94
1.233	1.19	7.300	2.16	13.367	1.51	19.43	1.94
1.250	1.19	7.317	2.16	13.383	1.51	19.45	1.94
1.267	1.19	7.333	2.16	13.400	1.51	19.47	1.94
1.283	1.19	7.350	2.16	13.417	1.51	19.48	1.94
1.300	1.19	7.367	2.16	13.433	1.51	19.50	1.94
1.317	1.19	7.383	2.16	13.450	1.51	19.52	1.94
1.333	1.19	7.400	2.16	13.467	1.51	19.53	1.94
1.350	1.19	7.417	2.16	13.483	1.51	19.55	1.94
1.367	1.19	7.433	2.16	13.500	1.51	19.57	1.94
1.383	1.19	7.450	2.16	13.517	1.51	19.58	1.94
1.400	1.19	7.467	2.16	13.533	1.51	19.60	1.94
1.417	1.19	7.483	2.16	13.550	1.51	19.62	1.94
1.433	1.19	7.500	2.16	13.567	1.51	19.63	1.94
1.450	1.19	7.517	2.16	13.583	1.51	19.65	1.94
1.467	1.19	7.533	2.16	13.600	1.51	19.67	1.94
1.483	1.19	7.550	2.16	13.617	1.51	19.68	1.94
1.500	1.19	7.567	2.16	13.633	1.51	19.70	1.94
1.517	1.19	7.583	2.16	13.650	1.51	19.72	1.94
1.533	1.19	7.600	2.16	13.667	1.51	19.73	1.94
1.550	1.19	7.617	2.16	13.683	1.51	19.75	1.94
1.567	1.19	7.633	2.16	13.700	1.51	19.77	1.94
1.583	1.19	7.650	2.16	13.717	1.51	19.78	1.94
1.600	1.19	7.667	2.16	13.733	1.51	19.80	1.94
1.617	1.19	7.683	2.16	13.750	1.51	19.82	1.94
1.633	1.19	7.700	2.16	13.767	8.83	19.83	1.94
1.650	1.19	7.717	2.16	13.783	8.85	19.85	1.94
1.667	1.19	7.733	2.16	13.800	8.85	19.87	1.94
1.683	1.19	7.750	2.16	13.817	8.85	19.88	1.94
1.700	1.19	7.767	2.16	13.833	8.85	19.90	1.94
1.717	1.19	7.783	2.16	13.850	8.85	19.92	1.94
1.733	1.19	7.800	2.16	13.867	8.85	19.93	1.94
1.750	1.19	7.817	2.16	13.883	8.85	19.95	1.94
1.767	1.19	7.833	2.16	13.900	8.85	19.97	1.94
1.783	1.19	7.850	2.16	13.917	8.85	19.98	1.94
1.800	1.19	7.867	2.16	13.933	8.85	20.00	1.94
1.817	1.19	7.883	2.16	13.950	8.85	20.02	1.94
1.833	1.19	7.900	2.16	13.967	8.85	20.03	1.94
1.850	1.19	7.917	2.16	13.983	8.85	20.05	1.94
1.867	1.19	7.933	2.16	14.000	8.85	20.07	1.94
1.883	1.19	7.950	2.16	14.017	8.85	20.08	1.94
1.900	1.19	7.967	2.16	14.033	8.85	20.10	1.94
1.917	1.19	7.983	2.16	14.050	8.85	20.12	1.94
1.933	1.19	8.000	2.16	14.067	8.85	20.13	1.94
1.950	1.19	8.017	2.16	14.083	8.85	20.15	1.94
1.967	1.19	8.033	2.16	14.100	8.85	20.17	1.94
1.983	1.19	8.050	2.16	14.117	8.85	20.18	1.94
2.000	1.19	8.067	2.16	14.133	8.85	20.20	1.94
2.017	1.19	8.083	2.16	14.150	8.85	20.22	1.94
2.033	1.19	8.100	2.16	14.167	8.85	20.23	1.94
2.050	1.19	8.117	2.16	14.183	8.85	20.25	1.94
2.067	1.19	8.133	2.16	14.200	8.85	20.27	1.30
2.083	1.19	8.150	2.16	14.217	8.85	20.28	1.29
2.100	1.19	8.167	2.16	14.233	8.85	20.30	1.29
2.117	1.19	8.183	2.16	14.250	8.85	20.32	1.29
2.133	1.19	8.200	2.16	14.267	3.25	20.33	1.29
2.150	1.19	8.217	2.16	14.283	3.24	20.35	1.29
2.167	1.19	8.233	2.16	14.300	3.24	20.37	1.29

2.183	1.19	8.250	2.16	14.317	3.24	20.38	1.29
2.200	1.19	8.267	2.91	14.333	3.24	20.40	1.29
2.217	1.19	8.283	2.91	14.350	3.24	20.42	1.29
2.233	1.19	8.300	2.91	14.367	3.24	20.43	1.29
2.250	1.19	8.317	2.91	14.383	3.24	20.45	1.29
2.267	1.40	8.333	2.91	14.400	3.24	20.47	1.29
2.283	1.40	8.350	2.91	14.417	3.24	20.48	1.29
2.300	1.40	8.367	2.91	14.433	3.24	20.50	1.29
2.317	1.40	8.383	2.91	14.450	3.24	20.52	1.29
2.333	1.40	8.400	2.91	14.467	3.24	20.53	1.29
2.350	1.40	8.417	2.91	14.483	3.24	20.55	1.29
2.367	1.40	8.433	2.91	14.500	3.24	20.57	1.29
2.383	1.40	8.450	2.91	14.517	3.24	20.58	1.29
2.400	1.40	8.467	2.91	14.533	3.24	20.60	1.29
2.417	1.40	8.483	2.91	14.550	3.24	20.62	1.29
2.433	1.40	8.500	2.91	14.567	3.24	20.63	1.29
2.450	1.40	8.517	2.91	14.583	3.24	20.65	1.29
2.467	1.40	8.533	2.91	14.600	3.24	20.67	1.29
2.483	1.40	8.550	2.91	14.617	3.24	20.68	1.29
2.500	1.40	8.567	2.91	14.633	3.24	20.70	1.29
2.517	1.40	8.583	2.91	14.650	3.24	20.72	1.29
2.533	1.40	8.600	2.91	14.667	3.24	20.73	1.29
2.550	1.40	8.617	2.91	14.683	3.24	20.75	1.29
2.567	1.40	8.633	2.91	14.700	3.24	20.77	1.29
2.583	1.40	8.650	2.91	14.717	3.24	20.78	1.29
2.600	1.40	8.667	2.91	14.733	3.24	20.80	1.29
2.617	1.40	8.683	2.91	14.750	3.24	20.82	1.29
2.633	1.40	8.700	2.91	14.767	3.24	20.83	1.29
2.650	1.40	8.717	2.91	14.783	3.24	20.85	1.29
2.667	1.40	8.733	2.91	14.800	3.24	20.87	1.29
2.683	1.40	8.750	2.91	14.817	3.24	20.88	1.29
2.700	1.40	8.767	2.91	14.833	3.24	20.90	1.29
2.717	1.40	8.783	2.91	14.850	3.24	20.92	1.29
2.733	1.40	8.800	2.91	14.867	3.24	20.93	1.29
2.750	1.40	8.817	2.91	14.883	3.24	20.95	1.29
2.767	1.40	8.833	2.91	14.900	3.24	20.97	1.29
2.783	1.40	8.850	2.91	14.917	3.24	20.98	1.29
2.800	1.40	8.867	2.91	14.933	3.24	21.00	1.29
2.817	1.40	8.883	2.91	14.950	3.24	21.02	1.29
2.833	1.40	8.900	2.91	14.967	3.24	21.03	1.29
2.850	1.40	8.917	2.91	14.983	3.24	21.05	1.29
2.867	1.40	8.933	2.91	15.000	3.24	21.07	1.29
2.883	1.40	8.950	2.91	15.017	3.24	21.08	1.29
2.900	1.40	8.967	2.91	15.033	3.24	21.10	1.29
2.917	1.40	8.983	2.91	15.050	3.24	21.12	1.29
2.933	1.40	9.000	2.91	15.067	3.24	21.13	1.29
2.950	1.40	9.017	2.91	15.083	3.24	21.15	1.29
2.967	1.40	9.033	2.91	15.100	3.24	21.17	1.29
2.983	1.40	9.050	2.91	15.117	3.24	21.18	1.29
3.000	1.40	9.067	2.91	15.133	3.24	21.20	1.29
3.017	1.40	9.083	2.91	15.150	3.24	21.22	1.29
3.033	1.40	9.100	2.91	15.167	3.24	21.23	1.29
3.050	1.40	9.117	2.91	15.183	3.24	21.25	1.29
3.067	1.40	9.133	2.91	15.200	3.24	21.27	1.29
3.083	1.40	9.150	2.91	15.217	3.24	21.28	1.29
3.100	1.40	9.167	2.91	15.233	3.24	21.30	1.29
3.117	1.40	9.183	2.91	15.250	3.24	21.32	1.29
3.133	1.40	9.200	2.91	15.267	3.24	21.33	1.29
3.150	1.40	9.217	2.91	15.283	3.24	21.35	1.29
3.167	1.40	9.233	2.91	15.300	3.24	21.37	1.29
3.183	1.40	9.250	2.91	15.317	3.24	21.38	1.29
3.200	1.40	9.267	3.45	15.333	3.24	21.40	1.29
3.217	1.40	9.283	3.45	15.350	3.24	21.42	1.29

Conservative Model Output (SCS)

3.233	1.40	9.300	3.45	15.367	3.24	21.43	1.29
3.250	1.40	9.317	3.45	15.383	3.24	21.45	1.29
3.267	1.40	9.333	3.45	15.400	3.24	21.47	1.29
3.283	1.40	9.350	3.45	15.417	3.24	21.48	1.29
3.300	1.40	9.367	3.45	15.433	3.24	21.50	1.29
3.317	1.40	9.383	3.45	15.450	3.24	21.52	1.29
3.333	1.40	9.400	3.45	15.467	3.24	21.53	1.29
3.350	1.40	9.417	3.45	15.483	3.24	21.55	1.29
3.367	1.40	9.433	3.45	15.500	3.24	21.57	1.29
3.383	1.40	9.450	3.45	15.517	3.24	21.58	1.29
3.400	1.40	9.467	3.45	15.533	3.24	21.60	1.29
3.417	1.40	9.483	3.45	15.550	3.24	21.62	1.29
3.433	1.40	9.500	3.45	15.567	3.24	21.63	1.29
3.450	1.40	9.517	3.45	15.583	3.24	21.65	1.29
3.467	1.40	9.533	3.45	15.600	3.24	21.67	1.29
3.483	1.40	9.550	3.45	15.617	3.24	21.68	1.29
3.500	1.40	9.567	3.45	15.633	3.24	21.70	1.29
3.517	1.40	9.583	3.45	15.650	3.24	21.72	1.29
3.533	1.40	9.600	3.45	15.667	3.24	21.73	1.29
3.550	1.40	9.617	3.45	15.683	3.24	21.75	1.29
3.567	1.40	9.633	3.45	15.700	3.24	21.77	1.29
3.583	1.40	9.650	3.45	15.717	3.24	21.78	1.29
3.600	1.40	9.667	3.45	15.733	3.24	21.80	1.29
3.617	1.40	9.683	3.45	15.750	3.24	21.82	1.29
3.633	1.40	9.700	3.45	15.767	3.24	21.83	1.29
3.650	1.40	9.717	3.45	15.783	3.24	21.85	1.29
3.667	1.40	9.733	3.45	15.800	3.24	21.87	1.29
3.683	1.40	9.750	3.45	15.817	3.24	21.88	1.29
3.700	1.40	9.767	3.88	15.833	3.24	21.90	1.29
3.717	1.40	9.783	3.88	15.850	3.24	21.92	1.29
3.733	1.40	9.800	3.88	15.867	3.24	21.93	1.29
3.750	1.40	9.817	3.88	15.883	3.24	21.95	1.29
3.767	1.40	9.833	3.88	15.900	3.24	21.97	1.29
3.783	1.40	9.850	3.88	15.917	3.24	21.98	1.29
3.800	1.40	9.867	3.88	15.933	3.24	22.00	1.29
3.817	1.40	9.883	3.88	15.950	3.24	22.02	1.29
3.833	1.40	9.900	3.88	15.967	3.24	22.03	1.29
3.850	1.40	9.917	3.88	15.983	3.24	22.05	1.29
3.867	1.40	9.933	3.88	16.000	3.24	22.07	1.29
3.883	1.40	9.950	3.88	16.017	3.24	22.08	1.29
3.900	1.40	9.967	3.88	16.033	3.24	22.10	1.29
3.917	1.40	9.983	3.88	16.050	3.24	22.12	1.29
3.933	1.40	10.000	3.88	16.067	3.24	22.13	1.29
3.950	1.40	10.017	3.88	16.083	3.24	22.15	1.29
3.967	1.40	10.033	3.88	16.100	3.24	22.17	1.29
3.983	1.40	10.050	3.88	16.117	3.24	22.18	1.29
4.000	1.40	10.067	3.88	16.133	3.24	22.20	1.29
4.017	1.40	10.083	3.88	16.150	3.24	22.22	1.29
4.033	1.40	10.100	3.88	16.167	3.24	22.23	1.29
4.050	1.40	10.117	3.88	16.183	3.24	22.25	1.29
4.067	1.40	10.133	3.88	16.200	3.24	22.27	1.29
4.083	1.40	10.150	3.88	16.217	3.24	22.28	1.29
4.100	1.40	10.167	3.88	16.233	3.24	22.30	1.29
4.117	1.40	10.183	3.88	16.250	3.24	22.32	1.29
4.133	1.40	10.200	3.88	16.267	1.95	22.33	1.29
4.150	1.40	10.217	3.88	16.283	1.94	22.35	1.29
4.167	1.40	10.233	3.88	16.300	1.94	22.37	1.29
4.183	1.40	10.250	3.88	16.317	1.94	22.38	1.29
4.200	1.40	10.267	4.96	16.333	1.94	22.40	1.29
4.217	1.40	10.283	4.96	16.350	1.94	22.42	1.29
4.233	1.40	10.300	4.96	16.367	1.94	22.43	1.29
4.250	1.40	10.317	4.96	16.383	1.94	22.45	1.29
4.267	1.73	10.333	4.96	16.400	1.94	22.47	1.29

Conservative Model Output (SCS)

4.283	1.73	10.350	4.96	16.417	1.94	22.48	1.29
4.300	1.73	10.367	4.96	16.433	1.94	22.50	1.29
4.317	1.73	10.383	4.96	16.450	1.94	22.52	1.29
4.333	1.73	10.400	4.96	16.467	1.94	22.53	1.29
4.350	1.73	10.417	4.96	16.483	1.94	22.55	1.29
4.367	1.73	10.433	4.96	16.500	1.94	22.57	1.29
4.383	1.73	10.450	4.96	16.517	1.94	22.58	1.29
4.400	1.73	10.467	4.96	16.533	1.94	22.60	1.29
4.417	1.73	10.483	4.96	16.550	1.94	22.62	1.29
4.433	1.73	10.500	4.96	16.567	1.94	22.63	1.29
4.450	1.73	10.517	4.96	16.583	1.94	22.65	1.29
4.467	1.73	10.533	4.96	16.600	1.94	22.67	1.29
4.483	1.73	10.550	4.96	16.617	1.94	22.68	1.29
4.500	1.73	10.567	4.96	16.633	1.94	22.70	1.29
4.517	1.73	10.583	4.96	16.650	1.94	22.72	1.29
4.533	1.73	10.600	4.96	16.667	1.94	22.73	1.29
4.550	1.73	10.617	4.96	16.683	1.94	22.75	1.29
4.567	1.73	10.633	4.96	16.700	1.94	22.77	1.29
4.583	1.73	10.650	4.96	16.717	1.94	22.78	1.29
4.600	1.73	10.667	4.96	16.733	1.94	22.80	1.29
4.617	1.73	10.683	4.96	16.750	1.94	22.82	1.29
4.633	1.73	10.700	4.96	16.767	1.94	22.83	1.29
4.650	1.73	10.717	4.96	16.783	1.94	22.85	1.29
4.667	1.73	10.733	4.96	16.800	1.94	22.87	1.29
4.683	1.73	10.750	4.96	16.817	1.94	22.88	1.29
4.700	1.73	10.767	6.69	16.833	1.94	22.90	1.29
4.717	1.73	10.783	6.69	16.850	1.94	22.92	1.29
4.733	1.73	10.800	6.69	16.867	1.94	22.93	1.29
4.750	1.73	10.817	6.69	16.883	1.94	22.95	1.29
4.767	1.73	10.833	6.69	16.900	1.94	22.97	1.29
4.783	1.73	10.850	6.69	16.917	1.94	22.98	1.29
4.800	1.73	10.867	6.69	16.933	1.94	23.00	1.29
4.817	1.73	10.883	6.69	16.950	1.94	23.02	1.29
4.833	1.73	10.900	6.69	16.967	1.94	23.03	1.29
4.850	1.73	10.917	6.69	16.983	1.94	23.05	1.29
4.867	1.73	10.933	6.69	17.000	1.94	23.07	1.29
4.883	1.73	10.950	6.69	17.017	1.94	23.08	1.29
4.900	1.73	10.967	6.69	17.033	1.94	23.10	1.29
4.917	1.73	10.983	6.69	17.050	1.94	23.12	1.29
4.933	1.73	11.000	6.69	17.067	1.94	23.13	1.29
4.950	1.73	11.017	6.69	17.083	1.94	23.15	1.29
4.967	1.73	11.033	6.69	17.100	1.94	23.17	1.29
4.983	1.73	11.050	6.69	17.117	1.94	23.18	1.29
5.000	1.73	11.067	6.69	17.133	1.94	23.20	1.29
5.017	1.73	11.083	6.69	17.150	1.94	23.22	1.29
5.033	1.73	11.100	6.69	17.167	1.94	23.23	1.29
5.050	1.73	11.117	6.69	17.183	1.94	23.25	1.29
5.067	1.73	11.133	6.69	17.200	1.94	23.27	1.29
5.083	1.73	11.150	6.69	17.217	1.94	23.28	1.29
5.100	1.73	11.167	6.69	17.233	1.94	23.30	1.29
5.117	1.73	11.183	6.69	17.250	1.94	23.32	1.29
5.133	1.73	11.200	6.69	17.267	1.94	23.33	1.29
5.150	1.73	11.217	6.69	17.283	1.94	23.35	1.29
5.167	1.73	11.233	6.69	17.300	1.94	23.37	1.29
5.183	1.73	11.250	6.69	17.317	1.94	23.38	1.29
5.200	1.73	11.267	10.36	17.333	1.94	23.40	1.29
5.217	1.73	11.283	10.36	17.350	1.94	23.42	1.29
5.233	1.73	11.300	10.36	17.367	1.94	23.43	1.29
5.250	1.73	11.317	10.36	17.383	1.94	23.45	1.29
5.267	1.73	11.333	10.36	17.400	1.94	23.47	1.29
5.283	1.73	11.350	10.36	17.417	1.94	23.48	1.29
5.300	1.73	11.367	10.36	17.433	1.94	23.50	1.29
5.317	1.73	11.383	10.36	17.450	1.94	23.52	1.29

5.333	1.73	11.400	10.36	17.467	1.94	23.53	1.29
5.350	1.73	11.417	10.36	17.483	1.94	23.55	1.29
5.367	1.73	11.433	10.36	17.500	1.94	23.57	1.29
5.383	1.73	11.450	10.36	17.517	1.94	23.58	1.29
5.400	1.73	11.467	10.36	17.533	1.94	23.60	1.29
5.417	1.73	11.483	10.36	17.550	1.94	23.62	1.29
5.433	1.73	11.500	10.36	17.567	1.94	23.63	1.29
5.450	1.73	11.517	10.36	17.583	1.94	23.65	1.29
5.467	1.73	11.533	10.36	17.600	1.94	23.67	1.29
5.483	1.73	11.550	10.36	17.617	1.94	23.68	1.29
5.500	1.73	11.567	10.36	17.633	1.94	23.70	1.29
5.517	1.73	11.583	10.36	17.650	1.94	23.72	1.29
5.533	1.73	11.600	10.36	17.667	1.94	23.73	1.29
5.550	1.73	11.617	10.36	17.683	1.94	23.75	1.29
5.567	1.73	11.633	10.36	17.700	1.94	23.77	1.29
5.583	1.73	11.650	10.36	17.717	1.94	23.78	1.29
5.600	1.73	11.667	10.36	17.733	1.94	23.80	1.29
5.617	1.73	11.683	10.36	17.750	1.94	23.82	1.29
5.633	1.73	11.700	10.36	17.767	1.94	23.83	1.29
5.650	1.73	11.717	10.36	17.783	1.94	23.85	1.29
5.667	1.73	11.733	10.36	17.800	1.94	23.87	1.29
5.683	1.73	11.750	10.36	17.817	1.94	23.88	1.29
5.700	1.73	11.767	44.87	17.833	1.94	23.90	1.29
5.717	1.73	11.783	44.89	17.850	1.94	23.92	1.29
5.733	1.73	11.800	44.89	17.867	1.94	23.93	1.29
5.750	1.73	11.817	44.89	17.883	1.94	23.95	1.29
5.767	1.73	11.833	44.89	17.900	1.94	23.97	1.29
5.783	1.73	11.850	44.89	17.917	1.94	23.98	1.29
5.800	1.73	11.867	44.89	17.933	1.94	24.00	1.29
5.817	1.73	11.883	44.89	17.950	1.94	24.02	1.29
5.833	1.73	11.900	44.89	17.967	1.94	24.03	1.29
5.850	1.73	11.917	44.89	17.983	1.94	24.05	1.29
5.867	1.73	11.933	44.89	18.000	1.94	24.07	1.29
5.883	1.73	11.950	44.89	18.017	1.94	24.08	1.29
5.900	1.73	11.967	44.89	18.033	1.94	24.10	1.29
5.917	1.73	11.983	44.89	18.050	1.94	24.12	1.29
5.933	1.73	12.000	44.89	18.067	1.94	24.13	1.29
5.950	1.73	12.017	119.07	18.083	1.94	24.15	1.29
5.967	1.73	12.033	119.12	18.100	1.94	24.17	1.29
5.983	1.73	12.050	119.12	18.117	1.94	24.18	1.29
6.000	1.73	12.067	119.12	18.133	1.94	24.20	1.29
6.017	1.73	12.083	119.12	18.150	1.94	24.22	1.29
6.033	1.73	12.100	119.12	18.167	1.94	24.23	1.29
6.050	1.73	12.117	119.12	18.183	1.94	24.25	1.29
6.067	1.73	12.133	119.12	18.200	1.94		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.583 (i)
TIME TO PEAK (hrs)= 12.617
RUNOFF VOLUME (mm)= 41.735
TOTAL RAINFALL (mm)= 107.901
RUNOFF COEFFICIENT = 0.387

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

CALIB STANDHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 6.57		
	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50	
	IMPERVIOUS	PERVIOUS (i)	

Conservative Model Output (SCS)

Surface Area	(ha)=	4.83	1.74	
Dep. Storage	(mm)=	1.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.28	10.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		119.12	50.71	
over (min)		5.00	6.00	
Storage Coeff.	(min)=	3.71 (ii)	5.61 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	6.00	
Unit Hyd. peak	(cms)=	0.27	0.20	
				TOTALS
PEAK FLOW	(cms)=	1.56	0.22	1.776 (iii)
TIME TO PEAK	(hrs)=	12.25	12.27	12.25
RUNOFF VOLUME	(mm)=	106.58	37.70	88.32
TOTAL RAINFALL	(mm)=	107.90	107.90	107.90
RUNOFF COEFFICIENT	=	0.99	0.35	0.82

(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 (0002)	Area	(ha)=	4.32		
ID= 1 DT= 1.0 min	Total Imp	(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		119.12	202.62	
over (min)		5.00	7.00	
Storage Coeff.	(min)=	3.27 (ii)	6.78 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	7.00	
Unit Hyd. peak	(cms)=	0.30	0.17	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.84	0.845 (iii)
TIME TO PEAK	(hrs)=	12.25	12.27	12.27
RUNOFF VOLUME	(mm)=	105.58	62.59	62.60
TOTAL RAINFALL	(mm)=	107.90	107.90	107.90
RUNOFF COEFFICIENT	=	0.98	0.58	0.58

***** 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 (0009)

Conservative Model Output (SCS)

1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0001):		6.57	1.776	12.25	88.32
+ ID2= 2 (0002):		4.32	0.845	12.27	62.60
ID = 3 (0009):		10.89	2.608	12.25	78.12

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)					
3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0009):		10.89	2.608	12.25	78.12
+ ID2= 2 (0007):		7.90	0.583	12.62	41.73
ID = 1 (0009):		18.79	2.908	12.27	67.19

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008)				
ID= 1 DT= 1.0 min	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.464 (i)
TIME TO PEAK (hrs)= 13.000
RUNOFF VOLUME (mm)= 33.886
TOTAL RAINFALL (mm)= 107.901
RUNOFF COEFFICIENT = 0.314

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

CALIB STANDHYD (0003)				
ID= 1 DT= 1.0 min	Area (ha)=	3.20		
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		119.12	202.62	
over (min)		5.00	7.00	
Storage Coeff.	(min)=	2.99 (ii)	6.50 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	7.00	
Unit Hyd. peak	(cms)=	0.32	0.17	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.63	0.633 (iii)
TIME TO PEAK	(hrs)=	12.22	12.27	12.27
RUNOFF VOLUME	(mm)=	105.58	62.59	62.60
TOTAL RAINFALL	(mm)=	107.90	107.90	107.90
RUNOFF COEFFICIENT	=	0.98	0.58	0.58

Conservative Model Output (SCS)

***** 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 (0004) ID= 1 DT= 1.0 min	Area (ha)= 2.70 Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		119.12	50.71	
over (min)		5.00	6.00	
Storage Coeff. (min)=		2.84 (ii)	5.73 (ii)	
Unit Hyd. Tpeak (min)=		5.00	6.00	
Unit Hyd. peak (cms)=		0.32	0.19	
				TOTALS
PEAK FLOW	(cms)=	0.65	0.09	0.739 (iii)
TIME TO PEAK	(hrs)=	12.25	12.27	12.25
RUNOFF VOLUME	(mm)=	105.57	37.70	87.59
TOTAL RAINFALL	(mm)=	107.90	107.90	107.90
RUNOFF COEFFICIENT	=	0.98	0.35	0.81

(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 (0010)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0003):	3.20	0.633	12.27	62.60
+ ID2= 2 (0004):	2.70	0.739	12.25	87.59
ID = 3 (0010):	5.90	1.362	12.25	74.03

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0010):	5.90	1.362	12.25	74.03
+ ID2= 2 (0008):	11.10	0.464	13.00	33.89

Conservative Model Output (SCS)

ID = 1 (0010):	17.00	1.505	12.27	54.43

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0010):		17.00	1.505	12.27	54.43
+ ID2= 2 (0009):		18.79	2.908	12.27	67.19
ID = 3 (0011):		35.79	4.412	12.27	61.13

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013)	Area (ha)=	6.58	
ID= 1 DT= 1.0 min	Total Imp(%)=	44.40	Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		119.12	67.96	
over (min)		5.00	11.00	
Storage Coeff.	(min)=	3.71 (ii)	10.47 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	11.00	
Unit Hyd. peak	(cms)=	0.27	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.72	0.48	1.144 (iii)
TIME TO PEAK	(hrs)=	12.25	12.33	12.27
RUNOFF VOLUME	(mm)=	105.57	42.47	63.80
TOTAL RAINFALL	(mm)=	107.90	107.90	107.90
RUNOFF COEFFICIENT	=	0.98	0.39	0.59

(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 (0012)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0011):		35.79	4.412	12.27	61.13
+ ID2= 2 (0013):		6.58	1.144	12.27	63.80
ID = 3 (0012):		42.37	5.557	12.27	61.55

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

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| RESERVOIR(  0014)|
| IN= 2---> OUT= 1 |
| DT=  1.0 min     |        OUTFLOW       STORAGE    |     OUTFLOW         STORAGE
--------------------          (cms)       (ha.m.)    |     (cms)           (ha.m.)
                              0.0000       0.0000    |       0.0001          5.0000

                                    AREA        QPEAK        TPEAK        R.V.
                                    (ha)        (cms)        (hrs)        (mm)
   INFLOW : ID= 2 (  0012)        42.370        5.557        12.27       61.55
   OUTFLOW: ID= 1 (  0014)        42.370        0.000        27.98        0.01

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                  TIME SHIFT OF PEAK FLOW          (min)=943.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  2.6074

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 FINISH
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      V    V   I    SSSSS  U   U    A    L
      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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\7ff1e
865-01a2-4262-bdcf-56ccf7e5bd17\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\7ff1e
865-01a2-4262-bdcf-56ccf7e5bd17\scen

DATE: 03/29/2018                          TIME: 03:42:04

USER:

COMMENTS: SCS 100 year
```

****
** Run 06 **
****

READ STORM	Filename: C:\Users\bpowers\AppData\Local\Temp\47d29410-34f5-48cf-9093-3a26fcec05c9\a8da804a
Ptotal=120.50 mm	Comments:

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.25	0.00	6.50	2.41	12.75	17.35	19.00	2.17
0.50	1.33	6.75	2.41	13.00	8.92	19.25	2.17
0.75	1.33	7.00	2.41	13.25	8.92	19.50	2.17
1.00	1.33	7.25	2.41	13.50	1.69	19.75	2.17
1.25	1.33	7.50	2.41	13.75	1.69	20.00	2.17
1.50	1.33	7.75	2.41	14.00	9.88	20.25	2.17
1.75	1.33	8.00	2.41	14.25	9.88	20.50	1.45
2.00	1.33	8.25	2.41	14.50	3.62	20.75	1.45
2.25	1.33	8.50	3.25	14.75	3.62	21.00	1.45
2.50	1.57	8.75	3.25	15.00	3.62	21.25	1.45
2.75	1.57	9.00	3.25	15.25	3.62	21.50	1.45
3.00	1.57	9.25	3.25	15.50	3.62	21.75	1.45
3.25	1.57	9.50	3.86	15.75	3.62	22.00	1.45
3.50	1.57	9.75	3.86	16.00	3.62	22.25	1.45
3.75	1.57	10.00	4.34	16.25	3.62	22.50	1.45
4.00	1.57	10.25	4.34	16.50	2.17	22.75	1.45
4.25	1.57	10.50	5.54	16.75	2.17	23.00	1.45
4.50	1.93	10.75	5.54	17.00	2.17	23.25	1.45
4.75	1.93	11.00	7.47	17.25	2.17	23.50	1.45
5.00	1.93	11.25	7.47	17.50	2.17	23.75	1.45
5.25	1.93	11.50	11.57	17.75	2.17	24.00	1.45
5.50	1.93	11.75	11.57	18.00	2.17	24.25	1.45
5.75	1.93	12.00	50.13	18.25	2.17		
6.00	1.93	12.25	133.03	18.50	2.17		
6.25	1.93	12.50	17.35	18.75	2.17		

CALIB NASHYD (0007) ID= 1 DT= 1.0 min					
	Area	(ha)=	7.90	Curve Number (CN)=	72.6
	Ia	(mm)=	6.50	# of Linear Res.(N)=	3.00
	U.H.	Tp(hrs)=	0.46		

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	0.00	6.083	1.93	12.150	133.03	18.22	2.17
0.033	0.00	6.100	1.93	12.167	133.03	18.23	2.17
0.050	0.00	6.117	1.93	12.183	133.03	18.25	2.17
0.067	0.00	6.133	1.93	12.200	133.03	18.27	2.17
0.083	0.00	6.150	1.93	12.217	133.03	18.28	2.17
0.100	0.00	6.167	1.93	12.233	133.03	18.30	2.17
0.117	0.00	6.183	1.93	12.250	133.03	18.32	2.17
0.133	0.00	6.200	1.93	12.267	17.46	18.33	2.17

Conservative Model Output (SCS)

0.150	0.00	6.217	1.93	12.283	17.35	18.35	2.17
0.167	0.00	6.233	1.93	12.300	17.35	18.37	2.17
0.183	0.00	6.250	1.93	12.317	17.35	18.38	2.17
0.200	0.00	6.267	2.41	12.333	17.35	18.40	2.17
0.217	0.00	6.283	2.41	12.350	17.35	18.42	2.17
0.233	0.00	6.300	2.41	12.367	17.35	18.43	2.17
0.250	0.00	6.317	2.41	12.383	17.35	18.45	2.17
0.267	1.33	6.333	2.41	12.400	17.35	18.47	2.17
0.283	1.33	6.350	2.41	12.417	17.35	18.48	2.17
0.300	1.33	6.367	2.41	12.433	17.35	18.50	2.17
0.317	1.33	6.383	2.41	12.450	17.35	18.52	2.17
0.333	1.33	6.400	2.41	12.467	17.35	18.53	2.17
0.350	1.33	6.417	2.41	12.483	17.35	18.55	2.17
0.367	1.33	6.433	2.41	12.500	17.35	18.57	2.17
0.383	1.33	6.450	2.41	12.517	17.35	18.58	2.17
0.400	1.33	6.467	2.41	12.533	17.35	18.60	2.17
0.417	1.33	6.483	2.41	12.550	17.35	18.62	2.17
0.433	1.33	6.500	2.41	12.567	17.35	18.63	2.17
0.450	1.33	6.517	2.41	12.583	17.35	18.65	2.17
0.467	1.33	6.533	2.41	12.600	17.35	18.67	2.17
0.483	1.33	6.550	2.41	12.617	17.35	18.68	2.17
0.500	1.33	6.567	2.41	12.633	17.35	18.70	2.17
0.517	1.33	6.583	2.41	12.650	17.35	18.72	2.17
0.533	1.33	6.600	2.41	12.667	17.35	18.73	2.17
0.550	1.33	6.617	2.41	12.683	17.35	18.75	2.17
0.567	1.33	6.633	2.41	12.700	17.35	18.77	2.17
0.583	1.33	6.650	2.41	12.717	17.35	18.78	2.17
0.600	1.33	6.667	2.41	12.733	17.35	18.80	2.17
0.617	1.33	6.683	2.41	12.750	17.35	18.82	2.17
0.633	1.33	6.700	2.41	12.767	8.93	18.83	2.17
0.650	1.33	6.717	2.41	12.783	8.92	18.85	2.17
0.667	1.33	6.733	2.41	12.800	8.92	18.87	2.17
0.683	1.33	6.750	2.41	12.817	8.92	18.88	2.17
0.700	1.33	6.767	2.41	12.833	8.92	18.90	2.17
0.717	1.33	6.783	2.41	12.850	8.92	18.92	2.17
0.733	1.33	6.800	2.41	12.867	8.92	18.93	2.17
0.750	1.33	6.817	2.41	12.883	8.92	18.95	2.17
0.767	1.33	6.833	2.41	12.900	8.92	18.97	2.17
0.783	1.33	6.850	2.41	12.917	8.92	18.98	2.17
0.800	1.33	6.867	2.41	12.933	8.92	19.00	2.17
0.817	1.33	6.883	2.41	12.950	8.92	19.02	2.17
0.833	1.33	6.900	2.41	12.967	8.92	19.03	2.17
0.850	1.33	6.917	2.41	12.983	8.92	19.05	2.17
0.867	1.33	6.933	2.41	13.000	8.92	19.07	2.17
0.883	1.33	6.950	2.41	13.017	8.92	19.08	2.17
0.900	1.33	6.967	2.41	13.033	8.92	19.10	2.17
0.917	1.33	6.983	2.41	13.050	8.92	19.12	2.17
0.933	1.33	7.000	2.41	13.067	8.92	19.13	2.17
0.950	1.33	7.017	2.41	13.083	8.92	19.15	2.17
0.967	1.33	7.033	2.41	13.100	8.92	19.17	2.17
0.983	1.33	7.050	2.41	13.117	8.92	19.18	2.17
1.000	1.33	7.067	2.41	13.133	8.92	19.20	2.17
1.017	1.33	7.083	2.41	13.150	8.92	19.22	2.17
1.033	1.33	7.100	2.41	13.167	8.92	19.23	2.17
1.050	1.33	7.117	2.41	13.183	8.92	19.25	2.17
1.067	1.33	7.133	2.41	13.200	8.92	19.27	2.17
1.083	1.33	7.150	2.41	13.217	8.92	19.28	2.17
1.100	1.33	7.167	2.41	13.233	8.92	19.30	2.17
1.117	1.33	7.183	2.41	13.250	8.92	19.32	2.17
1.133	1.33	7.200	2.41	13.267	1.70	19.33	2.17
1.150	1.33	7.217	2.41	13.283	1.69	19.35	2.17
1.167	1.33	7.233	2.41	13.300	1.69	19.37	2.17
1.183	1.33	7.250	2.41	13.317	1.69	19.38	2.17

Conservative Model Output (SCS)

1.200	1.33	7.267	2.41	13.333	1.69	19.40	2.17
1.217	1.33	7.283	2.41	13.350	1.69	19.42	2.17
1.233	1.33	7.300	2.41	13.367	1.69	19.43	2.17
1.250	1.33	7.317	2.41	13.383	1.69	19.45	2.17
1.267	1.33	7.333	2.41	13.400	1.69	19.47	2.17
1.283	1.33	7.350	2.41	13.417	1.69	19.48	2.17
1.300	1.33	7.367	2.41	13.433	1.69	19.50	2.17
1.317	1.33	7.383	2.41	13.450	1.69	19.52	2.17
1.333	1.33	7.400	2.41	13.467	1.69	19.53	2.17
1.350	1.33	7.417	2.41	13.483	1.69	19.55	2.17
1.367	1.33	7.433	2.41	13.500	1.69	19.57	2.17
1.383	1.33	7.450	2.41	13.517	1.69	19.58	2.17
1.400	1.33	7.467	2.41	13.533	1.69	19.60	2.17
1.417	1.33	7.483	2.41	13.550	1.69	19.62	2.17
1.433	1.33	7.500	2.41	13.567	1.69	19.63	2.17
1.450	1.33	7.517	2.41	13.583	1.69	19.65	2.17
1.467	1.33	7.533	2.41	13.600	1.69	19.67	2.17
1.483	1.33	7.550	2.41	13.617	1.69	19.68	2.17
1.500	1.33	7.567	2.41	13.633	1.69	19.70	2.17
1.517	1.33	7.583	2.41	13.650	1.69	19.72	2.17
1.533	1.33	7.600	2.41	13.667	1.69	19.73	2.17
1.550	1.33	7.617	2.41	13.683	1.69	19.75	2.17
1.567	1.33	7.633	2.41	13.700	1.69	19.77	2.17
1.583	1.33	7.650	2.41	13.717	1.69	19.78	2.17
1.600	1.33	7.667	2.41	13.733	1.69	19.80	2.17
1.617	1.33	7.683	2.41	13.750	1.69	19.82	2.17
1.633	1.33	7.700	2.41	13.767	9.86	19.83	2.17
1.650	1.33	7.717	2.41	13.783	9.88	19.85	2.17
1.667	1.33	7.733	2.41	13.800	9.88	19.87	2.17
1.683	1.33	7.750	2.41	13.817	9.88	19.88	2.17
1.700	1.33	7.767	2.41	13.833	9.88	19.90	2.17
1.717	1.33	7.783	2.41	13.850	9.88	19.92	2.17
1.733	1.33	7.800	2.41	13.867	9.88	19.93	2.17
1.750	1.33	7.817	2.41	13.883	9.88	19.95	2.17
1.767	1.33	7.833	2.41	13.900	9.88	19.97	2.17
1.783	1.33	7.850	2.41	13.917	9.88	19.98	2.17
1.800	1.33	7.867	2.41	13.933	9.88	20.00	2.17
1.817	1.33	7.883	2.41	13.950	9.88	20.02	2.17
1.833	1.33	7.900	2.41	13.967	9.88	20.03	2.17
1.850	1.33	7.917	2.41	13.983	9.88	20.05	2.17
1.867	1.33	7.933	2.41	14.000	9.88	20.07	2.17
1.883	1.33	7.950	2.41	14.017	9.88	20.08	2.17
1.900	1.33	7.967	2.41	14.033	9.88	20.10	2.17
1.917	1.33	7.983	2.41	14.050	9.88	20.12	2.17
1.933	1.33	8.000	2.41	14.067	9.88	20.13	2.17
1.950	1.33	8.017	2.41	14.083	9.88	20.15	2.17
1.967	1.33	8.033	2.41	14.100	9.88	20.17	2.17
1.983	1.33	8.050	2.41	14.117	9.88	20.18	2.17
2.000	1.33	8.067	2.41	14.133	9.88	20.20	2.17
2.017	1.33	8.083	2.41	14.150	9.88	20.22	2.17
2.033	1.33	8.100	2.41	14.167	9.88	20.23	2.17
2.050	1.33	8.117	2.41	14.183	9.88	20.25	2.17
2.067	1.33	8.133	2.41	14.200	9.88	20.27	1.45
2.083	1.33	8.150	2.41	14.217	9.88	20.28	1.45
2.100	1.33	8.167	2.41	14.233	9.88	20.30	1.45
2.117	1.33	8.183	2.41	14.250	9.88	20.32	1.45
2.133	1.33	8.200	2.41	14.267	3.63	20.33	1.45
2.150	1.33	8.217	2.41	14.283	3.62	20.35	1.45
2.167	1.33	8.233	2.41	14.300	3.62	20.37	1.45
2.183	1.33	8.250	2.41	14.317	3.62	20.38	1.45
2.200	1.33	8.267	3.25	14.333	3.62	20.40	1.45
2.217	1.33	8.283	3.25	14.350	3.62	20.42	1.45
2.233	1.33	8.300	3.25	14.367	3.62	20.43	1.45

2.250	1.33	8.317	3.25	14.383	3.62	20.45	1.45
2.267	1.57	8.333	3.25	14.400	3.62	20.47	1.45
2.283	1.57	8.350	3.25	14.417	3.62	20.48	1.45
2.300	1.57	8.367	3.25	14.433	3.62	20.50	1.45
2.317	1.57	8.383	3.25	14.450	3.62	20.52	1.45
2.333	1.57	8.400	3.25	14.467	3.62	20.53	1.45
2.350	1.57	8.417	3.25	14.483	3.62	20.55	1.45
2.367	1.57	8.433	3.25	14.500	3.62	20.57	1.45
2.383	1.57	8.450	3.25	14.517	3.62	20.58	1.45
2.400	1.57	8.467	3.25	14.533	3.62	20.60	1.45
2.417	1.57	8.483	3.25	14.550	3.62	20.62	1.45
2.433	1.57	8.500	3.25	14.567	3.62	20.63	1.45
2.450	1.57	8.517	3.25	14.583	3.62	20.65	1.45
2.467	1.57	8.533	3.25	14.600	3.62	20.67	1.45
2.483	1.57	8.550	3.25	14.617	3.62	20.68	1.45
2.500	1.57	8.567	3.25	14.633	3.62	20.70	1.45
2.517	1.57	8.583	3.25	14.650	3.62	20.72	1.45
2.533	1.57	8.600	3.25	14.667	3.62	20.73	1.45
2.550	1.57	8.617	3.25	14.683	3.62	20.75	1.45
2.567	1.57	8.633	3.25	14.700	3.62	20.77	1.45
2.583	1.57	8.650	3.25	14.717	3.62	20.78	1.45
2.600	1.57	8.667	3.25	14.733	3.62	20.80	1.45
2.617	1.57	8.683	3.25	14.750	3.62	20.82	1.45
2.633	1.57	8.700	3.25	14.767	3.62	20.83	1.45
2.650	1.57	8.717	3.25	14.783	3.62	20.85	1.45
2.667	1.57	8.733	3.25	14.800	3.62	20.87	1.45
2.683	1.57	8.750	3.25	14.817	3.62	20.88	1.45
2.700	1.57	8.767	3.25	14.833	3.62	20.90	1.45
2.717	1.57	8.783	3.25	14.850	3.62	20.92	1.45
2.733	1.57	8.800	3.25	14.867	3.62	20.93	1.45
2.750	1.57	8.817	3.25	14.883	3.62	20.95	1.45
2.767	1.57	8.833	3.25	14.900	3.62	20.97	1.45
2.783	1.57	8.850	3.25	14.917	3.62	20.98	1.45
2.800	1.57	8.867	3.25	14.933	3.62	21.00	1.45
2.817	1.57	8.883	3.25	14.950	3.62	21.02	1.45
2.833	1.57	8.900	3.25	14.967	3.62	21.03	1.45
2.850	1.57	8.917	3.25	14.983	3.62	21.05	1.45
2.867	1.57	8.933	3.25	15.000	3.62	21.07	1.45
2.883	1.57	8.950	3.25	15.017	3.62	21.08	1.45
2.900	1.57	8.967	3.25	15.033	3.62	21.10	1.45
2.917	1.57	8.983	3.25	15.050	3.62	21.12	1.45
2.933	1.57	9.000	3.25	15.067	3.62	21.13	1.45
2.950	1.57	9.017	3.25	15.083	3.62	21.15	1.45
2.967	1.57	9.033	3.25	15.100	3.62	21.17	1.45
2.983	1.57	9.050	3.25	15.117	3.62	21.18	1.45
3.000	1.57	9.067	3.25	15.133	3.62	21.20	1.45
3.017	1.57	9.083	3.25	15.150	3.62	21.22	1.45
3.033	1.57	9.100	3.25	15.167	3.62	21.23	1.45
3.050	1.57	9.117	3.25	15.183	3.62	21.25	1.45
3.067	1.57	9.133	3.25	15.200	3.62	21.27	1.45
3.083	1.57	9.150	3.25	15.217	3.62	21.28	1.45
3.100	1.57	9.167	3.25	15.233	3.62	21.30	1.45
3.117	1.57	9.183	3.25	15.250	3.62	21.32	1.45
3.133	1.57	9.200	3.25	15.267	3.62	21.33	1.45
3.150	1.57	9.217	3.25	15.283	3.62	21.35	1.45
3.167	1.57	9.233	3.25	15.300	3.62	21.37	1.45
3.183	1.57	9.250	3.26	15.317	3.62	21.38	1.45
3.200	1.57	9.267	3.86	15.333	3.62	21.40	1.45
3.217	1.57	9.283	3.86	15.350	3.62	21.42	1.45
3.233	1.57	9.300	3.86	15.367	3.62	21.43	1.45
3.250	1.57	9.317	3.86	15.383	3.62	21.45	1.45
3.267	1.57	9.333	3.86	15.400	3.62	21.47	1.45
3.283	1.57	9.350	3.86	15.417	3.62	21.48	1.45

Conservative Model Output (SCS)

3.300	1.57	9.367	3.86	15.433	3.62	21.50	1.45
3.317	1.57	9.383	3.86	15.450	3.62	21.52	1.45
3.333	1.57	9.400	3.86	15.467	3.62	21.53	1.45
3.350	1.57	9.417	3.86	15.483	3.62	21.55	1.45
3.367	1.57	9.433	3.86	15.500	3.62	21.57	1.45
3.383	1.57	9.450	3.86	15.517	3.62	21.58	1.45
3.400	1.57	9.467	3.86	15.533	3.62	21.60	1.45
3.417	1.57	9.483	3.86	15.550	3.62	21.62	1.45
3.433	1.57	9.500	3.86	15.567	3.62	21.63	1.45
3.450	1.57	9.517	3.86	15.583	3.62	21.65	1.45
3.467	1.57	9.533	3.86	15.600	3.62	21.67	1.45
3.483	1.57	9.550	3.86	15.617	3.62	21.68	1.45
3.500	1.57	9.567	3.86	15.633	3.62	21.70	1.45
3.517	1.57	9.583	3.86	15.650	3.62	21.72	1.45
3.533	1.57	9.600	3.86	15.667	3.62	21.73	1.45
3.550	1.57	9.617	3.86	15.683	3.62	21.75	1.45
3.567	1.57	9.633	3.86	15.700	3.62	21.77	1.45
3.583	1.57	9.650	3.86	15.717	3.62	21.78	1.45
3.600	1.57	9.667	3.86	15.733	3.62	21.80	1.45
3.617	1.57	9.683	3.86	15.750	3.62	21.82	1.45
3.633	1.57	9.700	3.86	15.767	3.62	21.83	1.45
3.650	1.57	9.717	3.86	15.783	3.62	21.85	1.45
3.667	1.57	9.733	3.86	15.800	3.62	21.87	1.45
3.683	1.57	9.750	3.86	15.817	3.62	21.88	1.45
3.700	1.57	9.767	4.34	15.833	3.62	21.90	1.45
3.717	1.57	9.783	4.34	15.850	3.62	21.92	1.45
3.733	1.57	9.800	4.34	15.867	3.62	21.93	1.45
3.750	1.57	9.817	4.34	15.883	3.62	21.95	1.45
3.767	1.57	9.833	4.34	15.900	3.62	21.97	1.45
3.783	1.57	9.850	4.34	15.917	3.62	21.98	1.45
3.800	1.57	9.867	4.34	15.933	3.62	22.00	1.45
3.817	1.57	9.883	4.34	15.950	3.62	22.02	1.45
3.833	1.57	9.900	4.34	15.967	3.62	22.03	1.45
3.850	1.57	9.917	4.34	15.983	3.62	22.05	1.45
3.867	1.57	9.933	4.34	16.000	3.62	22.07	1.45
3.883	1.57	9.950	4.34	16.017	3.62	22.08	1.45
3.900	1.57	9.967	4.34	16.033	3.62	22.10	1.45
3.917	1.57	9.983	4.34	16.050	3.62	22.12	1.45
3.933	1.57	10.000	4.34	16.067	3.62	22.13	1.45
3.950	1.57	10.017	4.34	16.083	3.62	22.15	1.45
3.967	1.57	10.033	4.34	16.100	3.62	22.17	1.45
3.983	1.57	10.050	4.34	16.117	3.62	22.18	1.45
4.000	1.57	10.067	4.34	16.133	3.62	22.20	1.45
4.017	1.57	10.083	4.34	16.150	3.62	22.22	1.45
4.033	1.57	10.100	4.34	16.167	3.62	22.23	1.45
4.050	1.57	10.117	4.34	16.183	3.62	22.25	1.45
4.067	1.57	10.133	4.34	16.200	3.62	22.27	1.45
4.083	1.57	10.150	4.34	16.217	3.62	22.28	1.45
4.100	1.57	10.167	4.34	16.233	3.62	22.30	1.45
4.117	1.57	10.183	4.34	16.250	3.62	22.32	1.45
4.133	1.57	10.200	4.34	16.267	2.18	22.33	1.45
4.150	1.57	10.217	4.34	16.283	2.17	22.35	1.45
4.167	1.57	10.233	4.34	16.300	2.17	22.37	1.45
4.183	1.57	10.250	4.34	16.317	2.17	22.38	1.45
4.200	1.57	10.267	5.54	16.333	2.17	22.40	1.45
4.217	1.57	10.283	5.54	16.350	2.17	22.42	1.45
4.233	1.57	10.300	5.54	16.367	2.17	22.43	1.45
4.250	1.57	10.317	5.54	16.383	2.17	22.45	1.45
4.267	1.93	10.333	5.54	16.400	2.17	22.47	1.45
4.283	1.93	10.350	5.54	16.417	2.17	22.48	1.45
4.300	1.93	10.367	5.54	16.433	2.17	22.50	1.45
4.317	1.93	10.383	5.54	16.450	2.17	22.52	1.45
4.333	1.93	10.400	5.54	16.467	2.17	22.53	1.45

Conservative Model Output (SCS)

4.350	1.93	10.417	5.54	16.483	2.17	22.55	1.45
4.367	1.93	10.433	5.54	16.500	2.17	22.57	1.45
4.383	1.93	10.450	5.54	16.517	2.17	22.58	1.45
4.400	1.93	10.467	5.54	16.533	2.17	22.60	1.45
4.417	1.93	10.483	5.54	16.550	2.17	22.62	1.45
4.433	1.93	10.500	5.54	16.567	2.17	22.63	1.45
4.450	1.93	10.517	5.54	16.583	2.17	22.65	1.45
4.467	1.93	10.533	5.54	16.600	2.17	22.67	1.45
4.483	1.93	10.550	5.54	16.617	2.17	22.68	1.45
4.500	1.93	10.567	5.54	16.633	2.17	22.70	1.45
4.517	1.93	10.583	5.54	16.650	2.17	22.72	1.45
4.533	1.93	10.600	5.54	16.667	2.17	22.73	1.45
4.550	1.93	10.617	5.54	16.683	2.17	22.75	1.45
4.567	1.93	10.633	5.54	16.700	2.17	22.77	1.45
4.583	1.93	10.650	5.54	16.717	2.17	22.78	1.45
4.600	1.93	10.667	5.54	16.733	2.17	22.80	1.45
4.617	1.93	10.683	5.54	16.750	2.17	22.82	1.45
4.633	1.93	10.700	5.54	16.767	2.17	22.83	1.45
4.650	1.93	10.717	5.54	16.783	2.17	22.85	1.45
4.667	1.93	10.733	5.54	16.800	2.17	22.87	1.45
4.683	1.93	10.750	5.54	16.817	2.17	22.88	1.45
4.700	1.93	10.767	7.47	16.833	2.17	22.90	1.45
4.717	1.93	10.783	7.47	16.850	2.17	22.92	1.45
4.733	1.93	10.800	7.47	16.867	2.17	22.93	1.45
4.750	1.93	10.817	7.47	16.883	2.17	22.95	1.45
4.767	1.93	10.833	7.47	16.900	2.17	22.97	1.45
4.783	1.93	10.850	7.47	16.917	2.17	22.98	1.45
4.800	1.93	10.867	7.47	16.933	2.17	23.00	1.45
4.817	1.93	10.883	7.47	16.950	2.17	23.02	1.45
4.833	1.93	10.900	7.47	16.967	2.17	23.03	1.45
4.850	1.93	10.917	7.47	16.983	2.17	23.05	1.45
4.867	1.93	10.933	7.47	17.000	2.17	23.07	1.45
4.883	1.93	10.950	7.47	17.017	2.17	23.08	1.45
4.900	1.93	10.967	7.47	17.033	2.17	23.10	1.45
4.917	1.93	10.983	7.47	17.050	2.17	23.12	1.45
4.933	1.93	11.000	7.47	17.067	2.17	23.13	1.45
4.950	1.93	11.017	7.47	17.083	2.17	23.15	1.45
4.967	1.93	11.033	7.47	17.100	2.17	23.17	1.45
4.983	1.93	11.050	7.47	17.117	2.17	23.18	1.45
5.000	1.93	11.067	7.47	17.133	2.17	23.20	1.45
5.017	1.93	11.083	7.47	17.150	2.17	23.22	1.45
5.033	1.93	11.100	7.47	17.167	2.17	23.23	1.45
5.050	1.93	11.117	7.47	17.183	2.17	23.25	1.45
5.067	1.93	11.133	7.47	17.200	2.17	23.27	1.45
5.083	1.93	11.150	7.47	17.217	2.17	23.28	1.45
5.100	1.93	11.167	7.47	17.233	2.17	23.30	1.45
5.117	1.93	11.183	7.47	17.250	2.17	23.32	1.45
5.133	1.93	11.200	7.47	17.267	2.17	23.33	1.45
5.150	1.93	11.217	7.47	17.283	2.17	23.35	1.45
5.167	1.93	11.233	7.47	17.300	2.17	23.37	1.45
5.183	1.93	11.250	7.47	17.317	2.17	23.38	1.45
5.200	1.93	11.267	11.57	17.333	2.17	23.40	1.45
5.217	1.93	11.283	11.57	17.350	2.17	23.42	1.45
5.233	1.93	11.300	11.57	17.367	2.17	23.43	1.45
5.250	1.93	11.317	11.57	17.383	2.17	23.45	1.45
5.267	1.93	11.333	11.57	17.400	2.17	23.47	1.45
5.283	1.93	11.350	11.57	17.417	2.17	23.48	1.45
5.300	1.93	11.367	11.57	17.433	2.17	23.50	1.45
5.317	1.93	11.383	11.57	17.450	2.17	23.52	1.45
5.333	1.93	11.400	11.57	17.467	2.17	23.53	1.45
5.350	1.93	11.417	11.57	17.483	2.17	23.55	1.45
5.367	1.93	11.433	11.57	17.500	2.17	23.57	1.45
5.383	1.93	11.450	11.57	17.517	2.17	23.58	1.45

Conservative Model Output (SCS)

5.400	1.93	11.467	11.57	17.533	2.17	23.60	1.45
5.417	1.93	11.483	11.57	17.550	2.17	23.62	1.45
5.433	1.93	11.500	11.57	17.567	2.17	23.63	1.45
5.450	1.93	11.517	11.57	17.583	2.17	23.65	1.45
5.467	1.93	11.533	11.57	17.600	2.17	23.67	1.45
5.483	1.93	11.550	11.57	17.617	2.17	23.68	1.45
5.500	1.93	11.567	11.57	17.633	2.17	23.70	1.45
5.517	1.93	11.583	11.57	17.650	2.17	23.72	1.45
5.533	1.93	11.600	11.57	17.667	2.17	23.73	1.45
5.550	1.93	11.617	11.57	17.683	2.17	23.75	1.45
5.567	1.93	11.633	11.57	17.700	2.17	23.77	1.45
5.583	1.93	11.650	11.57	17.717	2.17	23.78	1.45
5.600	1.93	11.667	11.57	17.733	2.17	23.80	1.45
5.617	1.93	11.683	11.57	17.750	2.17	23.82	1.45
5.633	1.93	11.700	11.57	17.767	2.17	23.83	1.45
5.650	1.93	11.717	11.57	17.783	2.17	23.85	1.45
5.667	1.93	11.733	11.57	17.800	2.17	23.87	1.45
5.683	1.93	11.750	11.57	17.817	2.17	23.88	1.45
5.700	1.93	11.767	50.11	17.833	2.17	23.90	1.45
5.717	1.93	11.783	50.13	17.850	2.17	23.92	1.45
5.733	1.93	11.800	50.13	17.867	2.17	23.93	1.45
5.750	1.93	11.817	50.13	17.883	2.17	23.95	1.45
5.767	1.93	11.833	50.13	17.900	2.17	23.97	1.45
5.783	1.93	11.850	50.13	17.917	2.17	23.98	1.45
5.800	1.93	11.867	50.13	17.933	2.17	24.00	1.45
5.817	1.93	11.883	50.13	17.950	2.17	24.02	1.45
5.833	1.93	11.900	50.13	17.967	2.17	24.03	1.45
5.850	1.93	11.917	50.13	17.983	2.17	24.05	1.45
5.867	1.93	11.933	50.13	18.000	2.17	24.07	1.45
5.883	1.93	11.950	50.13	18.017	2.17	24.08	1.45
5.900	1.93	11.967	50.13	18.033	2.17	24.10	1.45
5.917	1.93	11.983	50.13	18.050	2.17	24.12	1.45
5.933	1.93	12.000	50.13	18.067	2.17	24.13	1.45
5.950	1.93	12.017	132.97	18.083	2.17	24.15	1.45
5.967	1.93	12.033	133.03	18.100	2.17	24.17	1.45
5.983	1.93	12.050	133.03	18.117	2.17	24.18	1.45
6.000	1.93	12.067	133.03	18.133	2.17	24.20	1.45
6.017	1.93	12.083	133.03	18.150	2.17	24.22	1.45
6.033	1.93	12.100	133.03	18.167	2.17	24.23	1.45
6.050	1.93	12.117	133.03	18.183	2.17	24.25	1.45
6.067	1.93	12.133	133.03	18.200	2.17		

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.695 (i)
TIME TO PEAK (hrs)= 12.600
RUNOFF VOLUME (mm)= 49.879
TOTAL RAINFALL (mm)= 120.502
RUNOFF COEFFICIENT = 0.414

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

CALIB STANDHYD (0001) ID= 1 DT= 1.0 min	Area (ha)= 6.57 Total Imp(%)= 73.50 Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.83	1.74
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	209.28	10.00

```
                          Conservative Model Output (SCS)
     Mannings n                =        0.013          0.250

     Max.Eff.Inten.(mm/hr)=       133.03          61.11
               over (min)           5.00           6.00
     Storage Coeff.  (min)=         3.55 (ii)      5.37 (ii)
     Unit Hyd. Tpeak (min)=         5.00           6.00
     Unit Hyd. peak  (cms)=         0.28           0.20
                                                              *TOTALS*
     PEAK FLOW         (cms)=       1.75           0.26        2.011 (iii)
     TIME TO PEAK      (hrs)=      12.25          12.27       12.25
     RUNOFF VOLUME      (mm)=     119.13          45.46       99.62
     TOTAL RAINFALL     (mm)=     120.50         120.50      120.50
     RUNOFF COEFFICIENT    =        0.99           0.38        0.83

       (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 (  0002)|   Area    (ha)=      4.32
|ID= 1 DT= 1.0 min |   Total Imp(%)=     59.00   Dir. Conn.(%)=   0.00
--------------------
                                  IMPERVIOUS      PERVIOUS (i)
     Surface Area      (ha)=          2.55            1.77
     Dep. Storage      (mm)=          2.00            5.00
     Average Slope      (%)=          1.00            2.00
     Length             (m)=        169.71           20.00
     Mannings n               =      0.013           0.250

     Max.Eff.Inten.(mm/hr)=       133.03          236.11
               over (min)           5.00            7.00
     Storage Coeff.  (min)=         3.13 (ii)       6.43 (ii)
     Unit Hyd. Tpeak (min)=         5.00            7.00
     Unit Hyd. peak  (cms)=         0.31            0.17
                                                              *TOTALS*
     PEAK FLOW         (cms)=       0.00            1.00        1.001 (iii)
     TIME TO PEAK      (hrs)=      12.25           12.27       12.27
     RUNOFF VOLUME      (mm)=     118.14           73.21       73.22
     TOTAL RAINFALL     (mm)=     120.50          120.50      120.50
     RUNOFF COEFFICIENT    =        0.98            0.61        0.61

***** 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.

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--------------------
| ADD HYD  (  0009)|
|   1 +  2 =  3    |          AREA      QPEAK       TPEAK        R.V.
--------------------          (ha)      (cms)       (hrs)        (mm)
        ID1= 1 (  0001):      6.57      2.011       12.25       99.62
      + ID2= 2 (  0002):      4.32      1.001       12.27       73.22
```

Conservative Model Output (SCS)

ID = 3 (0009):	10.89	2.998	12.25	89.15

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0009)
3 + 2 = 1

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 3 (0009):	10.89	2.998	12.25	89.15
+ ID2= 2 (0007):	7.90	0.695	12.60	49.88
ID = 1 (0009):	18.79	3.359	12.27	77.70

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008)
ID= 1 DT= 1.0 min

Area (ha)= 11.10 Curve Number (CN)= 66.4
Ia (mm)= 7.20 # of Linear Res.(N)= 3.00
U.H. Tp(hrs)= 0.79

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.560 (i)
TIME TO PEAK (hrs)= 13.000
RUNOFF VOLUME (mm)= 40.948
TOTAL RAINFALL (mm)= 120.502
RUNOFF COEFFICIENT = 0.340

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

CALIB STANDHYD (0003)
ID= 1 DT= 1.0 min

Area (ha)= 3.20
Total Imp(%)= 59.00 Dir. Conn.(%)= 0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		133.03	236.11	
over (min)		5.00	7.00	
Storage Coeff. (min)=		2.86 (ii)	6.16 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.33	0.18	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.75	0.749 (iii)
TIME TO PEAK	(hrs)=	12.22	12.27	12.27
RUNOFF VOLUME	(mm)=	118.14	73.22	73.22
TOTAL RAINFALL	(mm)=	120.50	120.50	120.50
RUNOFF COEFFICIENT	=	0.98	0.61	0.61

***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
YOU SHOULD CONSIDER SPLITTING THE AREA.

Conservative Model Output (SCS)

(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 (0004)	ID= 1 DT= 1.0 min	Area (ha)= 2.70	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		133.03	61.11	
over	(min)	5.00	6.00	
Storage Coeff.	(min)=	2.72 (ii)	5.48 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	6.00	
Unit Hyd. peak	(cms)=	0.32	0.20	
				TOTALS
PEAK FLOW	(cms)=	0.73	0.11	0.835 (iii)
TIME TO PEAK	(hrs)=	12.25	12.27	12.25
RUNOFF VOLUME	(mm)=	118.14	45.45	98.88
TOTAL RAINFALL	(mm)=	120.50	120.50	120.50
RUNOFF COEFFICIENT	=	0.98	0.38	0.82

(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 (0010)	1 + 2 = 3		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 1 (0003):		3.20	0.749	12.27	73.22
	+ ID2= 2 (0004):		2.70	0.835	12.25	98.88
	ID = 3 (0010):		5.90	1.574	12.25	84.96

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)	3 + 2 = 1		AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
	ID1= 3 (0010):		5.90	1.574	12.25	84.96
	+ ID2= 2 (0008):		11.10	0.560	13.00	40.95
	ID = 1 (0010):		17.00	1.749	12.27	63.98

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0010):	17.00	1.749	12.27	63.98
	+ ID2= 2 (0009):	18.79	3.359	12.27	77.70
	ID = 3 (0011):	35.79	5.108	12.27	71.18

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB STANDHYD (0013)	Area (ha)=	6.58		
ID= 1 DT= 1.0 min	Total Imp(%)=	44.40	Dir. Conn.(%)=	33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	133.03	81.35	
over	(min)	5.00	11.00	
Storage Coeff.	(min)=	3.55 (ii)	10.02 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	11.00	
Unit Hyd. peak	(cms)=	0.28	0.11	
				TOTALS
PEAK FLOW	(cms)=	0.81	0.58	1.329 (iii)
TIME TO PEAK	(hrs)=	12.25	12.33	12.27
RUNOFF VOLUME	(mm)=	118.13	50.87	73.62
TOTAL RAINFALL	(mm)=	120.50	120.50	120.50
RUNOFF COEFFICIENT	=	0.98	0.42	0.61

(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 (0012)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0011):	35.79	5.108	12.27	71.18
	+ ID2= 2 (0013):	6.58	1.329	12.27	73.62
	ID = 3 (0012):	42.37	6.437	12.27	71.56

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)
IN= 2---> OUT= 1

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                                Conservative Model Output (SCS)
| DT=  1.0 min     |          OUTFLOW        STORAGE    |      OUTFLOW          STORAGE
--------------------          (cms)         (ha.m.)    |      (cms)          (ha.m.)
                              0.0000         0.0000    |       0.0001          5.0000

                                        AREA          QPEAK         TPEAK         R.V.
                                        (ha)          (cms)         (hrs)         (mm)
   INFLOW : ID= 2 (  0012)            42.370         6.437         12.27        71.56
   OUTFLOW: ID= 1 (  0014)            42.370         0.000         27.97         0.01

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=  0.00
                    TIME SHIFT OF PEAK FLOW          (min)=942.00
                    MAXIMUM  STORAGE   USED        (ha.m.)=  3.0318

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================================================================================
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       V    V   I    SSSSS  U   U    A    L
       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)\VH Suite 4.0\VO2\voin.dat

  Output  filename:
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fd7-cefe-4abb-93d1-4b7c1e288642\scen
  Summary filename:
C:\Users\bpowers\AppData\Local\Civica\VH4\61fe3ac0-5a97-4fee-8ce5-102abfc61ce9\01e42
fd7-cefe-4abb-93d1-4b7c1e288642\scen

DATE: 03/29/2018                                TIME: 03:42:04

USER:

COMMENTS: _____25mm - 4 hour Chicago_____

--------------------------------------------------------------------------------
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  ************************************
  ** Run 07                         **
  ************************************

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| CHICAGO STORM    |    IDF curve parameters: A= 568.700
| Ptotal= 24.99 mm |                          B=   6.662
```

Conservative Model Output (SCS)

C= 0.819

used in: INTENSITY = A / (t + B)^C

Duration of storm = 4.00 hrs
Storm time step = 5.00 min
Time to peak ratio = 0.33

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.08	1.36	1.08	6.91	2.08	4.18	3.08	1.86
0.17	1.45	1.17	11.03	2.17	3.77	3.17	1.78
0.25	1.55	1.25	26.16	2.25	3.43	3.25	1.71
0.33	1.67	1.33	76.07	2.33	3.16	3.33	1.64
0.42	1.81	1.42	33.71	2.42	2.92	3.42	1.58
0.50	1.99	1.50	18.64	2.50	2.72	3.50	1.52
0.58	2.20	1.58	12.62	2.58	2.55	3.58	1.47
0.67	2.47	1.67	9.46	2.67	2.39	3.67	1.43
0.75	2.82	1.75	7.55	2.75	2.26	3.75	1.38
0.83	3.29	1.83	6.28	2.83	2.14	3.83	1.34
0.92	3.97	1.92	5.38	2.92	2.04	3.92	1.30
1.00	5.03	2.00	4.70	3.00	1.94	4.00	1.26

CALIB NASHYD (0007) ID= 1 DT= 1.0 min	Area (ha)= 7.90	Curve Number (CN)= 72.6
	Ia (mm)= 6.50	# of Linear Res.(N)= 3.00
	U.H. Tp(hrs)= 0.46	

NOTE: RAINFALL WAS TRANSFORMED TO 1.0 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
0.017	1.36	1.017	6.91	2.017	4.18	3.02	1.86
0.033	1.36	1.033	6.91	2.033	4.18	3.03	1.86
0.050	1.36	1.050	6.91	2.050	4.18	3.05	1.86
0.067	1.36	1.067	6.91	2.067	4.18	3.07	1.86
0.083	1.36	1.083	6.91	2.083	4.18	3.08	1.86
0.100	1.45	1.100	11.03	2.100	3.77	3.10	1.78
0.117	1.45	1.117	11.03	2.117	3.77	3.12	1.78
0.133	1.45	1.133	11.03	2.133	3.77	3.13	1.78
0.150	1.45	1.150	11.03	2.150	3.77	3.15	1.78
0.167	1.45	1.167	11.03	2.167	3.77	3.17	1.78
0.183	1.55	1.183	26.16	2.183	3.43	3.18	1.71
0.200	1.55	1.200	26.16	2.200	3.43	3.20	1.71
0.217	1.55	1.217	26.16	2.217	3.43	3.22	1.71
0.233	1.55	1.233	26.16	2.233	3.43	3.23	1.71
0.250	1.55	1.250	26.16	2.250	3.43	3.25	1.71
0.267	1.67	1.267	76.07	2.267	3.16	3.27	1.64
0.283	1.67	1.283	76.07	2.283	3.16	3.28	1.64
0.300	1.67	1.300	76.07	2.300	3.16	3.30	1.64
0.317	1.67	1.317	76.07	2.317	3.16	3.32	1.64
0.333	1.67	1.333	76.07	2.333	3.16	3.33	1.64
0.350	1.81	1.350	33.71	2.350	2.92	3.35	1.58
0.367	1.81	1.367	33.71	2.367	2.92	3.37	1.58
0.383	1.81	1.383	33.71	2.383	2.92	3.38	1.58
0.400	1.81	1.400	33.71	2.400	2.92	3.40	1.58
0.417	1.81	1.417	33.71	2.417	2.92	3.42	1.58
0.433	1.99	1.433	18.64	2.433	2.72	3.43	1.53
0.450	1.99	1.450	18.64	2.450	2.72	3.45	1.52

Conservative Model Output (SCS)

0.467	1.99	1.467	18.64	2.467	2.72	3.47	1.52
0.483	1.99	1.483	18.64	2.483	2.72	3.48	1.52
0.500	1.99	1.500	18.64	2.500	2.72	3.50	1.52
0.517	2.20	1.517	12.62	2.517	2.55	3.52	1.47
0.533	2.20	1.533	12.62	2.533	2.55	3.53	1.47
0.550	2.20	1.550	12.62	2.550	2.55	3.55	1.47
0.567	2.20	1.567	12.62	2.567	2.55	3.57	1.47
0.583	2.20	1.583	12.62	2.583	2.55	3.58	1.47
0.600	2.47	1.600	9.46	2.600	2.39	3.60	1.43
0.617	2.47	1.617	9.46	2.617	2.39	3.62	1.43
0.633	2.47	1.633	9.46	2.633	2.39	3.63	1.43
0.650	2.47	1.650	9.46	2.650	2.39	3.65	1.43
0.667	2.47	1.667	9.46	2.667	2.39	3.67	1.43
0.683	2.82	1.683	7.55	2.683	2.26	3.68	1.38
0.700	2.82	1.700	7.55	2.700	2.26	3.70	1.38
0.717	2.82	1.717	7.55	2.717	2.26	3.72	1.38
0.733	2.82	1.733	7.55	2.733	2.26	3.73	1.38
0.750	2.82	1.750	7.55	2.750	2.26	3.75	1.38
0.767	3.29	1.767	6.28	2.767	2.14	3.77	1.34
0.783	3.29	1.783	6.28	2.783	2.14	3.78	1.34
0.800	3.29	1.800	6.28	2.800	2.14	3.80	1.34
0.817	3.29	1.817	6.28	2.817	2.14	3.82	1.34
0.833	3.29	1.833	6.28	2.833	2.14	3.83	1.34
0.850	3.97	1.850	5.38	2.850	2.04	3.85	1.30
0.867	3.97	1.867	5.38	2.867	2.04	3.87	1.30
0.883	3.97	1.883	5.38	2.883	2.04	3.88	1.30
0.900	3.97	1.900	5.38	2.900	2.04	3.90	1.30
0.917	3.97	1.917	5.38	2.917	2.04	3.92	1.30
0.933	5.03	1.933	4.70	2.933	1.94	3.93	1.26
0.950	5.03	1.950	4.70	2.950	1.94	3.95	1.26
0.967	5.03	1.967	4.70	2.967	1.94	3.97	1.26
0.983	5.03	1.983	4.70	2.983	1.94	3.98	1.26
1.000	5.03	2.000	4.70	3.000	1.94	4.00	1.26

Unit Hyd Qpeak (cms)= 0.656

PEAK FLOW (cms)= 0.039 (i)
TIME TO PEAK (hrs)= 2.050
RUNOFF VOLUME (mm)= 2.990
TOTAL RAINFALL (mm)= 24.991
RUNOFF COEFFICIENT = 0.120

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

CALIB STANDHYD (0001)	Area (ha)= 6.57		
ID= 1 DT= 1.0 min	Total Imp(%)= 73.50	Dir. Conn.(%)= 73.50	

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	4.83	1.74
Dep. Storage	(mm)=	1.00	5.00
Average Slope	(%)=	1.00	2.00
Length	(m)=	209.28	10.00
Mannings n	=	0.013	0.250
Max.Eff.Inten.(mm/hr)=		76.07	3.41
over (min)		5.00	7.00
Storage Coeff. (min)=		4.44 (ii)	6.72 (ii)
Unit Hyd. Tpeak (min)=		5.00	7.00
Unit Hyd. peak (cms)=		0.24	0.17
			TOTALS

Conservative Model Output (SCS)

PEAK FLOW	(cms)=	0.71	0.01	0.715 (iii)
TIME TO PEAK	(hrs)=	1.38	1.50	1.38
RUNOFF VOLUME	(mm)=	23.99	2.03	18.17
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.96	0.08	0.73

(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 (0002)	Area	(ha)=	4.32		
ID= 1 DT= 1.0 min	Total Imp	(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.55	1.77	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	169.71	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	76.07	26.76	
over	(min)	5.00	12.00	
Storage Coeff.	(min)=	3.91 (ii)	11.80 (ii)	
Unit Hyd. Tpeak	(min)=	5.00	12.00	
Unit Hyd. peak	(cms)=	0.33	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.07	0.073 (iii)
TIME TO PEAK	(hrs)=	1.37	1.57	1.57
RUNOFF VOLUME	(mm)=	22.99	5.52	5.52
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.92	0.22	0.22

***** 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 (0009)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0001):		6.57	0.715	1.38	18.17
+ ID2= 2 (0002):		4.32	0.073	1.57	5.52
ID = 3 (0009):		10.89	0.746	1.38	13.15

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Conservative Model Output (SCS)

ADD HYD (0009)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
ID1= 3 (0009):		10.89	0.746	1.38	13.15
+ ID2= 2 (0007):		7.90	0.039	2.05	2.99
ID = 1 (0009):		18.79	0.748	1.38	8.88

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB NASHYD (0008) ID= 1 DT= 1.0 min				
	Area (ha)=	11.10	Curve Number (CN)=	66.4
	Ia (mm)=	7.20	# of Linear Res.(N)=	3.00
	U.H. Tp(hrs)=	0.79		

Unit Hyd Qpeak (cms)= 0.537

PEAK FLOW (cms)= 0.028 (i)
TIME TO PEAK (hrs)= 2.583
RUNOFF VOLUME (mm)= 2.163
TOTAL RAINFALL (mm)= 24.991
RUNOFF COEFFICIENT = 0.087

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

CALIB STANDHYD (0003) ID= 1 DT= 1.0 min				
	Area (ha)=	3.20		
	Total Imp(%)=	59.00	Dir. Conn.(%)=	0.00

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.89	1.31	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	146.06	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		76.07	26.76	
over (min)		5.00	12.00	
Storage Coeff. (min)=		3.58 (ii)	11.47 (ii)	
Unit Hyd. Tpeak (min)=		5.00	12.00	
Unit Hyd. peak (cms)=		0.36	0.10	
				TOTALS
PEAK FLOW	(cms)=	0.00	0.06	0.055 (iii)
TIME TO PEAK	(hrs)=	1.37	1.57	1.57
RUNOFF VOLUME	(mm)=	22.99	5.52	5.52
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.92	0.22	0.22

***** 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.

Conservative Model Output (SCS)

CALIB					
STANDHYD (0004)	Area (ha)=	2.70			
ID= 1 DT= 1.0 min	Total Imp(%)=	73.50	Dir. Conn.(%)=	73.50	

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	1.98	0.72	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	134.16	20.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		76.07	3.41	
over (min)		5.00	7.00	
Storage Coeff. (min)=		3.40 (ii)	6.85 (ii)	
Unit Hyd. Tpeak (min)=		5.00	7.00	
Unit Hyd. peak (cms)=		0.29	0.16	
				TOTALS
PEAK FLOW	(cms)=	0.31	0.00	0.317 (iii)
TIME TO PEAK	(hrs)=	1.37	1.50	1.37
RUNOFF VOLUME	(mm)=	22.99	2.03	17.44
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.92	0.08	0.70

(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 (0010)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0003):	3.20	0.055	1.57	5.52
	+ ID2= 2 (0004):	2.70	0.317	1.37	17.44
	ID = 3 (0010):	5.90	0.338	1.38	10.97

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0010)		AREA	QPEAK	TPEAK	R.V.
3 + 2 = 1		(ha)	(cms)	(hrs)	(mm)
	ID1= 3 (0010):	5.90	0.338	1.38	10.97
	+ ID2= 2 (0008):	11.10	0.028	2.58	2.16
	ID = 1 (0010):	17.00	0.339	1.38	5.22

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
	ID1= 1 (0010):	17.00	0.339	1.38	5.22

+ ID2= 2 (0009):	18.79	0.748	1.38	8.88
ID = 3 (0011):	35.79	1.087	1.38	7.14

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

CALIB
STANDHYD (0013)
ID= 1 DT= 1.0 min

Area (ha)= 6.58
Total Imp(%)= 44.40 Dir. Conn.(%)= 33.80

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	2.92	3.66	
Dep. Storage	(mm)=	2.00	5.00	
Average Slope	(%)=	1.00	2.00	
Length	(m)=	209.44	30.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.(mm/hr)=		76.07	5.33	
over (min)		5.00	13.00	
Storage Coeff. (min)=		4.44 (ii)	12.53 (ii)	
Unit Hyd. Tpeak (min)=		5.00	13.00	
Unit Hyd. peak (cms)=		0.24	0.09	
				TOTALS
PEAK FLOW	(cms)=	0.33	0.03	0.334 (iii)
TIME TO PEAK	(hrs)=	1.38	1.62	1.38
RUNOFF VOLUME	(mm)=	22.99	2.56	9.46
TOTAL RAINFALL	(mm)=	24.99	24.99	24.99
RUNOFF COEFFICIENT	=	0.92	0.10	0.38

(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 (0012)
1 + 2 = 3

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
ID1= 1 (0011):	35.79	1.087	1.38	7.14
+ ID2= 2 (0013):	6.58	0.334	1.38	9.46
ID = 3 (0012):	42.37	1.421	1.38	7.50

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0014)
IN= 2---> OUT= 1
DT= 1.0 min

OUTFLOW (cms)	STORAGE (ha.m.)	OUTFLOW (cms)	STORAGE (ha.m.)
0.0000	0.0000	0.0001	5.0000

	AREA (ha)	QPEAK (cms)	TPEAK (hrs)	R.V. (mm)
INFLOW : ID= 2 (0012)	42.370	1.421	1.38	7.50
OUTFLOW: ID= 1 (0014)	42.370	0.000	8.45	0.00

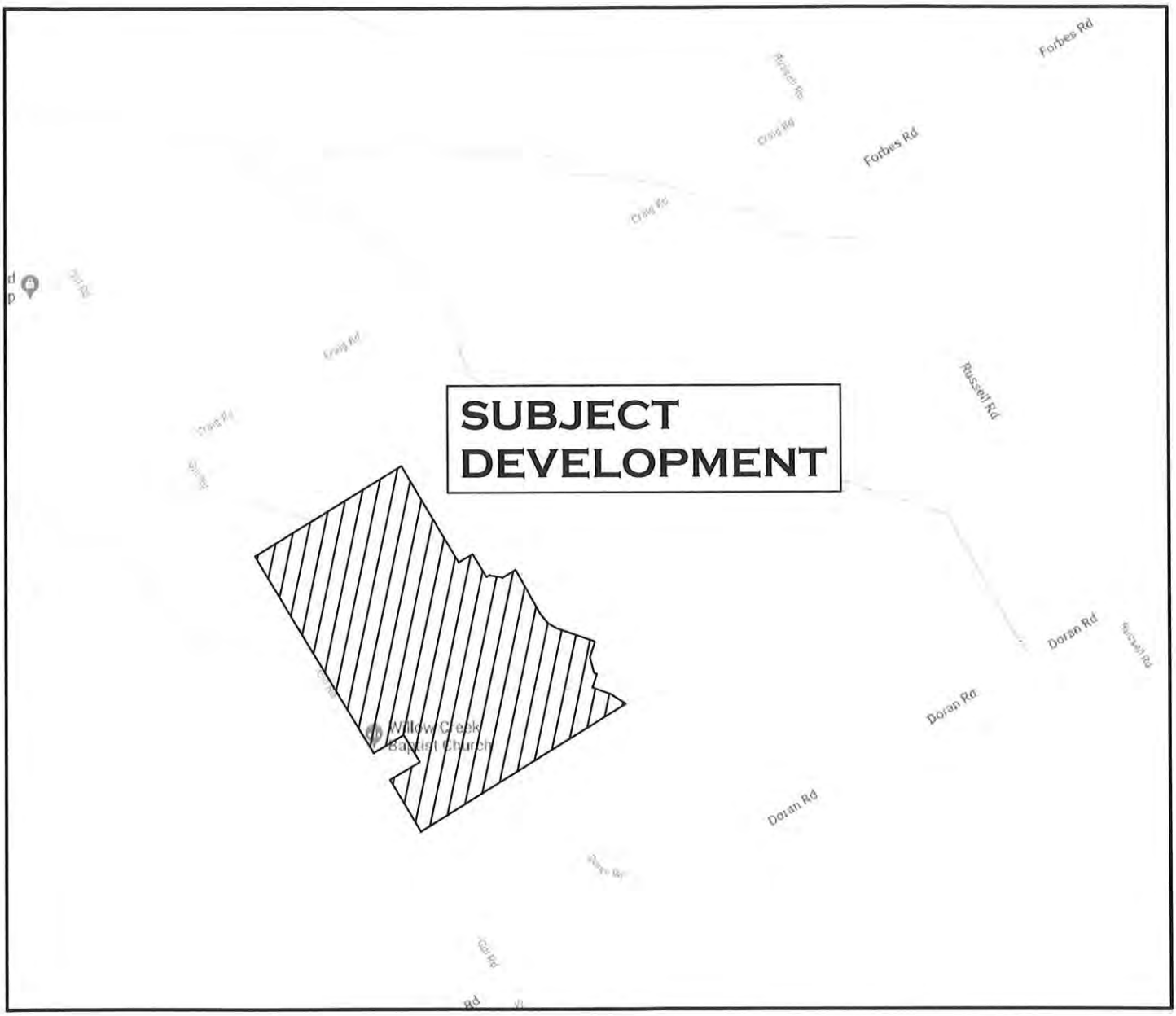
Conservative Model Output (SCS)

PEAK FLOW REDUCTION [Qout/Qin](%)= 0.00
TIME SHIFT OF PEAK FLOW (min)=424.00
MAXIMUM STORAGE USED (ha.m.)= 0.3179

FIGURES

Figure 1: Site Location
Figure 2: Concept Plan
Figure 3: Pre- Development Drainage Plan
Figure 4: Post- Development Drainage Plan
Figure 5: OTTHYMO Catchment Discretization Plan

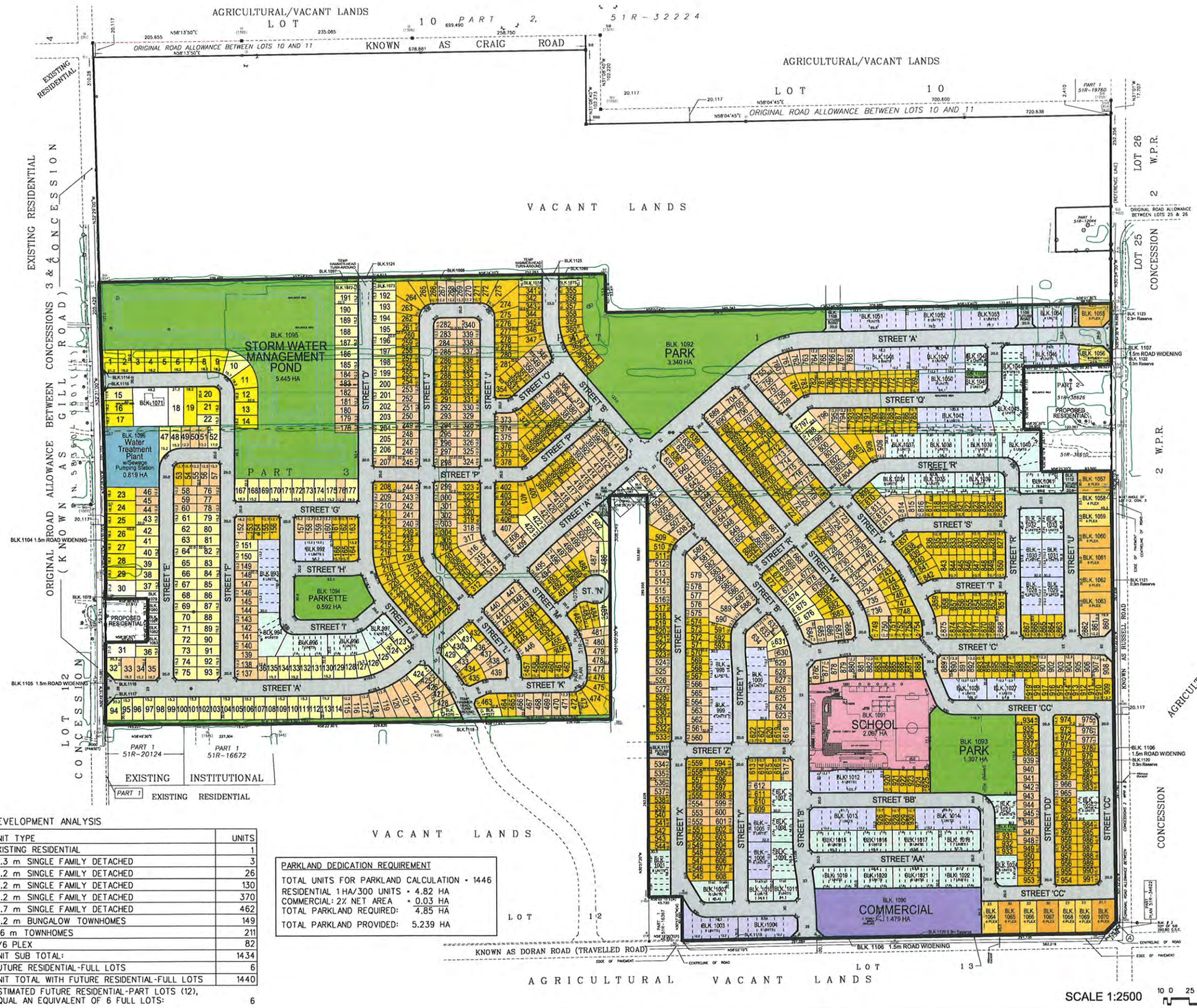
Drawing 101: General Site Servicing Plan
Drawing 101A: Temporary Raw Water Waterman General Layout
Drawings 102A: Site Grading Plan (North West Part)
Drawings 102B: Site Grading Plan (Central West Part)
Drawings 102C: Site Grading Plan (South West Part)
Drawings 102D: Site Grading Plan (South East Part)
Drawings 102E: Site Grading Plan (North East Part)
Drawings 102F: Site Grading Plan (Typical Rear Yard Drainage)
Drawing 104A: Stormwater Management Facility Plan
Drawing 106: Sanitary Drainage Plan
Drawing 107: Storm Drainage Plan



Project	MIDHURST HEIGHTS DEVELOPMENT TOWNSHIP OF SPRINGWATER	CROZIER & ASSOCIATES Consulting Engineers	THE HARBOUREDGE BUILDING, 40 HURON STREET, SUITE 301, COLLINGWOOD, ON L9Y 4R3 705 446-3510 T 705 446-3520 F WWW.CFCROZIER.CA INFO@CFCROZIER.CA
Drawing	SITE LOCATION	Drawn By B.K. / Design By L.W. / Project 845-3675	
		Scale N.T.S. / Date 02/28/2018 / Check By C.F.C. / Drawing FIG 1	

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\FIGURES\3675-FIGURE 5.dwg, FIG 1, 3/29/2018 3:27:01 PM, scousins

Figure 2



DEVELOPMENT ANALYSIS

UNIT TYPE	UNITS
EXISTING RESIDENTIAL	1
21.3 m SINGLE FAMILY DETACHED	3
18.2 m SINGLE FAMILY DETACHED	26
15.2 m SINGLE FAMILY DETACHED	130
12.2 m SINGLE FAMILY DETACHED	370
10.7 m SINGLE FAMILY DETACHED	462
12.2 m BUNGALOW TOWNHOMES	149
7.6 m TOWNHOMES	211
4/6 PLEX	82
UNIT SUB TOTAL:	1434
FUTURE RESIDENTIAL-FULL LOTS	6
UNIT TOTAL WITH FUTURE RESIDENTIAL-FULL LOTS	1440
ESTIMATED FUTURE RESIDENTIAL-PART LOTS (12), EQUAL AN EQUIVALENT OF 6 FULL LOTS:	6

PARKLAND DEDICATION REQUIREMENT

TOTAL UNITS FOR PARKLAND CALCULATION = 1446
RESIDENTIAL 1 HA/300 UNITS = 4.82 HA
COMMERCIAL: 2% NET AREA = 0.03 HA
TOTAL PARKLAND REQUIRED: 4.85 HA
TOTAL PARKLAND PROVIDED: 5.239 HA

SCALE 1:2500 (10 0 25 50 100 m)

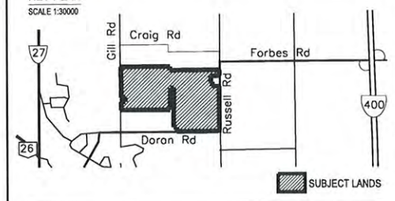
MIDHURST HEIGHTS DEVELOPMENT

DRAFT PLAN OF SUBDIVISION

OF PART LOT 11, CONCESSION 3
AND PART OF LOT 12, CONCESSION 3
(GEOGRAPHIC TOWNSHIP OF VESPRA)
TOWNSHIP OF SPRINGWATER
COUNTY OF SIMCOE

WESTON CONSULTING
planning + urban design

KEY PLAN
SCALE 1:30000



OWNER'S CERTIFICATE:
I authorize Weston Consulting Group Inc. to prepare and submit this plan for draft approval.

SEE ORIGINAL SUBMISSION ..... Date: .....

ALEX TROOP, PRESIDENT
MIDHURST ROSE ALLIANCE INC.
MIDHURST ROSE ALLIANCE COONEY INC
MIDHURST ROSE ALLIANCE O'BRIEN INC.
ALLIANCE HOMES LTD.
6048 HIGHWAY 9, UNIT 7
SCHOMBERG, ONTARIO
L0G 1T0
TEL 905-761-7066 FAX 905-761-7201

SURVEYOR'S CERTIFICATE:
I hereby certify that the boundaries of the lands being subdivided and their correct relationship to the adjacent lands are accurately and correctly shown on this plan.

SEE ORIGINAL SUBMISSION ..... Date: .....

C. T. STRONGMAN SURVEYING LTD.
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4145 BURNSIDE LINE
R.R. No. 4, ORILLIA, ONTARIO
L3V 6H4
TEL 705-329-0765 FAX 705-329-0424

ADDITIONAL INFORMATION:
[Section 51(17) of the Planning Act, R.S.O. 1990, c. P. 13], as amended to May 26, 2014.
a), b), e), f), g), & j) - on plan.
c) - on key plan
d) - see statistics
h) - municipal water and sewage services
i) - sandy loam
k) - all services to be made available by developer
l) - nil

DEVELOPMENT STATISTICS:

Residential - Single Family Detached [Lots 1-991]:	41.265 ha
Residential-Bungalow Townhomes (12.2m) [Blks. 992,993,998-1000,1003-1006, 1012-1014,1026-1031,1042,1045-1047,1050-1054]:	6.045 ha
Residential-Townhomes (7.6m) [Blks. 994-997,1001,1002,1007-1011, 1015-1025,1032-1041,1043,1044,1048,1049]:	5.789 ha
Residential - 4&6 Plex [Blks 1055-1070]:	1.941 ha
Existing Residential Lot [Blk. 1071]:	0.261 ha
Future Residential-Full Lots [Blks. 1072-1077]:	0.246 ha
Future Residential-Part Lots [Blks. 1078-1089]:	0.277 ha
Commercial [Blk. 1090]:	1.479 ha
School [Blk. 1091]:	2.067 ha
Neighbourhood Park [Blk. 1092,1093]:	4.647 ha
Parkette [Blk. 1094]:	0.592 ha
Storm Water Management Pond [Blk. 1095]:	5.445 ha
Water Treatment/Sewage Pumping Station [Blk.1096]:	0.619 ha
Trail Blocks [Blks. 1097-1101]:	0.579 ha
Future Well Site [Blks. 1102,1103]:	0.059 ha
Road Widenings [Blks. 1104-1107]:	0.280 ha
Future Roads [Blks. 1108-1112]:	0.305 ha
Future Laneway (8.5m) [Blk. 1113]:	0.028 ha
0.3m Reserves [Blks. 1114-1125]:	0.040 ha
Road:	25.276 ha
TOTAL:	97.240 ha

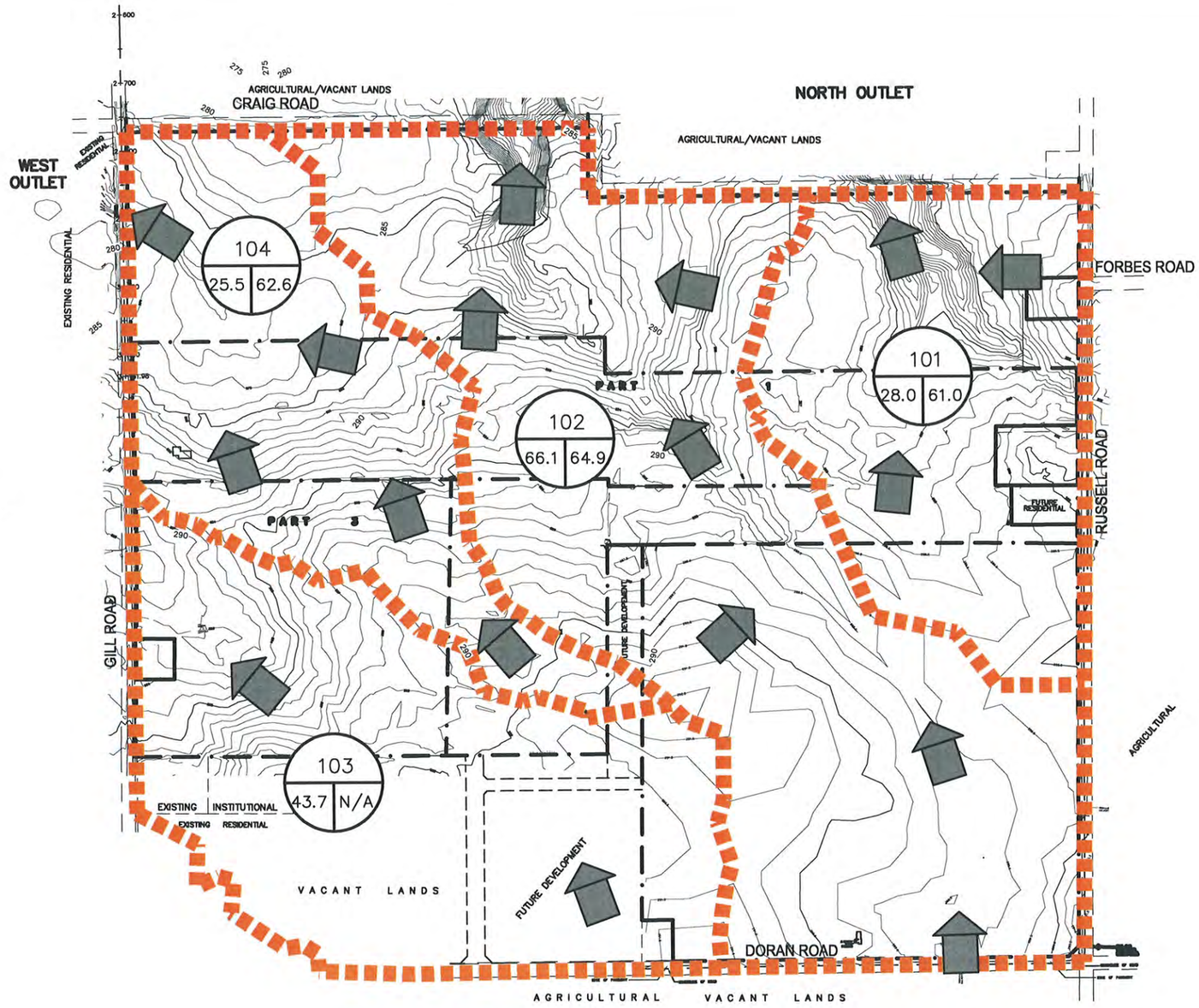
WESTON CONSULTING
planning + urban design
1-800.363.3558 westonconsulting.com
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Oakville: 1660 North Service Rd. E. Suite 114 Oakville, Ontario L6H 7G3 T. 905.844.8749 F. 905.738.6637
Toronto: 127 Berkeley St. Toronto, Ontario M5A 2X1 T. 416.640.9917 F. 905.738.6637

REVISIONS LIST

27 MAY 2014	Revise Lot #'s & statistics
23 MAY 2014	Revise Parkette, Transitional Lotting & Future Road Blk.
14 MAY 2014	Revise school/park/adjacent lotting
4 APR 2014	Revised draft plan based on comments received

File Number:	4679
Drawn By:	SM / SB
Planner:	RG
Scale:	see scale bar
CAD:	4679/draft plans/D6.dgn

Drawing Number: D6



N

NOTE:
EXTERNAL CATCHMENTS SOUTH OF DORAN ROAD AND EAST OF RUSSELL ROAD ARE NOT SHOWN AS THEY DO NOT RELATE TO CURRENT PHASES OF DEVELOPMENT.

LEGEND

- PROPERTY BOUNDARY
- OVERLAND DRAINAGE DIRECTION
- EXISTING CONTOUR
- PRE-DEVELOPMENT DRAINAGE CATCHMENT BOUNDARY (MNT 2013)
- CATCHMENT AREA ID
- CURVE NUMBER
- CATCHMENT AREA (ha)

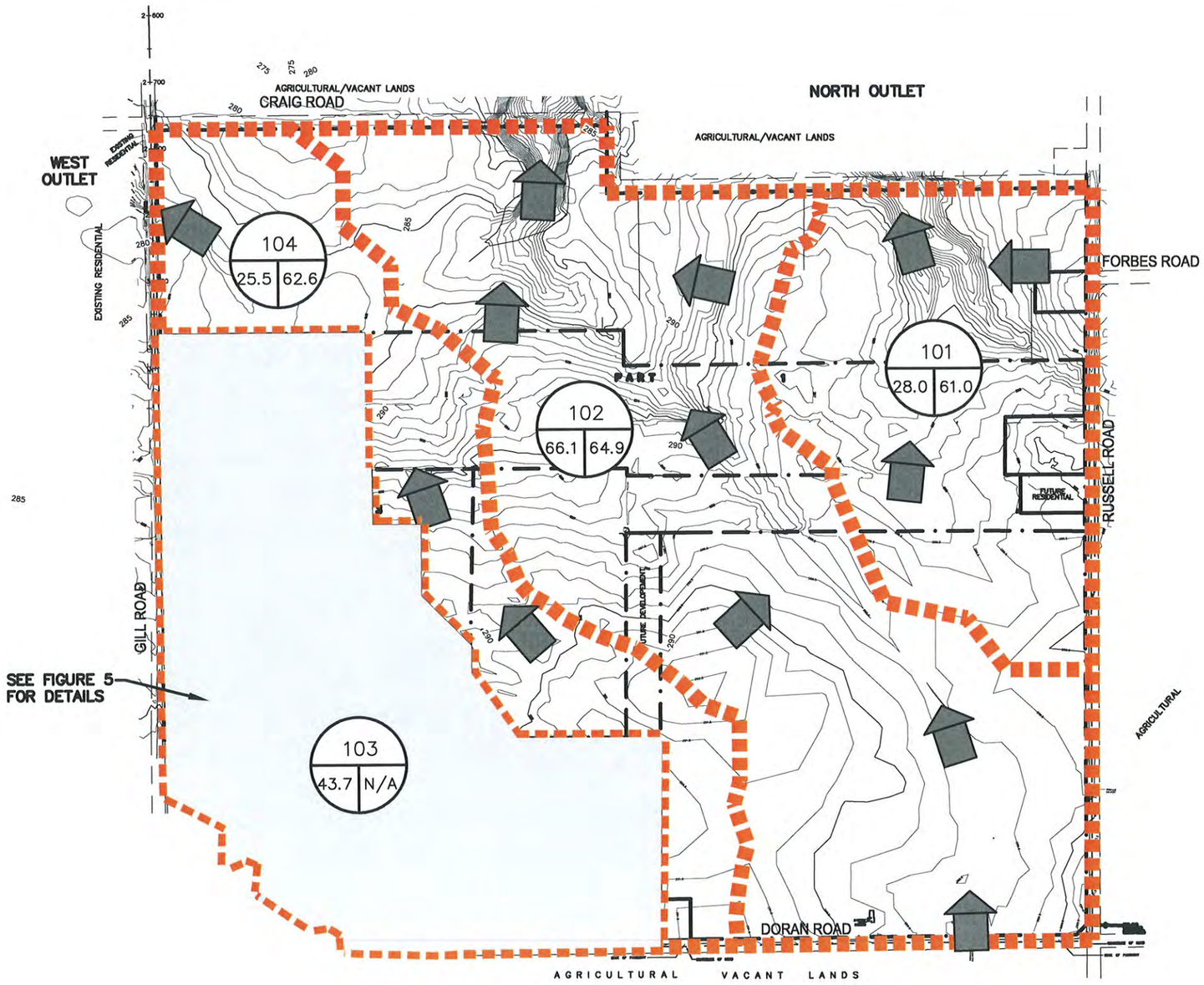
Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: OVERALL PRE-DEVELOPMENT DRAINAGE AREA PLAN

CROZIER & ASSOCIATES Consulting Engineers
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info@cfcrozier.ca

Drawn By	L.W.	Design By	L.W.	Project	845-3675
Scale	1:7500	Date	02/28/2018	Check By	C.F.C.	Drawing	FIG 3

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\FIGURES\3675 FIGURE 3-4.dwg, FIG 3, 3/29/2018 4:09:18 PM,



N

NOTE:
EXTERNAL CATCHMENTS SOUTH OF DORAN ROAD AND EAST OF RUSSELL ROAD ARE NOT SHOWN AS THEY DO NOT RELATE TO CURRENT PHASES OF DEVELOPMENT.

LEGEND

- PROPERTY BOUNDARY
- OVERLAND DRAINAGE DIRECTION
- EXISTING CONTOUR
- PRE-DEVELOPMENT DRAINAGE CATCHMENT BOUNDARY (MNT 2013)
- CATCHMENT AREA ID
- CURVE NUMBER
- CATCHMENT AREA (ha)

101
28.0 | 61.0

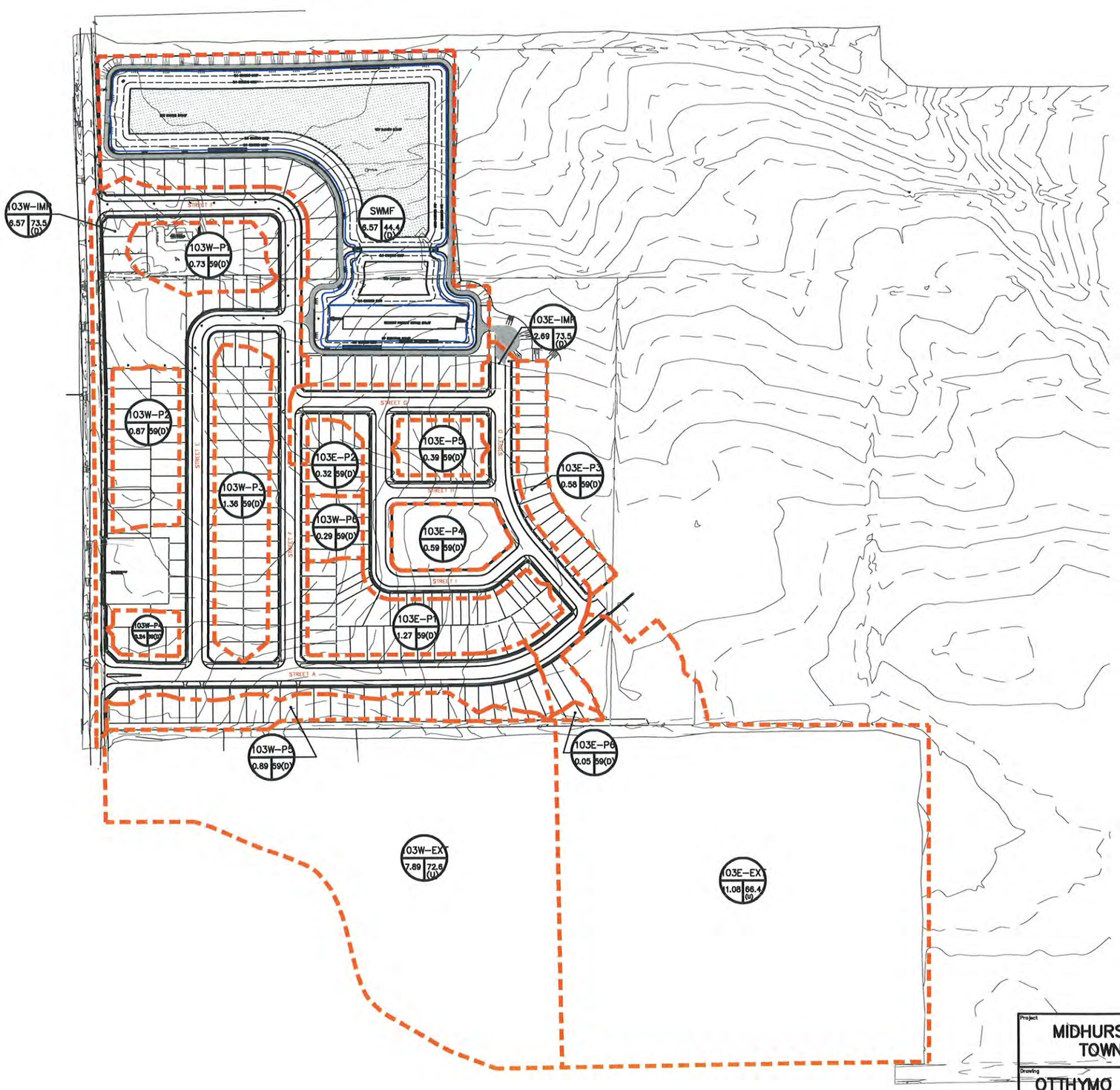
Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: OVERALL POST-DEVELOPMENT DRAINAGE AREA PLAN

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Drawn By	L.W.	Design By	L.W.	Project	845-3675
Scale	1:7500	Date	02/28/2018	Check By	C.F.C.	Drawing	FIG 4

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\FIGURES\3675 FIGURE 3-4.dwg, FIG 4, 3/29/2018 4:09:41 PM,



NOTE:
OTTHYMO MODELING DISCRETIZATION HAS BEEN LUMPED AS FOLLOWS:

- 103W-P: CONSISTS OF REAR YARD CATCHMENTS WITH DRAINAGE TO WEST SWMF INLET, INCLUDING 103W-P1, 103W-P2, 103W-P3, 103W-P4, 103W-P5 AND 103W-P6.
- 103E-P: CONSISTS OF REAR YARD CATCHMENTS WITH DRAINAGE TO EAST SWMF INLET, INCLUDING 103E-P1, 103E-P2, 103E-P3, 103E-P4, 103E-P5 AND 103E-P6.

LEGEND

CATCHMENT BOUNDARY

X
XX XX

STORM CATCHMENT ID

DEVELOPED CATCHMENT (D): PERCENT IMPERVIOUS
UNDEVELOPED CATCHMENT (U): RUNOFF CURVE NUMBER

STORM CATCHMENT AREA (ha)

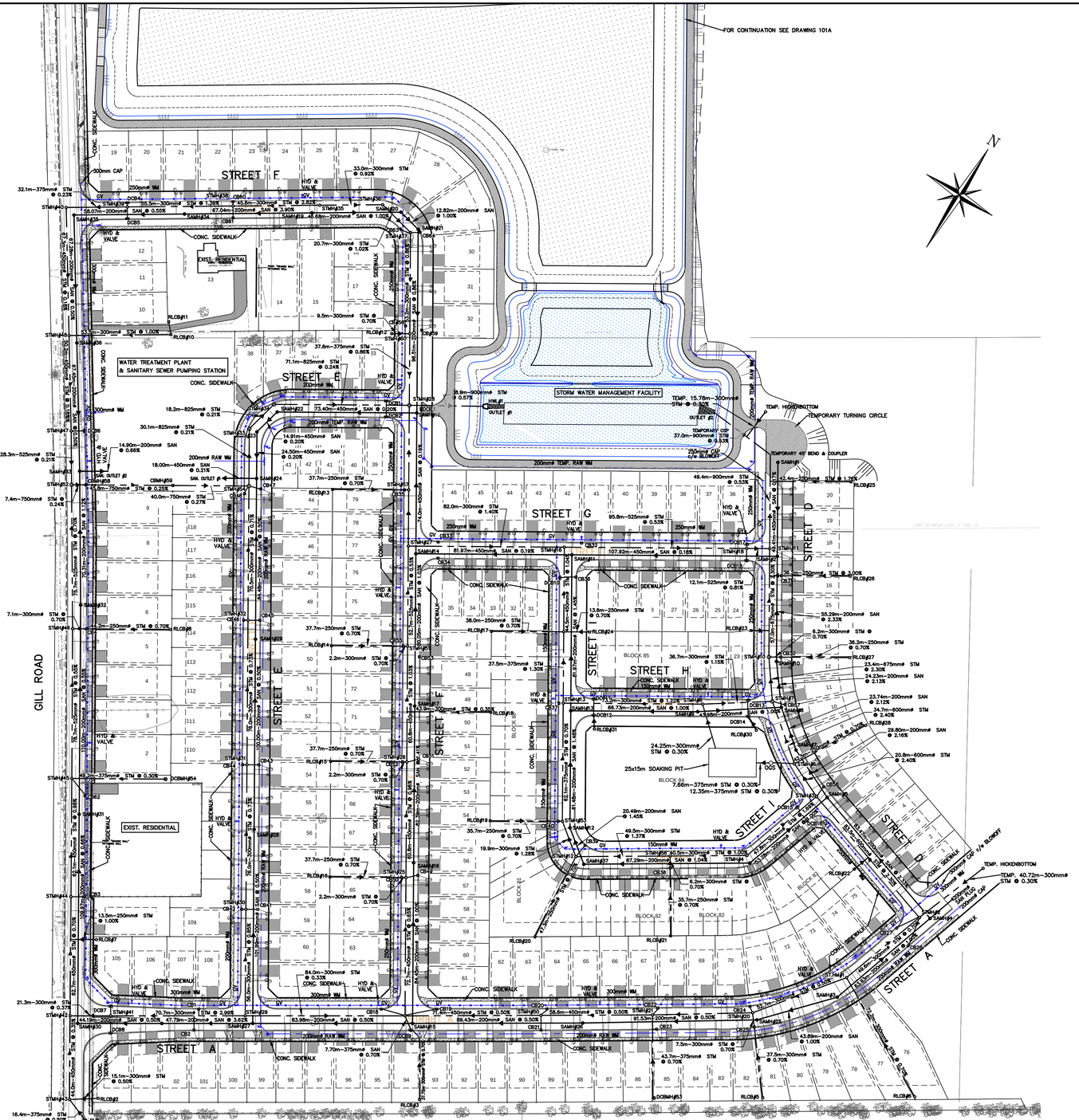
Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: OTTHYMO CATCHMENT DISCRETIZATION PLAN

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Drawn By	B.K.	Design By	L.W.	Project	845-3675
Scale	1:4000	Date	02/28/2018	Check By	C.F.C.	Drawing	FIG 5

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\FIGURES\3675-FIGURE 5.dwg, FIG 5, 3/29/2018 3:35:39 PM, scousins



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GEODETIC BENCHMARKS

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Engineer

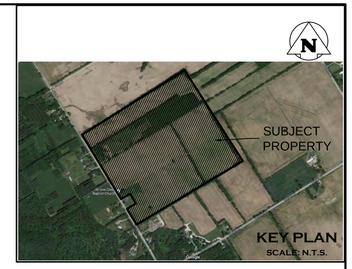
Engineer

Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: GENERAL SITE SERVICING PLAN

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Drawn By	Design By	Project
J.K.	J.K.	845–3675
Scale: 1:1250	Date: 10/03/2018	Check By: R.W./B.H.
		Drawing: 101



200mmø RAW WATER WATERMAIN (1.8m MIN. COVER)

FOR CONTINUATION SEE DRAWINGS 101, 103 & 104

3.0m

45°

DEVELOPMENT BOUNDARY

STORMWATER MANAGEMENT FACILITY

STREET 'D'

STREET 'J'

STREET 'P'

STREET 'G'

STREET 'H'

STREET 'I'

STREET 'A'

STREET 'Q'

STREET 'V'

STREET 'W'

STREET 'R'

STREET 'S'

STREET 'T'

STREET 'U'

STREET 'R'

STREET 'T'

STREET 'U'

STREET 'R'

STREET 'S'

STREET 'T'

STREET 'U'

STREET 'R'

STREET 'T'

STREET 'U'

STREET 'R'

STREET 'S





LEGEND

- CONTOUR (0.5m INTERVALS)
- PROPOSED DEVELOPMENT LOT LINES
- x 216.30 — PROPOSED GRADES
- x 216.30 — EXISTING GRADES TO MATCH
- xTW-216.30 — PROPOSED TOP OF WALL GRADES
- STMH#1 — STORM SEWER MANHOLE
- CBMH#1 — CATCHBASIN MANHOLE
- DCBMH#1 — DOUBLE CATCHBASIN MANHOLE
- DCB — DOUBLE CATCHBASIN
- RLCB#1 — REAR LOT CATCHBASIN
- CB — CATCHBASIN
- DICB — DITCH INLET CATCHBASIN
- OVERLAND FLOW ROUTE
- LOT LINE DRAINAGE
- SWALE
- HDSF — HEAVY DUTY SILT FENCE
- STRAW BALE FLOW CHECK
- LOCATION OF INFILTRATION TRENCH
- PROP. DRIVEWAY
- BUILDING SETBACK AS PER ZONING

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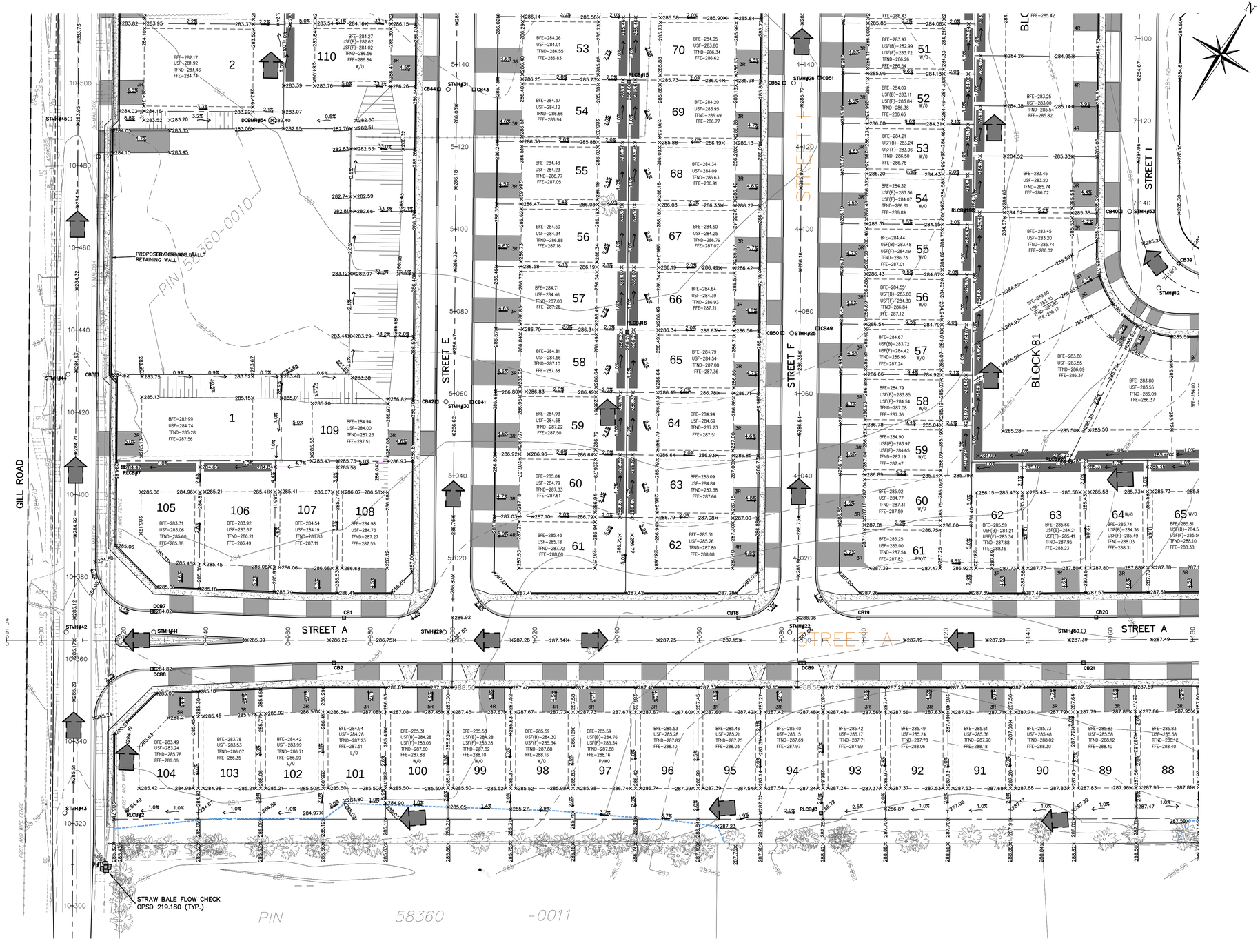
Engineer

Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: SITE GRADING PLAN
(CENTRAL WEST PART)

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Drawn By	Design By	Project
J.K.	J.K.	845-3675
Scale: 1:500	Date: 10/03/2018	Check By: R.W./B.H.
		Drawing: 102B





LEGEND

- 215.00 — CONTOUR (0.5m INTERVALS)
- PROPOSED DEVELOPMENT LOT LINES
- x 216.30 — PROPOSED GRADES
- x 216.30 — EXISTING GRADES TO MATCH
- xTW–216.30 — PROPOSED TOP OF WALL GRADES
- STMH#1 — STORM SEWER MANHOLE
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- DICB — DITCH INLET CATCHBASIN
- OVERLAND FLOW ROUTE
- LOT LINE DRAINAGE
- SWALE
- HDSF HDSF HDSF — HEAVY DUTY SILT FENCE
- STRAW BALE FLOW CHECK
- LOCATION OF INFILTRATION TRENCH
- PROP. DRIVEWAY
- BUILDING SETBACK AS PER ZONING
- BUTTERNUT TREES PROTECTION ZONE LIMIT

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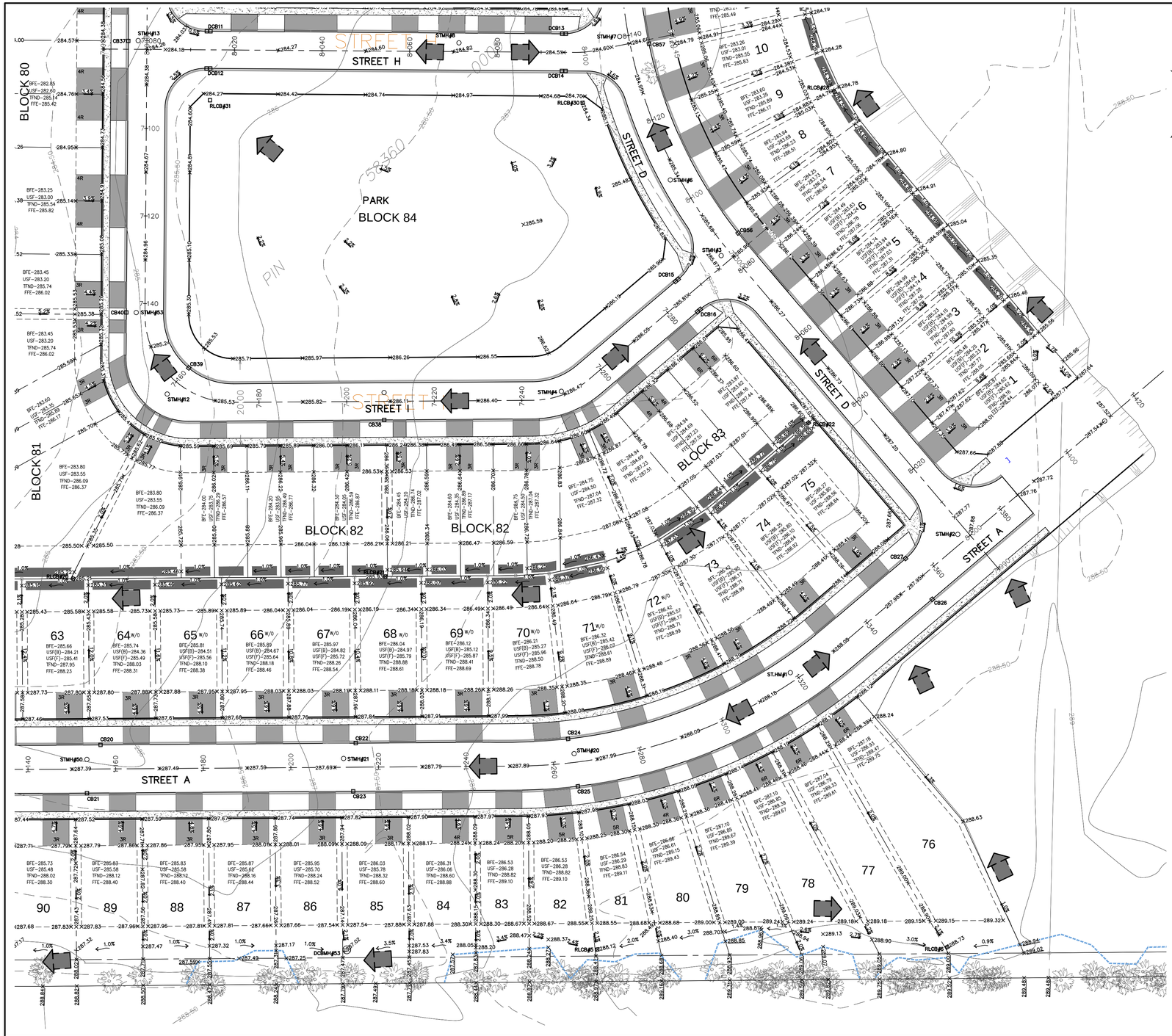
Engineer

Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: SITE GRADING PLAN
(SOUTH WEST PART)

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THE HARBOUREDGE BUILDING,
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Scale	1:500	Date	10/03/2018	Check By	R.W./B.H.	Drawing	102C





LEGEND

- 215.00 — CONTOUR (0.5m INTERVALS)
- PROPOSED DEVELOPMENT LOT LINES
- x 216.30 — PROPOSED GRADES
- x 216.30 — EXISTING GRADES TO MATCH
- x TW-216.30 — PROPOSED TOP OF WALL GRADES
- STMH#1 — STORM SEWER MANHOLE
- CBMH#1 — CATCHBASIN MANHOLE
- DCBMH#1 — DOUBLE CATCHBASIN MANHOLE
- DCB — DOUBLE CATCHBASIN
- RLCB#1 — REAR LOT CATCHBASIN
- CB — CATCHBASIN
- DICB — DITCH INLET CATCHBASIN
- OVERLAND FLOW ROUTE
- LOT LINE DRAINAGE
- SWALE
- HDSF — HEAVY DUTY SILT FENCE
- STRAW BALE FLOW CHECK
- LOCATION OF INFILTRATION TRENCH
- PROP. DRIVEWAY
- BUILDING SETBACK AS PER ZONING
- BUTTERNUT TREES PROTECTION ZONE LIMIT

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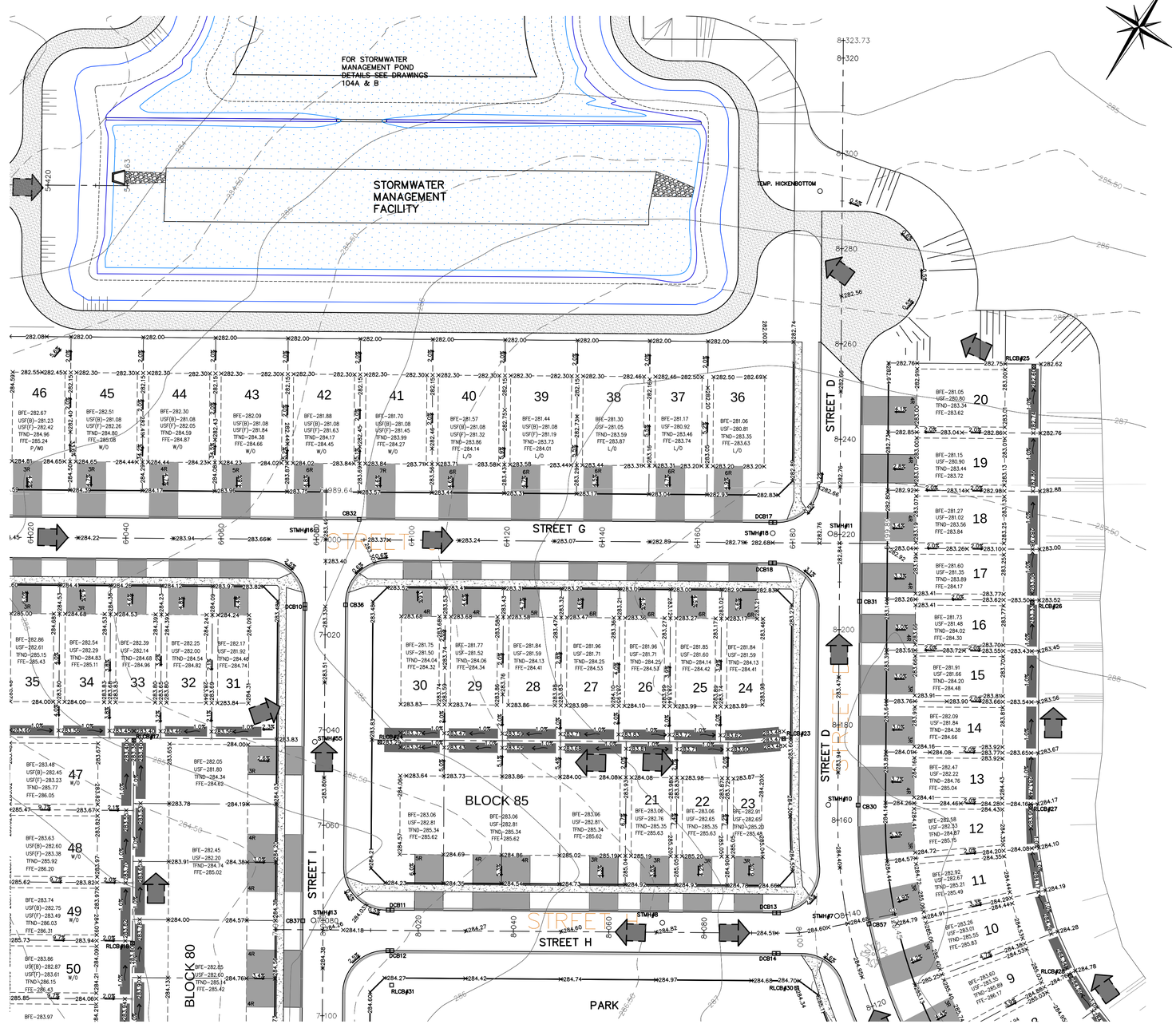
Engineer

Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: SITE GRADING PLAN
(SOUTH EAST PART)

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Drawn By	Design By	Project
J.K.	J.K.	845-3675
Scale: 1:500	Date: 10/03/2018	Check By: R.W./B.H.
		Drawing: 102D





LEGEND

- 215.00 — CONTOUR (0.5m INTERVALS)
- PROPOSED DEVELOPMENT LOT LINES
- x 216.30 — PROPOSED GRADES
- x 216.30 — EXISTING GRADES TO MATCH
- x TW–216.30 — PROPOSED TOP OF WALL GRADES
- STMH#1 — STORM SEWER MANHOLE
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- LOT LINE DRAINAGE
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- STRAW BALE FLOW CHECK
- LOCATION OF INFILTRATION TRENCH
- PROP. DRIVEWAY
- BUILDING SETBACK AS PER ZONING

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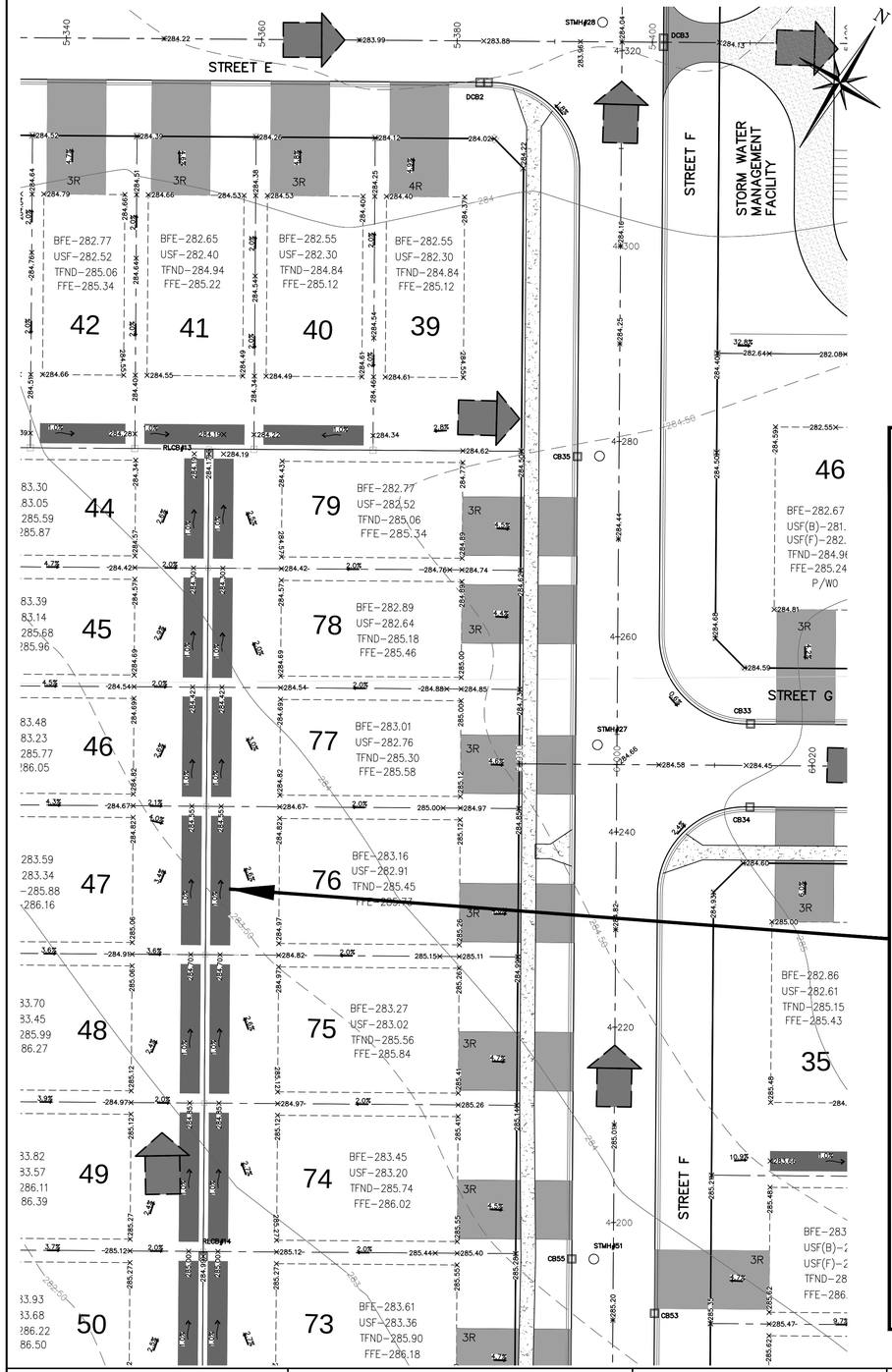
Engineer

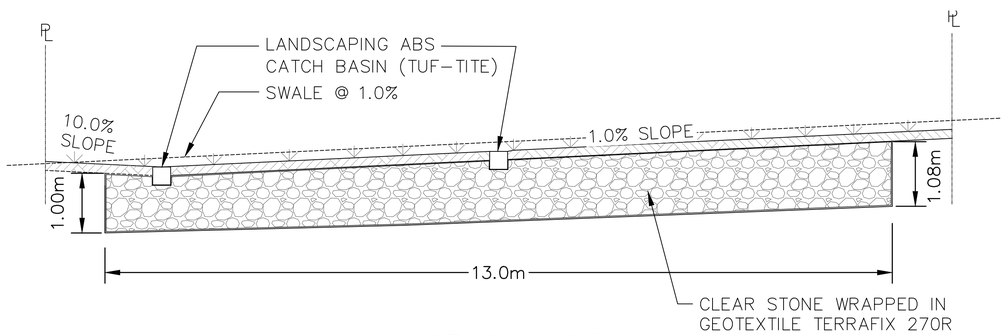
Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: SITE GRADING PLAN
(NORTH EAST PART)

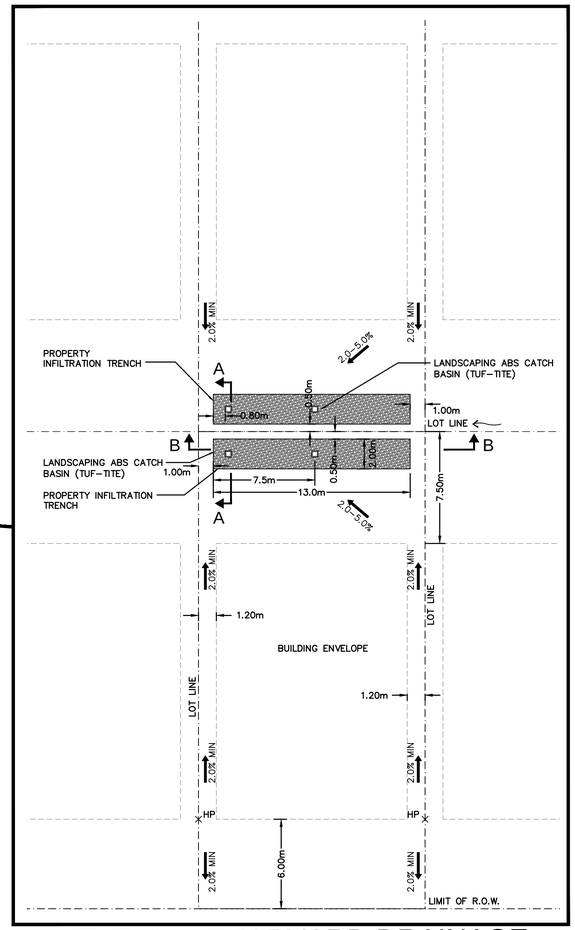
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705 446-3520 F
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Drawn By	Design By	Project
J.K.	J.K.	845–3675
Scale: 1:500	Date: 10/03/2018	Check By: R.W./B.H.
		Drawing: 102E

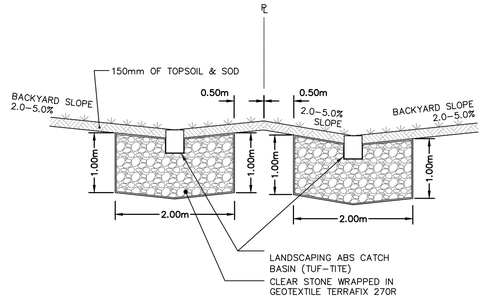




SECTION B-B
SCALE: N.T.S.



TYPICAL REARYARD DRAINAGE
SCALE 1:200



SECTION A-A
SCALE: N.T.S.



LEGEND

- 515.00 — CONTOUR (0.5m INTERVALS)
- PROPOSED DEVELOPMENT LOT LINES
- x 284.30 — PROPOSED GRADES
- x 283.00 — EXISTING GRADES TO MATCH
- STMH#1 — STORM SEWER MANHOLE
- CBMH#1 — CATCHBASIN MANHOLE
- DCBMH#1 — DOUBLE CATCHBASIN MANHOLE
- DCB — DOUBLE CATCHBASIN
- RLCB#1 — REAR LOT CATCHBASIN
- CB — LANDSCAPING CATCHBASIN
- OVERLAND FLOW ROUTE
- LOT LINE DRAINAGE
- SWALE
- INDIVIDUAL LOT CATCHMENTS AREA

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TEMPORARY BENCHMARKS

GEODETIC BENCHMARKS

No.	ISSUE / REVISION	DATE: MM/DD/YYYY
1	ISSUED FOR FIRST ENGINEERING SUBMISSION	29/03/2018

Engineer

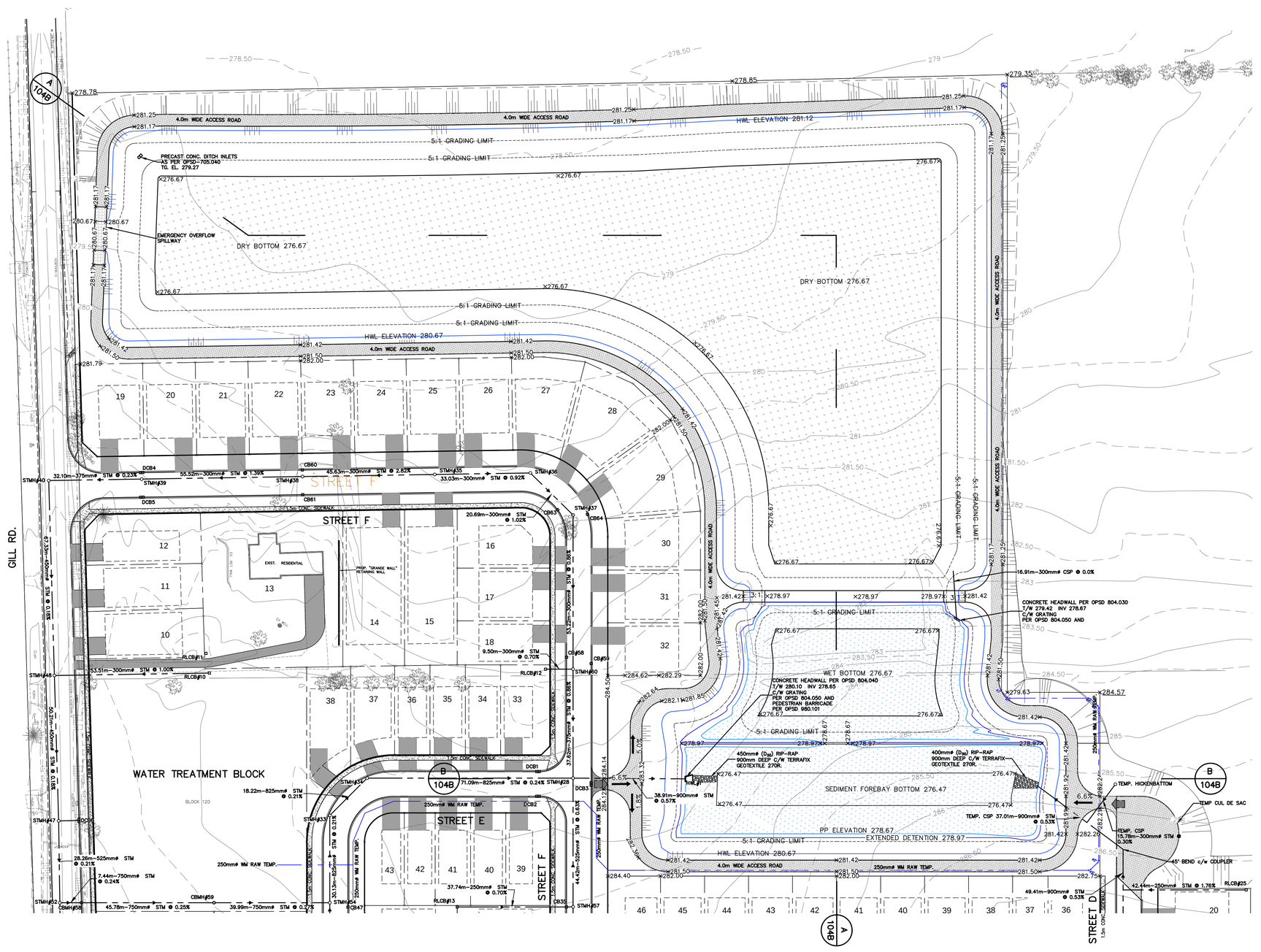
Engineer

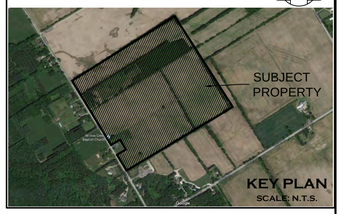
Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: SITE GRADING PLAN
(TYPICAL REAR YARD DRAINAGE)

CROZIER & ASSOCIATES Consulting Engineers
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
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Drawn By	Design By	Project
J.K.	J.K.	845-3675
Scale: 1:300	Date: 10/03/2018	Check By: R.W./B.H.
		Drawing: 102F





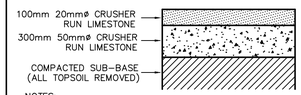
LEGEND

- 215.00 — EX. CONTOURS
- ×278.00 — PR. ELEVATION (MATCH EXISTING)
- ×281.50 — PR. ELEVATION
- PROPERTY LINE
- PR. 4.0m WIDE MAINTENANCE ACCESS ROAD
- PR. STM SEWER AND MH
- PR. HEADWALL
- PR. OVERLAND FLOW ROUTE
- PR. RIP–RAP c/w TERRAFIX GEOTEXTILE 270R

SWM Facility Operating Characteristics		
	Elevation (m)	Volume (m^3)
Bottom (Main Cell)	276.67	--
Bottom (Forebay)	276.47	--
Perm. Pool	278.67	10390 (Dead)
Ext. Detention	278.97	2290
High Water Level	280.67	115580
Top of Berm	281.17	136770

4.0m WIDE ACCESS ROAD STRUCTURE DETAIL

SCALE: N.T.S.



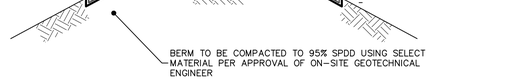
NOTES:

REFER TO CONSTRUCTION NOTES FOR DETAILS ON PLACEMENT OF MATERIALS.

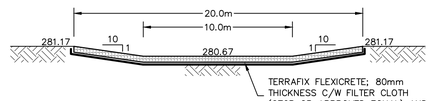
TYPICAL EMERGENCY SPILLWAY

SCALE: N.T.S.

PROFILE



CROSS SECTION



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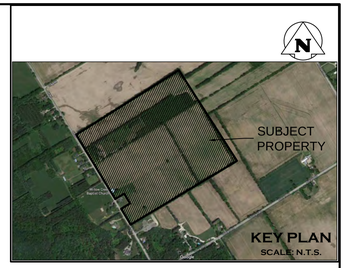
Engineer

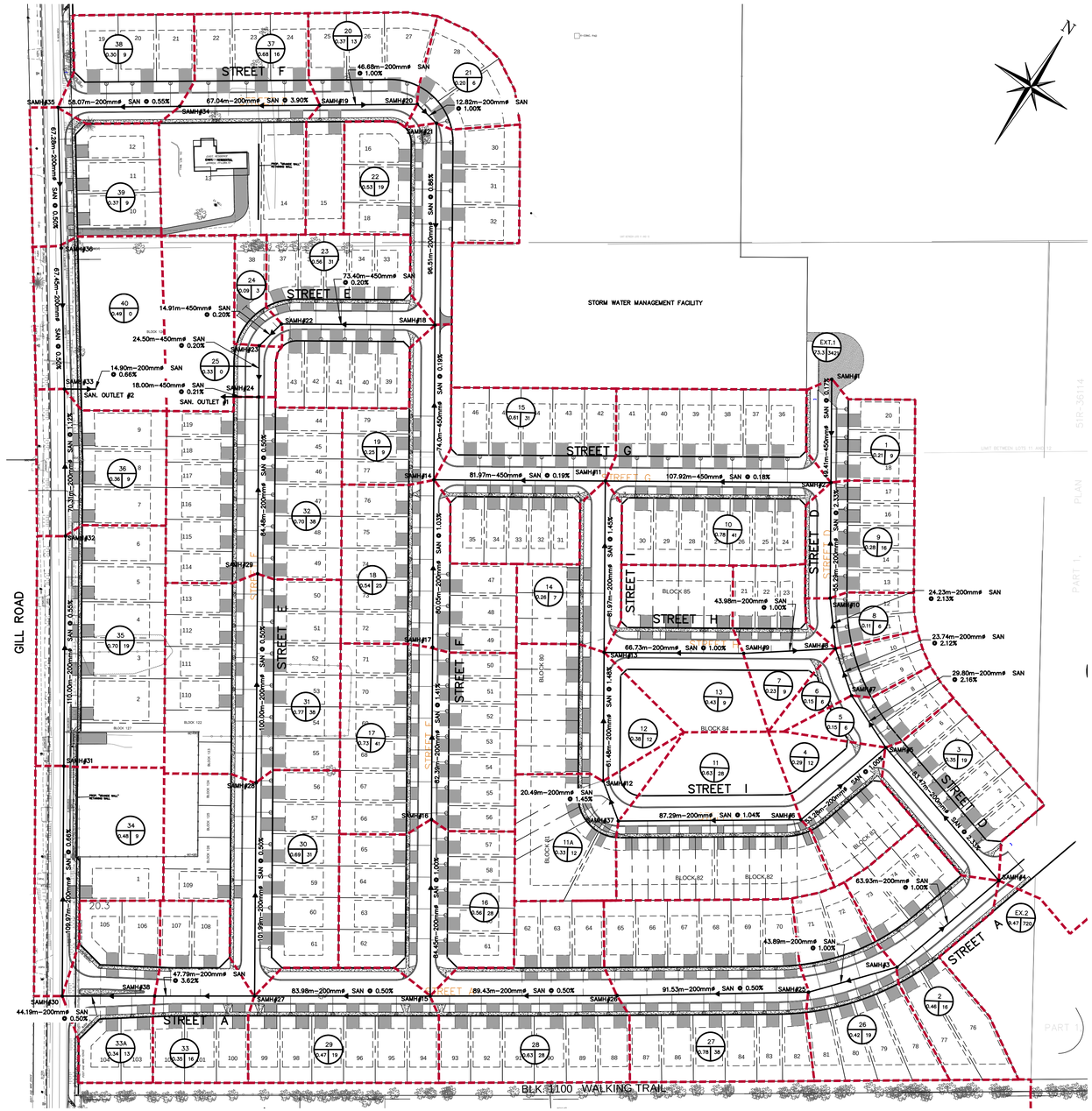
Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: STORM WATER MANAGEMENT FACILITY

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Drawn By	Design By	Project
J.K.	B.H.	845–3675
Scale: 1:750	Date: 10/03/2018	Check By: R.W./B.H.
		Drawing: 104A





LEGEND

- PR. SANITARY SEWER & MANHOLE
- PR. SANITARY CATCHMENT
- X — SANITARY CATCHMENT AREA ID
- X.XX, XX.X — SANITARY CATCHMENT POPULATION (3.5ppu), SANITARY CATCHMENT AREA (ha)

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Engineer

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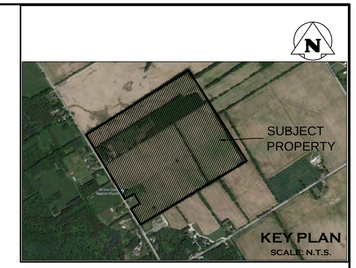
Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

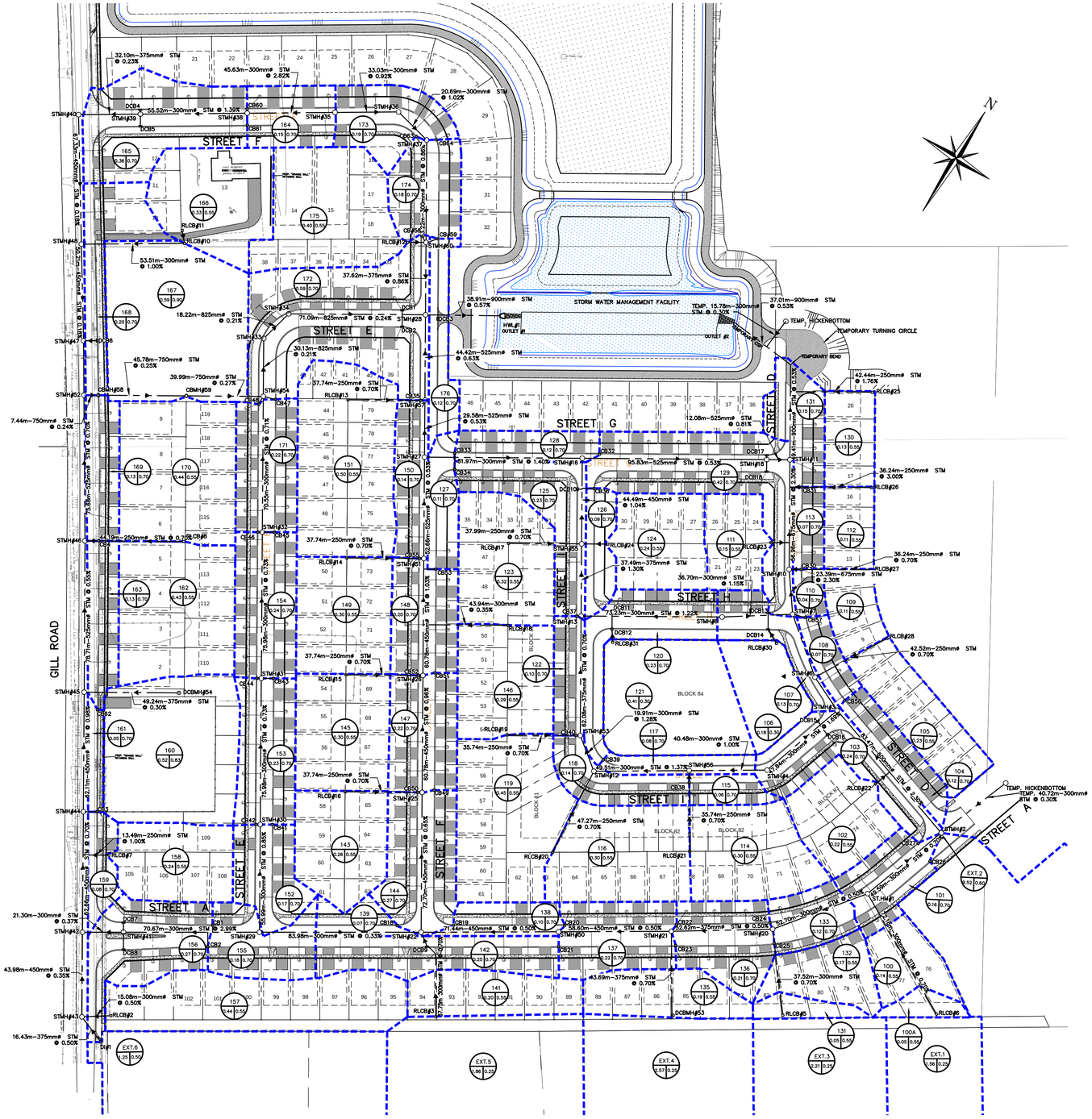
Drawing: SANITARY DRAINAGE PLAN

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Drawn By	Design By	Project
J.K.	J.K.	845–3675

Scale	Date	Check By	Drawing
1:1250	10/03/2018	R.W./B.H.	106





LEGEND

- PR. STORM SEWER & MANHOLE
- PR. CATCHBASIN
- PR. DOUBLE CATCHBASIN
- PR. CATCHBASIN MANHOLE
- PR. DOUBLE CATCHBASIN MANHOLE
- PR. STORM CATCHMENT (TO STORM SEWER)
- STORM CATCHMENT AREA ID (X)
- STORM CATCHMENT RUN-OFF CO-EFFICIENT (X.XX)
- STORM CATCHMENT AREA (ha) (XX.X)

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1	ISSUED FOR FIRST ENGINEERING SUBMISSION	29/03/2018

Engineer

Engineer

Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: STORM DRAINAGE PLAN

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Drawn By	Design By	Project
J.K.	J.K.	845-3675
Scale: 1:1250	Date: 10/03/2018	Check By: R.W./B.H.	Drawing: 107

SCS consulting group ltd

File #: 1168/1194
Date: August 8, 2014

Mr. Glenn Switzer, P. Eng.
Director of Engineering and Technical Services
Nottawasaga Conservation Authority
8195 8th Line
Utopia, Ontario, L0M 1T0

Dear Mr. Switzer:

Re: **Midhurst Master Drainage Plan – Phase 1**
Item #4 – 48 hour Extended Detention of 25mm Rainfall
Midhurst, Ontario

Further to our submissions of May 2, 2014 and May 27, 2014, please accept the following supplemental information in support of the Extended Detention evaluation (Item #4) of the Phase 1 work program for the Master Drainage Plan for your review and approval.

As per NVCA's correspondence of May 29, 2014, the target statement for Extended Detention is:

Demonstrate the ability of the SWM system to hold back the 25mm storm runoff for 48 hours.

As requested by NVCA, we have evaluated the ability for the proposed SWM ponds to provide increased extended detention (beyond the MOE standard 24hr control) to allow the flexibility for increased erosion protection if required as a result of the Phase 2 work program. As shown in the appended hydrology model and the pond operational characteristics shown in the following tables, each facility has the capability of retaining the 25mm rainfall event with a 72 hour release rate. The modelling was conservatively completed assuming no on-site Low Impact Development Techniques to demonstrate the ability for the SWM facilities to provide further erosion protection if deemed necessary. In addition all design storms have been increased by 15% per recommendation from the Township in an attempt to account for the effects of climate change. We note that this exceeds NVCA's target of 48 hour release.

SWM Pond	Extended Detention Volume (m^3)	Extended Detention Release Rate - 24 Hours (L/s)	Extended Detention Release Rate – 48 Hours (L/s)	Extended Detention Release Rate - 72 Hours (L/s)	Total Required Pond Volume to Achieve 72 Hour (m^3)	Total Provided Pond Volume (m^3)
North Pond	5860	102	51	34	27254	33791
Carson Road North Pond	3414	59	30	20	15885	18754
Carson Road South Pond	6190	107	54	36	30688	31895
South Pond	5130	89	45	30	6990	9323
Russell Road Pond	7098	123	62	41	46133	57440

As shown above, the 48 hour extended detention target or the 25mm storm can be both met and exceeded within the currently proposed stormwater management facilities. As noted in the submission letter for Item #2 – Peak Flow Control, all post-development peak flows for the 2 through 100 year storm event are equivalent to or less than the pre-development peak flows at all proposed SWM facilities utilizing a 72 hour extended detention release rate.

Please call the undersigned if you have any questions or require any additional information.

Sincerely,

SCS Consulting Group Ltd.

Steve Schaefer, P. Eng.
Principal
sschaefer@scsconsultinggroup.com

Attachments: Hydrology model and associated parameters

c. Mr. Wayne Wilson, NVCA
Mr. Chris Hibbard, NVCA
Mr. Brad Sokach, Township of Springwater
Mr. Brent Spagnol, Township of Springwater
Mr. Joe Mullan, Ainley
Mr. Greg Marek, Simcoe County
Ms. Shauna Dudding, Geranium Corporation
Mr. Matthew Cory, Malone Given Parsons

P:\1168 Midhurst - Doran Road\Correspondence\Letters\NVCA-sms-Item 4 - Phase 1 Master Drainage Information-08Aug14.docx

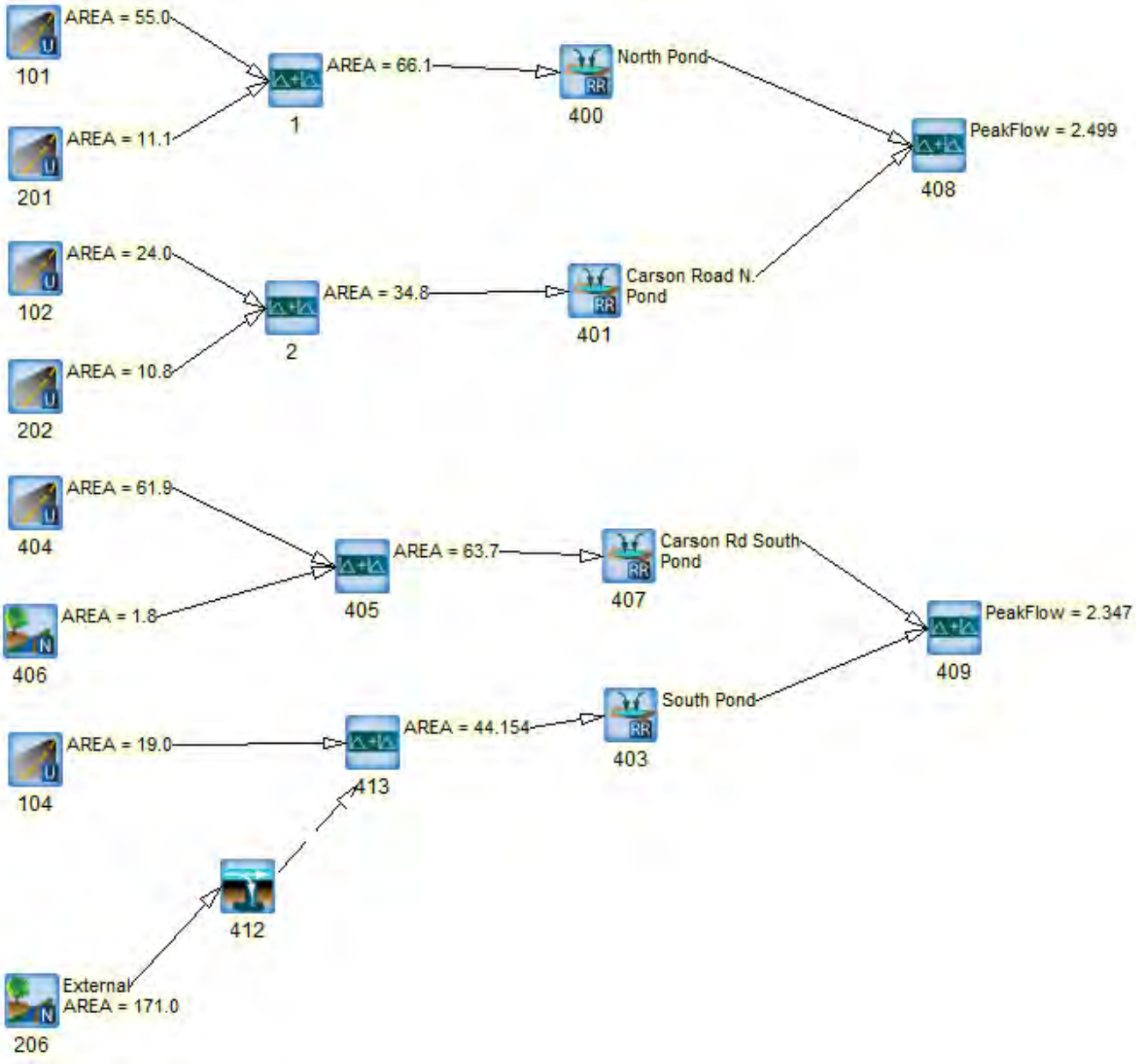
APPENDIX A

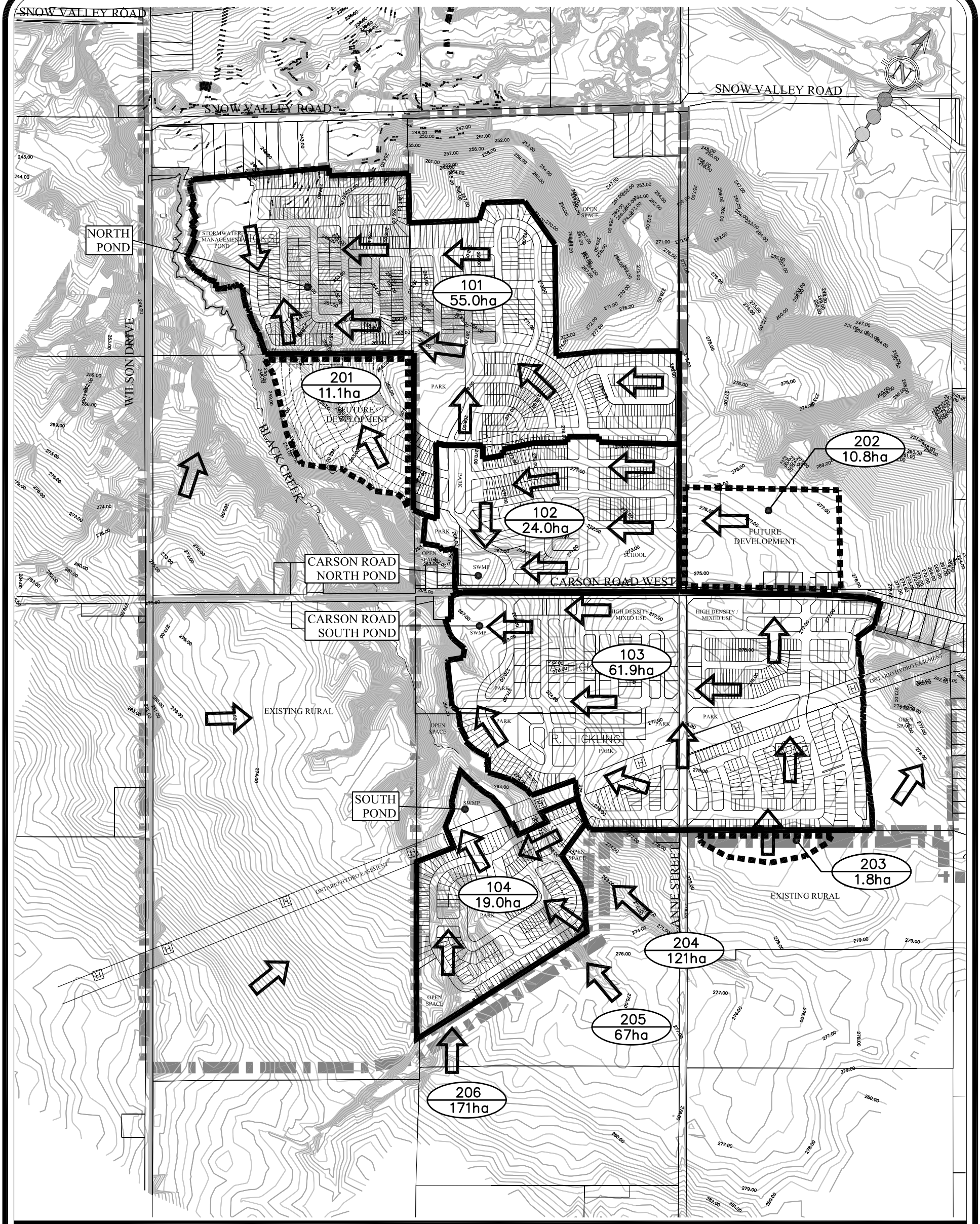
HYDROLOGY MODEL AND ASSOCIATED INPUTS



APPENDIX A1

CARSON ROAD
(FOR PRE-DEVELOPMENT MODELLING REFER TO ITEM #2)


AREA = 55.0
101
AREA = 11.1
201
1
AREA = 66.1
North Pond
400
PeakFlow = 2.499
408
AREA = 24.0
102
AREA = 10.8
202
2
AREA = 34.8
Carson Road N. Pond
401
AREA = 61.9
404
AREA = 1.8
406
405
AREA = 63.7
Carson Rd South Pond
407
PeakFlow = 2.347
409
AREA = 19.0
104
413
AREA = 44.154
South Pond
403
412
External
AREA = 171.0
206



LEGEND:

- LIMIT OF DEVELOPMENT APPLICATION
- LIMIT OF SECONDARY PLAN STUDY
- STORM DRAINAGE BOUNDARY
- EXTERNAL DRAINAGE BOUNDARY
- OVERLAND FLOW DIRECTION
- 101 / 20.0ha — CATCHMENT ID / DRAINAGE AREA

CARSON ROAD DEVELOPMENT INC. (CRDI)

POST-DEVELOPMENT DRAINAGE PLAN

CARSON ROAD DEVELOPMENT INC.
3190 STEELES AVE. EAST, SUITE 3000
MARKHAM, ONTARIO L3R 1G9
TEL: (905) 477-1177
FAX: (905) 477-1279

SCS consulting group ltd
30 CENTURIAN DRIVE, SUITE 100
MARKHAM, ONTARIO L3R 8B8
TEL: (905) 475-1900
FAX: (905) 475-8335

DATE:	APRIL 2013	CHECKED BY:	J.M.P
SCALE:	1:10000	DRAWN BY:	S.F./V.W.
PROJECT No:	1194	FIGURE No:	4.2

File: P:\1194 Midhurst Carson Road\Drawings\FSP\Figs\Report Figures\1194D-PREL-POST-4.2.dwg – Revised by <PTURCHET> : Thu, Apr 11 2013 – 5:26pm

Carson Road Proposed Conditions
VO2 Parameter Summary

Midhurst - Carson Road
Project Number : 1194
Date: June 2014
Designer Initials: JMP

NASHYD

Number	203	204
Description		
DT(min)	2	2
Area (ha)	1.8	171.0
CN	68.0	65.0
IA(mm)	7.0	7.0
TP (hr)	0.320	1.370

STANDHYD

Number	101	102	103	104	201	202
Description						
DT(min)	2	2	2	2	2	2
Area (ha)	55.00	24.00	61.90	19.00	11.10	10.80
XIMP*	0.30	0.39	0.33	0.25	0.30	0.35
TIMP	0.48	0.51	0.48	0.42	0.50	0.55
CN	57.0	59.0	59.0	59.0	59.0	59.0
IA(mm)	5.0	5.0	5.0	5.0	5.0	5.0
SLPP(%)	2	2	2	2	2	2
LGP(m)	40	40	40	40	40	40
MNP	0.25	0.25	0.25	0.25	0.25	0.25
DPSI (mm)	1.0	1.0	1.0	1.0	1.0	1.0
SLPI(%)	1.0	1.0	1.0	1.0	1.0	1.0
LGI(m)	605.5	400.0	642.4	355.9	272.0	268.3
MNI	0.013	0.013	0.013	0.013	0.013	0.013

Total Developed Area = 183.6 ha
Total Drainage Area = 354.6 ha

Initial Abstraction (IA) Values*

Cover	Depth (mm)
Woods	10.00
Pasture/Meadow	8.00
Cultivated	7.0
Lawns	5.0
Wetlands	12/16
Impervious Areas	2

*Values as per Table 10.2 of NVCA Stormwater Technical Guide

SCS CURVE NUMBER DETERMINATION

Midhurst - Carson Road
Project Number: 1194
Date: June 12, 2009

Site Soils: (as per Soils Mapping)

Soil Type	Hydrologic Soil Group
Tioga Loamy Sand	A
Vassey Sandy Loam	AB

TABLE OF CURVE NUMBERS (CN's)

Land Use	Hydrologic Soil Type						
	A	AB	B	BC	C	CD	D
Wetlands/Lakes/SWMF	50	50	50	50	50	50	50
Woods	32	46	60	67	73	76	79
Meadows	38	51	65	71	76	79	81
Pasture/Lawn	49	59	69	74	79	82	84
Cultivated	62	68	74	78	82	84	86
Impervious Areas	100	100	100	100	100	100	100

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
2. Chin (2000), Water-Resources Engineering, Table 6.13-Curve Numbers for Various Urban Land Uses

HYDROLOGIC SOIL TYPE (%) - Existing Conditions

Catchment	Hydrologic Soil Type							TOTAL
	A	AB	B	BC	C	CD	D	
101	23.5	76.5	0	0	0	0	0	100
102	0	100	0	0	0	0	0	100
103	0	100	0	0	0	0	0	100
104	0	100	0	0	0	0	0	100
201	0	100	0	0	0	0	0	100
202	0	100	0	0	0	0	0	100
203	0	100	0	0	0	0	0	100
204	50	50	0	0	0	0	0	100

LAND USE (%) - Existing Conditions

Catchment	Wetlands/Lakes/SWM	Woods	Meadows	Pasture/Lawn	Cultivated	Impervious Areas	Total
101	0.0	0.0	0.0	100.0	0.0	0.0	100.0
102	0.0	0.0	0.0	100.0	0.0	0.0	100.0
103	0.0	0.0	0.0	100.0	0.0	0.0	100.0
104	0.0	0.0	0.0	100.0	0.0	0.0	100.0
201	0.0	0.0	0.0	100.0	0.0	0.0	100.0
202	0.0	0.0	0.0	100.0	0.0	0.0	100.0
203	0.0	0.0	0.0	0.0	100.0	0.0	100.0
204	0.0	0.0	0.0	0.0	100.0	0.0	100.0

CURVE NUMBER (CN) - Existing Conditions

Catchment	Wetlands/Lakes/SWM	Woods	Meadows	Pasture/Lawn	Cultivated	Impervious Areas	Weighted CN
101	0.0	0.0	0.0	56.7	0.0	0.0	57
102	0.0	0.0	0.0	59.0	0.0	0.0	59
103	0.0	0.0	0.0	59.0	0.0	0.0	59
104	0.0	0.0	0.0	59.0	0.0	0.0	59
201	0.0	0.0	0.0	59.0	0.0	0.0	59
202	0.0	0.0	0.0	59.0	0.0	0.0	59
203	0.0	0.0	0.0	0.0	68.0	0.0	68
204	0.0	0.0	0.0	0.0	65.0	0.0	65

** post development catchments concerned with pervious CN values only
** AMC II assumed
** Hydrological Soil Group taken from MTO Drainage Manual for each soil type


SV
CARSON
PARA
BARRIE
KEM
Allandale
Mimet Pt
Little Lake
Tis-Vasl
Tis
Ans
Gsl
Stsl
Tisl
Bs
Ds
M
Smsc
Vasl
Tis-Bf
Ans
Gul
Vine
I N N

DRAINAGE AREA CHARACTERISTICS

Development Type	Area (Ha)	% Imperviousness (TIMP)	% Imperviousness (XIMP)	Impervious Area (Ha)
Singles	44.90	60%	25%	26.94
Townhouses	0.00	90%	30%	0.00
Park	5.56	10%	0%	0.56
Pond	4.20	50%	50%	2.10
Pumping Station Block	0.05	50%	50%	0.03
Open Space	0.27	0%	0%	0.00
Subtotal	*54.97*	*54%*	*24%*	*29.62*
Fut. Townhouses	0.00	90%	30%	0.00
Fut. Singles	10.23	60%	25%	6.14
Fut. Park	0.87	10%	0%	0.09
Subtotal	*11.10*	*50%*	*30%*	*6.23*
Total	**66.07**	**54%**	**24%**	**35.84**

PERMANENT POOL

Level of Protection = 1 (Enhanced)

Weighted Impervious = 54 %

Drainage Area = 66.07 ha

SWMP Type = 4. Wet Pond

Required Permanent Pool (including 40m^3/ha for extended detention)= 188 m^3/ha
Required Permanent Pool (minus 40m^3/ha for extended detention)= 148 m^3/ha

Required Permanent Pool = 9787 m^3

TABLE 3.2 - WATER QUALITY STORAGE REQUIREMENTS
(FROM MOE SWM PLANNING AND DESIGN MANUAL - 2004)

Protection Level	SWMP Type	Storage Volume (m^3/s) for Impervious Level			
		35%	55%	70%	85%
Enhanced (Level 1)	1. Infiltration	25	30	35	40
	2. Wetlands	80	105	120	140
	3. Hybrid Wet Pond/Wetland	110	150	175	195
	4. Wet Pond	140	190	225	250
Normal (Level 2)	1. Infiltration	20	20	25	30
	2. Wetlands	60	70	80	90
	3. Hybrid Wet Pond/Wetland	75	90	105	120
	4. Wet Pond	90	110	130	150
Basic (Level 3)	1. Infiltration	20	20	20	20
	2. Wetlands	60	60	60	60
	3. Hybrid Wet Pond/Wetland	60	70	75	80
	4. Wet Pond	60	75	85	95
	5. Dry Pond (Continuous Flow)	90	150	200	240

EXTENDED DETENTION

Using the 25mm - 4 hour Chicago Storm

Erosion Control Volume (V) = Runoff Depth (mm) x Drainage Area (ha) x 10 (m^3) / (mm)(ha)

Erosion Control Volume (V) = 8.87 mm x 66.07 ha x 10 m^3 / mm·ha

Erosion Control Volume (V) = 5860 m^3

Using 40m^3/ha

Extended Detention Volume (V) = 40m^3/ha x Drainage Area (ha)

Extended Detention Volume (V) = 40 m^3/ha 66.07 ha

Extended Detention Volume (V) = 2643 m^3

Governing Volume (V) = 5860 m^3

Peak Flowrate (Q_p) = Extended Detention Volume (m^3) / Detention Time (hr) x 1 (hr) / 3600 (s) x 1.5 (peaking factor)

Peak Flowrate (Q_p) = 5860 m^3 / 72 hr x 1 (hr) / 3600 (s) x 1.5 (peaking factor)

Peak Flowrate (Q_p) = 0.034 m^3/s

NORTH POND

STAGE STORAGE TABLE

Elevation (m)	Area (m^2)	Avg Area (m^2)	ΔH (m)	ΔVolume (m^3)	Total Volume (m3)	Active Storage (m3)	Depth (m)	
236.00	8613				0		0	
		9274	0.5	4637				
236.50	9934				4637		0.5	
		10651	0.5	5325				
237.00	11367				9962	0	1	
		12440	0.5	6220				
237.50	**13513**				**16182**	**0**	**1.5**	**N.W.L.**
		14493	0.5	7247				
238.00	15473				23429	7247	2	
		16211	0.5	8105				
238.50	16948				31534	15352	2.5	
		17703	0.5	8852				
239.00	18459				40386	24204	3	
		19175	0.5	9588				
239.50	19892				49973	33791	3.5	

Permanent Pool Volume Required =	9787	m^3	
Permanent Pool Volume Provided =	16182	m^3	65% Extra
Extended Detention volume required =	5860	m^3	
Extended Detention waterlevel =	237.90	m	
5 year control volume required =	8919	m^3	
5 year control waterlevel =	238.10	m	
100 year control volume required =	27254	m^3	
100 year waterlevel =	239.17	m	
Freeboard =	0.33	m	

1. Forebay Area Sizing

Forebay

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
236.0	2,116				0	0.0
		2,356	0.5	1,178		
236.5	2,595				1,178	0.5
		2,853	0.5	1,427		
237.0	3,111				2,605	1.0
		3,509	0.5	1,754		
237.5	3,906				4,359	1.5

Total Permanent Pool

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
236.0	8,613				0	0.0
		9,274	0.5	4,637		
236.5	9,934				4,637	0.5
		10,651	0.5	5,325		
237.0	11,367				9,962	1.0
		12,440	0.5	6,220		
237.5	13,513				16,182	1.5

Minimum Criteria (per MOE guidelines)

Forebay area is **29** % of total Permanent Pool area
Maximum Forebay area is **33** % of total Permanent Pool area
Therefore the minimum criteria per MOE guidelines is satisfied

2. Forebay Settling Length

Dist = $(r \times Q_p / V_s)^{0.5}$ where:

Dist = (2.8 x 0.032 / 0.0003)^0.5

Dist = 17.3

Dist = forebay length (m)
r = length to width ratio
= 2.80
Q_p = peak flow rate from pond during 25mm design storm (m^3/s)
= 0.032
V_s = settling velocity (m/s)
= 0.0003

Minimum forebay length is (m) **17.3**
Actual forebay length is (m) **110.0**
CRITERIA SATISFIED

3. Forebay Dispersion Length

Dist = $(8 \times Q) / (d \times V_f)$ where:

Dist = (8 x 5.376) / (1.5 x 0.5)

Dist = 57.3

Dist = forebay length (m)
Q = inlet flow rate (m^3/s) (10-year flow)
= 5.376
d = depth of permanent pool in forebay (m)
= 1.5
V_f = desired velocity in forebay (m/s)
0.5

Minimum forebay length is (m) **57.3**
Actual forebay length is (m) **110.0**
CRITERIA SATISFIED

4. Minimum Forebay Bottom Width

Width = Dist / 8 where:

Dist = 110 / 8

Dist = 13.8

Width = minimum forebay bottom width (m)
Dist = forebay length (m)
= 110

Minimum bottom width is (m) **13.8**
Actual bottom width is (m) **39.0**
CRITERIA SATISFIED

5. Maximum Velocity Check

V = Q/A where:

V = 5.376 / 69

V = 0.08

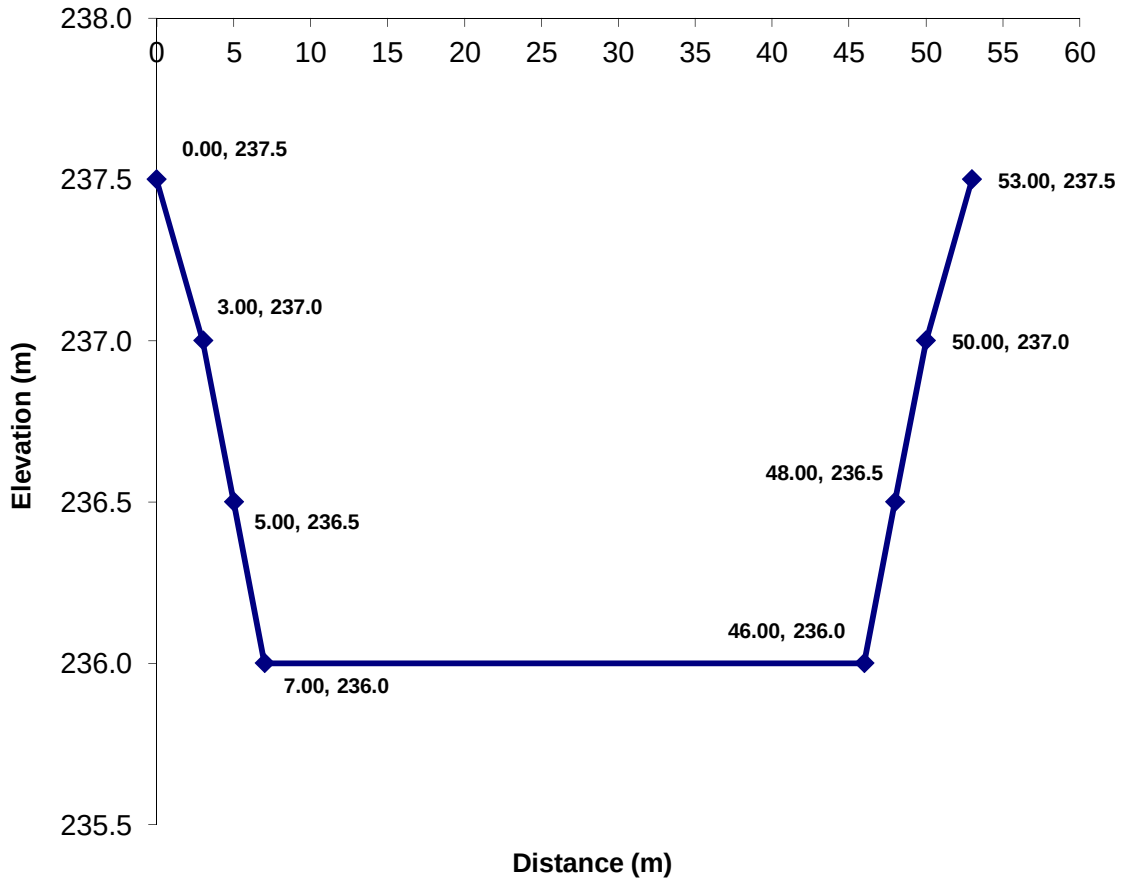
V = velocity (m/s)
Q = inlet flow rate (m^3/s) (10-year flow)
= 5.376
A = average cross-sectional area of entire forebay (r^2) (see **Page 3**)
= 69

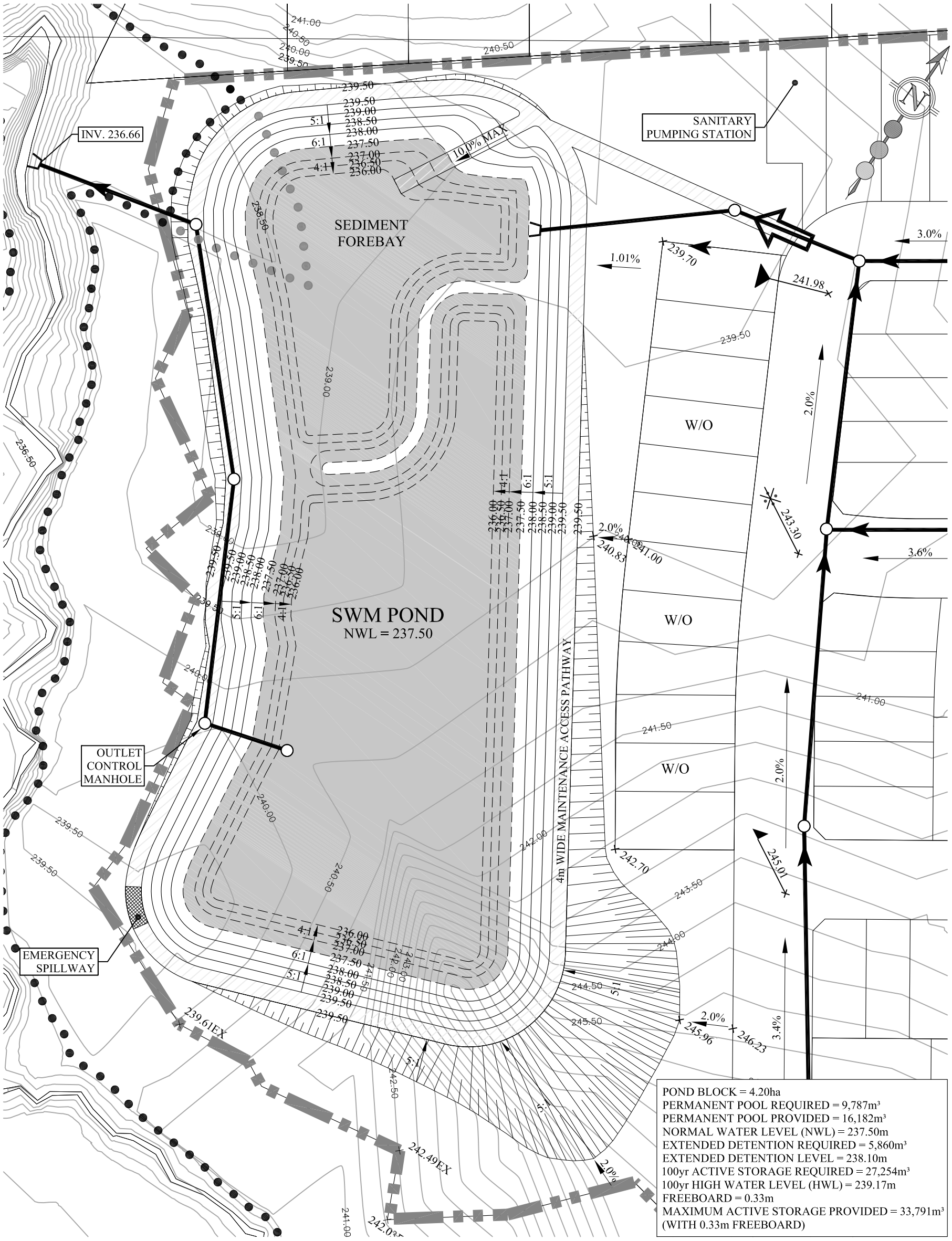
Maximum velocity permitted is (m/s) **0.15**
Actual velocity is (m/s) **0.08**
CRITERIA SATISFIED

Distance (m)	Elevation (m)
0.00	237.5
3.00	237.0
5.00	236.5
7.00	236.0
46.00	236.0
48.00	236.5
50.00	237.0
53.00	237.5

Area (m^2) = 69.00

Average Forebay Cross-Section





LEGEND:

- LIMIT OF DEVELOPMENT APPLICATION
- EXISTING FLOODLINE
- PROPOSED FLOODLINE
- MAX. 3:1 SLOPE
- 243.00 — EXISTING CONTOUR
- × 246.50 — PROPOSED GRADE
- ×237.59EX — EXISTNG GRADE
- OVERLAND FLOW
- 238.50 — POND CONTOUR
- PROPOSED MAINTENACE ACCESS ROAD
- PROPOSED EMERGENCY SPILLWAY
- PROPOSED OVERLAND FLOW ROUTE
- PROPOSED STORM SEWER

CARSON ROAD DEVELOPMENT INC. (CRDI)

PRELIMINARY SWM POND GRADING - NORTH POND

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FAX: (905) 475-8335

DATE:	AUGUST 2014	CHECKED BY:	J.M.P
SCALE:	1:1000	DRAWN BY:	Y.K.
PROJECT No:	1194	FIGURE No:	4.4.1

File: P:\1194 Midhurst Carson Road\Drawings\FSP\Figs\Report Figures\1194D-PREL-POND-NRTH-4.4.1.dwg – Revised by <MBRITTON> : Fri, Aug 08 2014 – 9:32am

DRAINAGE AREA CHARACTERISTICS

Development Type	Area (Ha)	% Imperviousness (TIMP)	% Imperviousness (XIMP)	Impervious Area (Ha)
Singles	15.9	60%	25%	9.5
Townhouses	0.0	90%	30%	0.0
Park	2.3	10%	0%	0.2
Pond	1.5	50%	50%	0.8
School	4.3	55%	55%	2.4
subtotal	*24.0*	*54%*	*30%*	*12.9*
Future Development	10.8	60%	25%	6.5
Total	**34.8**	**56%**	**28%**	**19.4**

PERMANENT POOL

Level of Protection = 1 (Enhanced)

Weighted Impervious = 56 %

Drainage Area = 34.80 ha

SWMP Type = 4. Wet Pond

Required Permanent Pool (including 40m^3/ha for extended detention)= 192 m^3/ha
Required Permanent Pool (minus 40m^3/ha for extended detention)= 152 m^3/ha

Required Permanent Pool = 5273 m^3

TABLE 3.2 - WATER QUALITY STORAGE REQUIREMENTS
(FROM MOE SWM PLANNING AND DESIGN MANUAL - 2004)

Protection Level	SWMP Type	Storage Volume (m^3/s) for Impervious Level			
		35%	55%	70%	85%
Enhanced (Level 1)	1. Infiltration	25	30	35	40
	2. Wetlands	80	105	120	140
	3. Hybrid Wet Pond/Wetland	110	150	175	195
	4. Wet Pond	140	190	225	250
Normal (Level 2)	1. Infiltration	20	20	25	30
	2. Wetlands	60	70	80	90
	3. Hybrid Wet Pond/Wetland	75	90	105	120
	4. Wet Pond	90	110	130	150
Basic (Level 3)	1. Infiltration	20	20	20	20
	2. Wetlands	60	60	60	60
	3. Hybrid Wet Pond/Wetland	60	70	75	80
	4. Wet Pond	60	75	85	95
	5. Dry Pond (Continuous Flow)	90	150	200	240

EXTENDED DETENTION

Using the 25mm - 4 hour Chicago Storm

Erosion Control Volume (V) = Runoff Depth (mm) x Drainage Area (ha) x 10 (m^3) / (mm)(ha)

Erosion Control Volume (V) = 9.81 mm x 34.80 ha x 10 m^3 / mm·ha

Erosion Control Volume (V) = 3414 m^3

Using 40m^3/ha

Extended Detention Volume (V) = 40m^3/ha x Drainage Area (ha)

Extended Detention Volume (V) = 40 m^3/ha 34.80 ha

Extended Detention Volume (V) = 1392 m^3

Governing Volume (V) = 3414 m^3

Peak Flowrate (Q_p) = Extended Detention Volume (m^3) / Detention Time (hr) x 1 (hr) / 3600 (s) x 1.5 (peaking factor)

Peak Flowrate (Q_p) = 3414 m^3 / 72 hr x 1 (hr) / 3600 (s) x 1.5 (peaking factor)

Peak Flowrate (Q_p) = 0.020 m^3/s

CARSON ROAD NORTH POND

STAGE STORAGE TABLE

Elevation (m)	Area (m^2)	Avg Area (m^2)	ΔH (m)	ΔVolume (m^3)	Total Volume (m3)	Active Storage (m3)	Depth (m)	
262.00	2226				0		0	
		2652	0.5	1326				
262.50	3079				1326		0.5	
		3485	0.5	1743				
263.00	3892				3069		1	
		4345	0.5	2173				
263.50	4799				5242		1.5	
		5423	0.5	2711				
264.00	**6047**				**7953**	**0**	**2**	**N.W.L.**
		6614	0.5	3307				
264.50	7181				11260	3307	2.5	
		8582	1.8	15448				
266.30	9983				26708	18755	4.3	

Permanent Pool Volume Required =	5273	m^3	
Permanent Pool Volume Provided =	7953	m^3	50.83% Extra
Extended Detention volume required =	3414	m^3	
Extended Detention waterlevel =	264.51	m	
5 year control volume required =	5668	m^3	
5 year control waterlevel =	264.78	m	
100 year control volume required =	15885	m^3	
100 year waterlevel =	265.97	m	
Freeboard =	0.33	m	

1. Forebay Area Sizing

Forebay

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
262.5	306				0	0
		417	0.5	208		
263.0	527				208	0.5
		657	0.5	329		
263.5	787				537	1
		954	0.5	477		
264.0	1121				1,014	1.5

Total Permanent Pool

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
262.0	2226				0	0
		2652	0.5	1,326		
262.5	3079				1,326	0.5
		3485	0.5	1,743		
263.0	3892				3,069	1
		4345	0.5	2,173		
263.5	4799				5,242	1.5
		5423	0.5	2,711		
264.0	6047				7,953	2

Minimum Criteria (per MOE guidelines)

Forebay area is **19** % of total Permanent Pool area
Maximum Forebay area is **33** % of total Permanent Pool area
Therefore the minimum criteria per MOE guidelines is satisfied

2. Forebay Settling Length

Dist = (r x Q_p / V_s)$^{0.5}$

Dist = (2 x 0.019 / 0.0003)^0.5

Dist = 11.3

where:

Dist = forebay length (m)
r = length to width ratio
= 2.00
Q_p = peak flow rate from pond during 25 mm design storm (m^3/s)
= 0.019
V_s = settling velocity (m/s)
= 0.0003

Minimum forebay length is (m) **11.3**
Actual forebay length is (m) **49.0**
CRITERIA SATISFIED

3. Forebay Dispersion Length

Dist = (8 x Q) / (d x V_f)

Dist = (8 x 3.562) / (1.5 x 0.5)

Dist = 38.0

where:

Dist = forebay length (m)
Q = inlet flow rate (m^3/s) (10-year flow)
= 3.562
d = depth of permanent pool in forebay (m)
= 1.5
V_f = desired velocity in forebay (m/s)
0.5

Minimum forebay length is (m) **38.0**
Actual forebay length is (m) **49.0**
CRITERIA SATISFIED

4. Minimum Forebay Bottom Width

Width = Dist / 8

Dist = 49 / 8

Dist = 6.1

where:

Width = minimum forebay bottom width (m)
Dist = forebay length (m)
= 49

Minimum bottom width is (m) **6.1**
Actual bottom width is (m) **12.1**
CRITERIA SATISFIED

5. Maximum Velocity Check

V = Q/A

V = 3.562 / 30

V = 0.12

where:

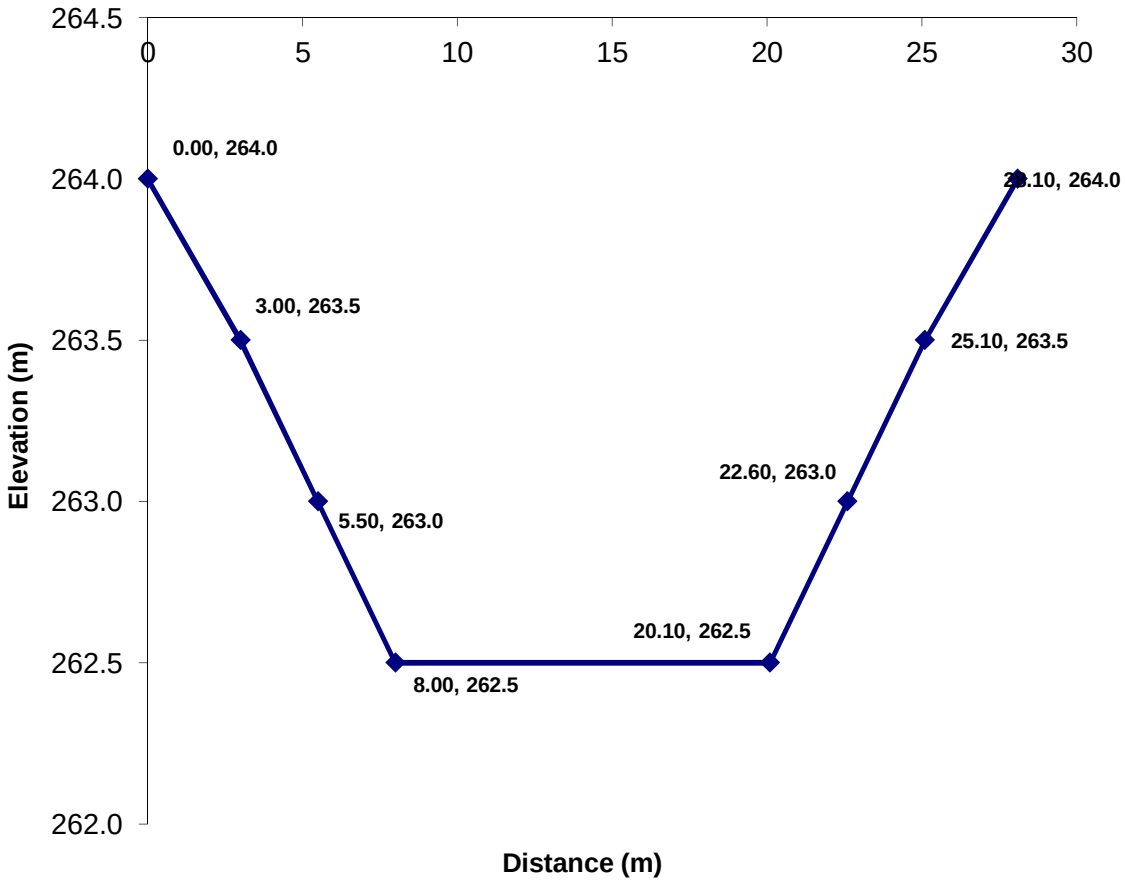
V = velocity (m/s)
Q = inlet flow rate (m^3/s) (10-year flow)
= 3.562
A = average cross-sectional area of entire forebay (^{2}) (see **Page 3**)
= 30

Maximum velocity permitted is (m/s) **0.15**
Actual velocity is (m/s) **0.12**
CRITERIA SATISFIED

Distance (m)	Elevation (m)
0.00	264.0
3.00	263.5
5.50	263.0
8.00	262.5
20.10	262.5
22.60	263.0
25.10	263.5
28.10	264.0

Area (m^2) = 30.15

Average Forebay Cross-Section



POND BLOCK = 1.30ha
PERMANENT POOL REQUIRED = 5,273m³
PERMANENT POOL PROVIDED = 7,953m³
NORMAL WATER LEVEL (NWL) = 264.00m
EXTENDED DETENTION REQUIRED =3,414m³
EXTENDED DETENTION LEVEL = 264.51m
100yr ACTIVE STORAGE REQUIRED = 15,885m³
100yr HIGH WATER LEVEL (HWL) = 265.97m
FREEBOARD = 0.33m
MAXIMUM ACTIVE STORAGE PROVIDED = 18,755m³
(WITH 0.33m FREEBOARD)

PARK

OPEN SPACE

CARSON ROAD WEST

SWM POND
NWL = 264.00

SEDIMENT FOREBAY

LIMIT OF DEVELOPMENT

1 m BUFFER

2 m FLAT BERM

EMERGENCY SPILLWAY

OVERLAND FLOW ROUTE

MAINTENANCE ACCESS ROAD

MAINTENANCE ACCESS ROAD

TO BLACK CREEK VIA EXISTING CARSON ROAD CULVERT

CARSON ROAD SOUTH POND OUTLET

NOTE: SCHEMATIC LAYOUT ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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FAX: (905) 475-8335

LEGEND:
- MAX. 3:1 SLOPE
- LIMIT OF DEVELOPMENT APPLICATION
- PROPOSED FLOODLINE
- 290.00 EXISTING CONTOUR
- × 166.50 PROPOSED GRADE
- 291.70 POND CONTOUR
- OVERLAND FLOW
- PROPOSED MAINTENACE ACCESS ROAD
- PROPOSED EMERGENCY SPILLWAY
- PROPOSED OVERLAND FLOW ROUTE
- PROPOSED STORM SEWER

CARSON ROAD DEVELOPMENT INC. (CRDI)

PRELIMINARY SWM POND GRADING - CARSON ROAD NORTH POND

DRAWN BY: S.F.	CHECKED BY: J.M.P.
SCALE: 1:1000	DATE: JUNE 2014
PROJECT No: 1194	FIGURE No: 4.4.2

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DRAINAGE AREA CHARACTERISTICS

Development Type	Area (Ha)	% Imperviousness (TIMP)	% Imperviousness (XIMP)	Impervious Area (Ha)
Singles	29.4	60%	25%	17.6
Townhouses	17.1	90%	30%	15.4
High Density/Mixed Use	4.5	85%	85%	3.8
Park	5.0	10%	0%	0.5
Pond	2.0	50%	50%	1.0
Open Space/External Drainage	5.6	0%	0%	0.0
Total	**63.7**	**60%**	**27%**	**38.4**

PERMANENT POOL

Level of Protection = 1 (Enhanced)

Weighted Impervious = 60 %

Drainage Area = 63.7 ha

SWMP Type = 4. Wet Pond

Required Permanent Pool (including 40m^3/ha for extended detention)= 202 m^3/ha
Required Permanent Pool (minus 40m^3/ha for extended detention)= 162 m^3/ha

Required Permanent Pool = 10340 m^3

TABLE 3.2 - WATER QUALITY STORAGE REQUIREMENTS
(FROM MOE SWM PLANNING AND DESIGN MANUAL - 2004)

Protection Level	SWMP Type	Storage Volume (m^3/s) for Impervious Level			
		35%	55%	70%	85%
Enhanced (Level 1)	1. Infiltration	25	30	35	40
	2. Wetlands	80	105	120	140
	3. Hybrid Wet Pond/Wetland	110	150	175	195
	4. Wet Pond	140	190	225	250
Normal (Level 2)	1. Infiltration	20	20	25	30
	2. Wetlands	60	70	80	90
	3. Hybrid Wet Pond/Wetland	75	90	105	120
	4. Wet Pond	90	110	130	150
Basic (Level 3)	1. Infiltration	20	20	20	20
	2. Wetlands	60	60	60	60
	3. Hybrid Wet Pond/Wetland	60	70	75	80
	4. Wet Pond	60	75	85	95
	5. Dry Pond (Continuous Flow)	90	150	200	240

EXTENDED DETENTION

Using the 25mm - 4 hour Chicago Storm

Erosion Control Volume (V) = Runoff Depth (mm) x Drainage Area (ha) x 10 (m^3) / (mm)(ha)

Erosion Control Volume (V) = 9.72 mm x 63.69 ha x 10 m^3 / mm·ha

Erosion Control Volume (V) = 6190 m^3

Using 40m^3/ha

Extended Detention Volume (V) = 40m^3/ha x Drainage Area (ha)

Extended Detention Volume (V) = 40 m^3/ha 63.69 ha

Extended Detention Volume (V) = 2547 m^3

Governing Volume (V) = 6190 m^3

Peak Flowrate (Q_p) = Extended Detention Volume (m^3) / Detention Time (hr) x 1 (hr) / 3600 (s) x 1.5 (peaking factor)

Peak Flowrate (Q_p) = 6190 m^3 / 72 hr x 1 (hr) / 3600 (s) x 1.5 (peaking factor)

Peak Flowrate (Q_p) = 0.036 m^3/s

STAGE STORAGE TABLE

Elevation (m)	Area (m^2)	Avg Area (m^2)	ΔH (m)	ΔVolume (m^3)	Total Volume (m3)	Active Storage (m3)	Depth (m)	
261.00	2372				0		0	
		3373	0.5	1686				
261.50	4373				1686		0.5	
		5113	0.5	2557				
262.00	5853				4243		1	
		6752	0.5	3376				
262.50	7650				7619		1.5	
		8649	0.5	4325				
263.00	**9648**				**11944**	**0**	**2**	**N.W.L.**
		10554	0.5	5277				
263.50	11460				17221	5277	2.5	
		11917	0.5	5959				
264.00	12375				23179	11236	3	
		12831	0.5	6416				
264.50	13288				29595	17651	3.5	
		13762	0.5	6881				
265.00	14237				36476	24532	4	
		14725	0.5	7362				
265.50	15212				43838	31895	4.5	

Permanent Pool Volume Required =	10340	m^3	
Permanent Pool Volume Provided =	11944	m^3	15.51% Extra
Extended Detention volume required =	6190	m^3	
Extended Detention waterlevel =	263.58	m	
5 year control volume required =	10071	m^3	
5 year control waterlevel =	263.90	m	
5 year active fluctuation =	0.90	m	
100 year control volume required =	30688	m^3	
100 year waterlevel =	265.42	m	
Freeboard =	0.08	m	

1. Forebay Area Sizing

Forebay

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
261.50	1036				0	0
		1269	0.5	635		
262.00	1502				635	0.5
		1738	0.5	869		
262.50	1974				1,504	1
		2285	0.5	1,142		
263.00	2596				2,646	1.5

Total Permanent Pool

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
261.00	2372				0	0
		3373	0.5	1,686		
261.50	4373				1,686	0.5
		5113	0.5	2,557		
262.00	5853				4,243	1
		6752	0.5	3,376		
262.50	7650				7,619	1.5
		8649	0.5	4,325		
263.00	9648				11,944	2

Minimum Criteria (per MOE guidelines)

Forebay area is **27** % of total Permanent Pool area
Maximum Forebay area is **33** % of total Permanent Pool area
Therefore the minimum criteria per MOE guidelines is satisfied

2. Forebay Settling Length

Dist = (r x Q_p / V_s)$^{0.5}$

Dist = (3.65 x 0.034 / 0.0003)^0.5

Dist = 20.3

where:
Dist = forebay length (m)
r = length to width ratio
= 3.65
Q_p = peak flow rate from pond during 25 mm design storm (m^3/s)
= 0.034
V_s = settling velocity (m/s)
= 0.0003

Minimum forebay length is (m)	**20.3**
Actual forebay length is (m)	**100.0**

CRITERIA SATISFIED

3. Forebay Dispersion Length

Dist = (8 x Q) / (d x V_f)

Dist = (8 x 5.64) / (1.5 x 0.5)

Dist = 60.2

where:
Dist = forebay length (m)
Q = inlet flow rate (m^3/s) (10-year flow)
= 5.64
d = depth of permanent pool in forebay (m)
= 1.5
V_f = desired velocity in forebay (m/s)
0.5

Minimum forebay length is (m)	**60.2**
Actual forebay length is (m)	**100.0**

CRITERIA SATISFIED

4. Minimum Forebay Bottom Width

Width = Dist / 8

Dist = 100 / 8

Dist = 12.5

where:
Width = minimum forebay bottom width (m)
Dist = forebay length (m)
= 100

Minimum bottom width is (m)	**12.5**
Actual bottom width is (m)	**24.0**

CRITERIA SATISFIED

5. Maximum Velocity Check

V = Q/A

V = 5.64 / 48

V = 0.12

where:
V = velocity (m/s)
Q = inlet flow rate (m^3/s) (10-year flow)
= 5.64
A = average cross-sectional area of entire forebay (^{2})
(see **Page 3**)
= 48

Maximum velocity permitted is (m/s)	**0.15**
Actual velocity is (m/s)	**0.12**

CRITERIA SATISFIED

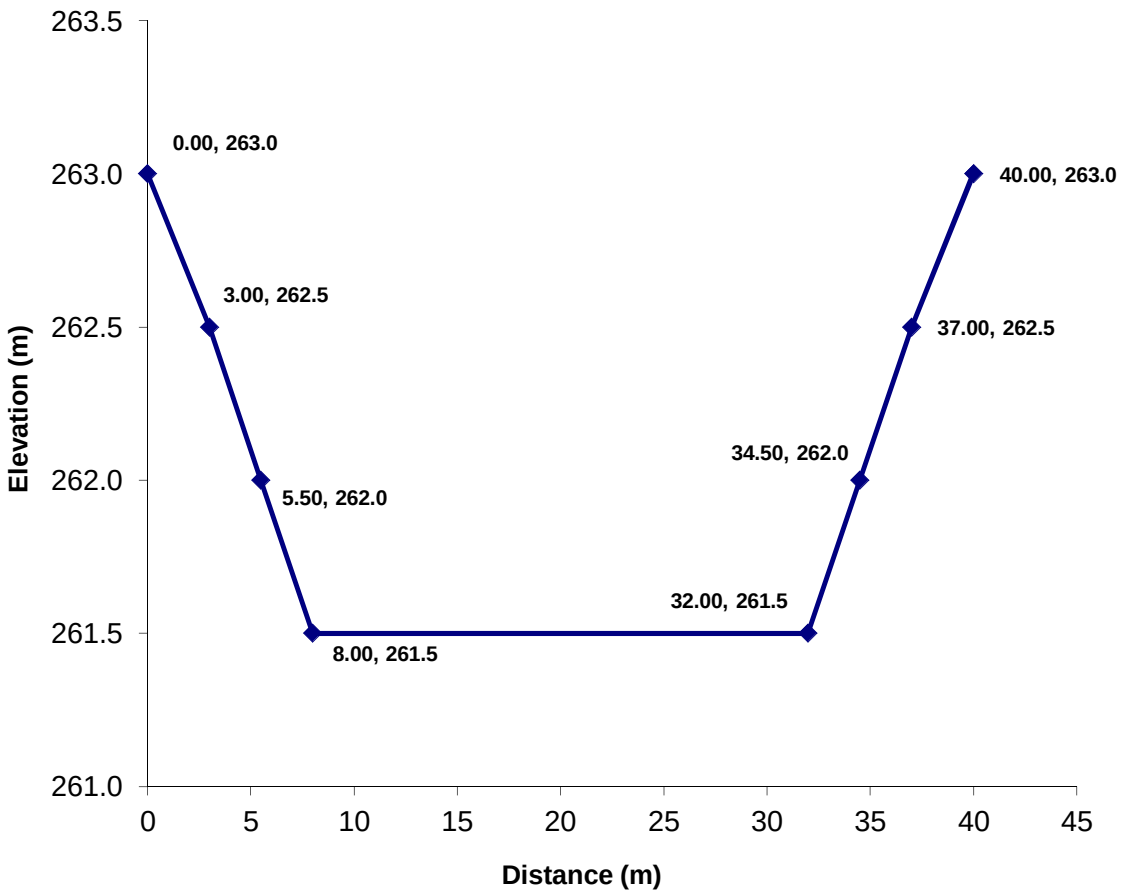
CARSON ROAD SOUTH POND
FOREBAY CALCULATIONS

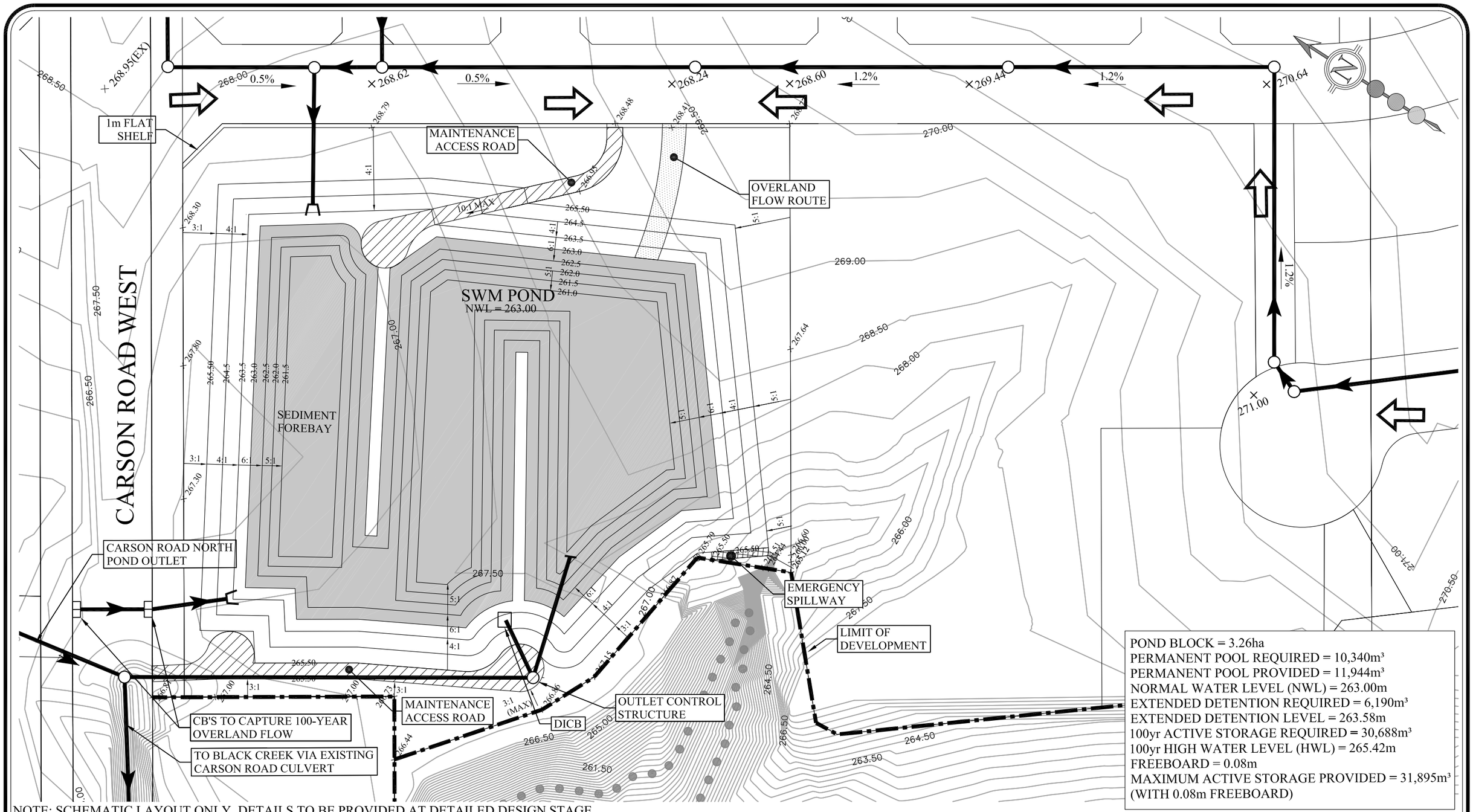
Midhurst - Carson Road
Project Number: 1194
Date: August 2014

Distance (m)	Elevation (m)
0.00	263.0
3.00	262.5
5.50	262.0
8.00	261.5
32.00	261.5
34.50	262.0
37.00	262.5
40.00	263.0

Area (m^2) = 48.00

Average Forebay Cross-Section





NOTE: SCHEMATIC LAYOUT ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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LEGEND:

- MAX. 3:1 SLOPE
- PROPOSED FLOODLINE
- 290.00 EXISTING CONTOUR
- × 166.50 PROPOSED GRADE
- 291.70 POND CONTOUR
- OVERLAND FLOW
- PROPOSED MAINTENACE ACCESS ROAD
- PROPOSED OVERLAND FLOW ROUTE
- PROPOSED STORM SEWER

CARSON ROAD DEVELOPMENT INC. (CRDI)

PRELIMINARY SWM POND GRADING - CARSON ROAD SOUTH POND

DRAWN BY:	S.F.	CHECKED BY:	J.M.P.
SCALE:	1:1000	DATE:	JUNE 2014
PROJECT No:	1194	FIGURE No:	4.4.3

File: P:\1194 Midhurst Carson Road\Drawings\FSP\Figs\Report Figures\1194D-PREL-POND-CARS-SOTH-4.4.3.dwg - Revised by <MBRITTON> : Tue, Aug 05 2014 - 3:32pm

DRAINAGE AREA CHARACTERISTICS

Development Type	Area (Ha)	% Imperviousness (TIMP)	% Imperviousness (XIMP)	Impervious Area (Ha)
Singles	14.1	60%	25%	8.5
Townhouses	0.0	90%	30%	0.0
Park	1.2	10%	0%	0.1
Pond	1.1	50%	50%	0.6
Open Space	2.6	0%	0%	0.0
Total	**19.0**	**48%**	**21%**	**9.1**

PERMANENT POOL

Level of Protection = 1 (Enhanced)

Weighted Impervious = 48 %

Drainage Area = 19.00 ha

SWMP Type = 4. Wet Pond

Required Permanent Pool (including 40m^3/ha for extended detention)= 173 m^3/ha
Required Permanent Pool (minus 40m^3/ha for extended detention)= 133 m^3/ha

Required Permanent Pool = 2520 m^3

TABLE 3.2 - WATER QUALITY STORAGE REQUIREMENTS
(FROM MOE SWM PLANNING AND DESIGN MANUAL - 2004)

Protection Level	SWMP Type	Storage Volume (m^3/s) for Impervious Level			
		35%	55%	70%	85%
Enhanced (Level 1)	1. Infiltration	25	30	35	40
	2. Wetlands	80	105	120	140
	3. Hybrid Wet Pond/Wetland	110	150	175	195
	4. Wet Pond	140	190	225	250
Normal (Level 2)	1. Infiltration	20	20	25	30
	2. Wetlands	60	70	80	90
	3. Hybrid Wet Pond/Wetland	75	90	105	120
	4. Wet Pond	90	110	130	150
Basic (Level 3)	1. Infiltration	20	20	20	20
	2. Wetlands	60	60	60	60
	3. Hybrid Wet Pond/Wetland	60	70	75	80
	4. Wet Pond	60	75	85	95
	5. Dry Pond (Continuous Flow)	90	150	200	240

EXTENDED DETENTION

Using the 25mm - 4 hour Chicago Storm

Erosion Control Volume (V) = Runoff Depth (mm) x Drainage Area (ha) x 10 (m^3) / (mm)(ha)

Erosion Control Volume (V) = 2.7 mm x 190.00 ha x 10 m^3 / mm·ha

Erosion Control Volume (V) = 5130 m^3

Using 40m^3/ha

Extended Detention Volume (V) = 40m^3/ha x Drainage Area (ha)

Extended Detention Volume (V) = 40 m^3/ha 19.00 ha

Extended Detention Volume (V) = 760 m^3

Governing Volume (V) = 5130 m^3

Peak Flowrate (Q_p) = Extended Detention Volume (m^3) / Detention Time (hr) x 1 (hr) / 3600 (s) x 1.5 (peaking factor)

Peak Flowrate (Q_p) = 5130 m^3 / 72 hr x 1 (hr) / 3600 (s) x 1.5 (peaking factor)

Peak Flowrate (Q_p) = 0.030 m^3/s

STAGE STORAGE TABLE

Elevation (m)	Area (m^2)	Avg Area (m^2)	ΔH (m)	ΔVolume (m^3)	Total Volume (m^3)	Active Storage (m^3)	Depth (m)	
262.75	1190				0		0	
		1520	0.5	760				
263.25	1850				760		0.5	
		2226	0.5	1113				
263.75	2602				1873		1	
		3144	0.5	1572				
264.25	**3685**				**3445**	**0**	**1.5**	**N.W.L.**
		4190	0.5	2095				
264.75	4695				5540	2095	2	
		5017	0.5	2509				
265.25	5339				8048	4604	2.5	
		5688	0.5	2844				
265.75	6037				10892	7448	3	
		6253	0.3	1876				
266.05	6468				12768	9323	2.8	

Permanent Pool Volume Required =	2520	m^3	
Permanent Pool Volume Provided =	3445	m^3	36.69% Extra
Extended Detention volume required =	5130	m^3	
Extended Detention waterlevel =	265.34	m	
5 year control volume required =	5153	m^3	
5 year control waterlevel =	265.35	m	
5 year active fluctuation =	1.10	m	
100 year control volume required =	6990	m^3	
100 year waterlevel =	265.67	m	
Freeboard =	0.38	m	

1. Forebay Area Sizing

Forebay

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
262.75	104				0	0
		180	0.5	90		
263.25	256				90	0.5
		350	0.5	175		
263.75	443				265	1
		611	0.5	305		
264.25	779				570	1.5

Total Permanent Pool

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
262.75	1190				0	0
		1520	0.5	760		
263.25	1850				760	0.5
		2226	0.5	1,113		
263.75	2602				1,873	1
		3143	0.5	1,572		
264.25	3685				3,445	1.5

Minimum Criteria (per MOE guidelines)

Forebay area is **21** % of total Permanent Pool area
Maximum Forebay area is **33** % of total Permanent Pool area
Therefore the minimum criteria per MOE guidelines is satisfied

2. Forebay Settling Length

Dist = $(r \times Q_p / V_s)^{0.5}$ where: Dist = forebay length (m)

r = length to width ratio

Dist = (2.1 x 0.027 / 0.0003)^0.5 = 2.10

Q_p = peak flow rate from pond during 25 mm design storm (m^3/s)

Dist = 13.7 = 0.027

V_s = settling velocity (m/s)

= 0.0003

Minimum forebay length is (m) **13.7**

Actual forebay length is (m) **46.4**

CRITERIA SATISFIED

3. Forebay Dispersion Length

Dist = $(8 \times Q) / (d \times V_f)$ where: Dist = forebay length (m)

Q = inlet flow rate (m^3/s) (10-year flow)

Dist = (8 x 1.529) / (1.5 x 0.5) = 1.529

d = depth of permanent pool in forebay (m)

Dist = 16.3 = 1.5

V_f = desired velocity in forebay (m/s)

0.5

Minimum forebay length is (m) **16.3**

Actual forebay length is (m) **46.4**

CRITERIA SATISFIED

4. Minimum Forebay Bottom Width

Width = Dist / 8 where: Width = minimum forebay bottom width (m)

Dist = forebay length (m)

Dist = 46.4 / 8 = 46.4

Dist = 5.8

Minimum bottom width is (m) **5.8**

Actual bottom width is (m) **5.8**

CRITERIA SATISFIED

5. Maximum Velocity Check

V = Q/A where: V = velocity (m/s)

Q = inlet flow rate (m^3/s) (10-year flow)

V = 1.529 / 19 = 1.529

A = average cross-sectional area of entire forebay (m^2) (see **Page 3**)

V = 0.08 = 19

Maximum velocity permitted is (m/s) **0.15**

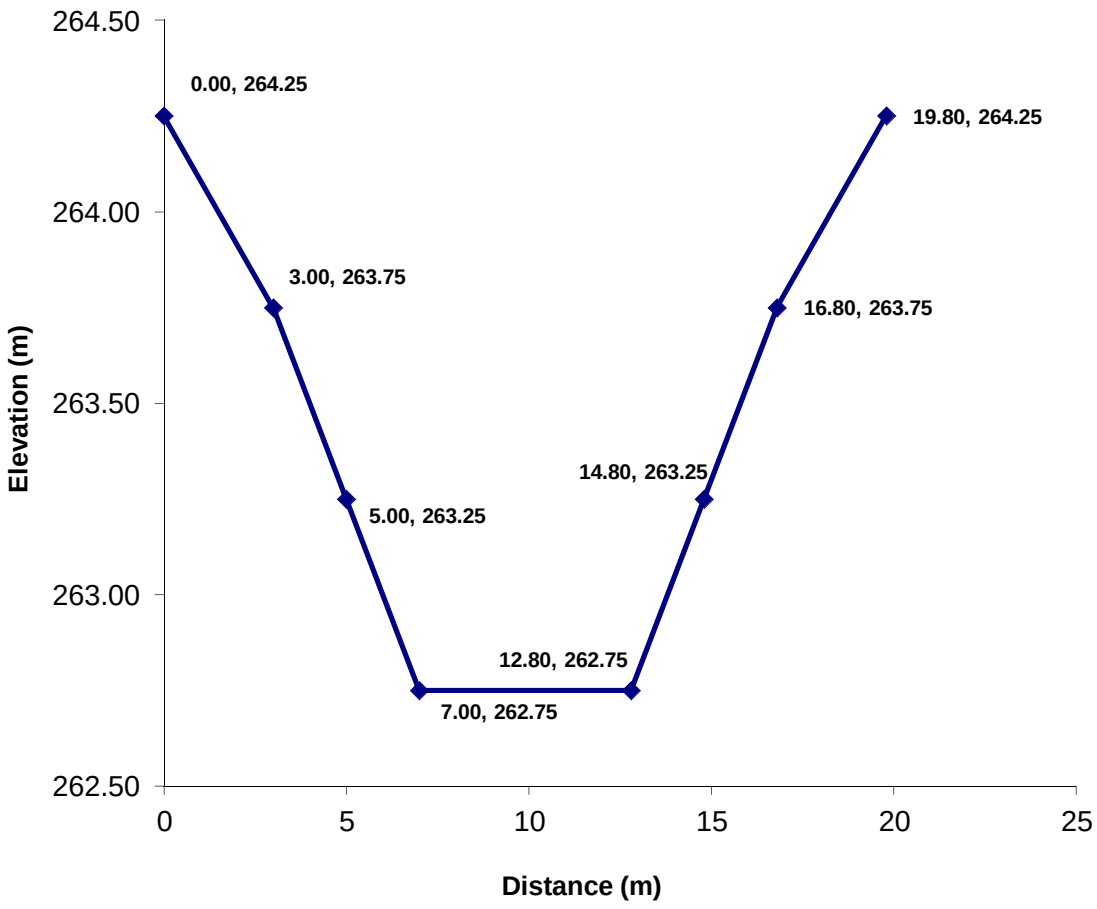
Actual velocity is (m/s) **0.08**

CRITERIA SATISFIED

Distance (m)	Elevation (m)
0.00	264.25
3.00	263.75
5.00	263.25
7.00	262.75
12.80	262.75
14.80	263.25
16.80	263.75
19.80	264.25

Area (m^2) = 19.20

Average Forebay Cross-Section



POND BLOCK = 0.95 ha
PERMANENT POOL REQUIRED = 2,520 m³
PERMANENT POOL PROVIDED = 3,445 m³
NORMAL WATER LEVEL (NWL) = 264.25 m
EXTENDED DETENTION REQUIRED = 5,130 m³
EXTENDED DETENTION LEVEL = 265.34 m
100yr ACTIVE STORAGE REQUIRED = 6,990 m³
100yr HIGH WATER LEVEL (HWL) = 265.67 m
FREEBOARD = 0.38m
MAXIMUM ACTIVE STORAGE PROVIDED = 9,323 m³
(WITH 0.38m FREEBOARD)

EMERGENCY SPILLWAY
LIMIT OF DEVELOPMENT
MAINTENANCE ACCESS ROAD
OVERLAND FLOW ROUTE
SWM POND
NWL = 264.25
SEDIMENT FOREBAY
ONTARIO HYDRO EASEMENT
OVERLAND FLOW ROUTE/MAINTENANCE ACCESS ROAD

264.11 EX
265.89 EX
266.50 EX
267.55 EX
267.73 EX
267.87 EX
269.19 EX
268.85 EX
268.83 EX
266.05 EX
266.71 EX
267.61 EX
268.22

NOTE: SCHEMATIC LAYOUT ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

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LEGEND:

- LIMIT OF DEVELOPMENT APPLICATION
- PROPOSED FLOODLINE
- 290.00 EXISTING CONTOUR
- × 268.83 EX EXISTING GRADE
- 266.05 POND CONTOUR
- PROPOSED MAINTENACE ACCESS ROAD
- PROPOSED EMERGENCY SPILLWAY
- PROPOSED OVERLAND FLOW ROUTE
- PROPOSED STORM SEWER

CARSON ROAD DEVELOPMENT INC. (CRDI)

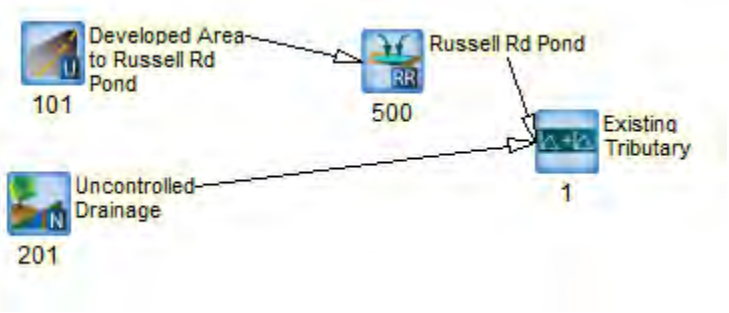
PRELIMINARY SWM POND GRADING - SOUTH POND

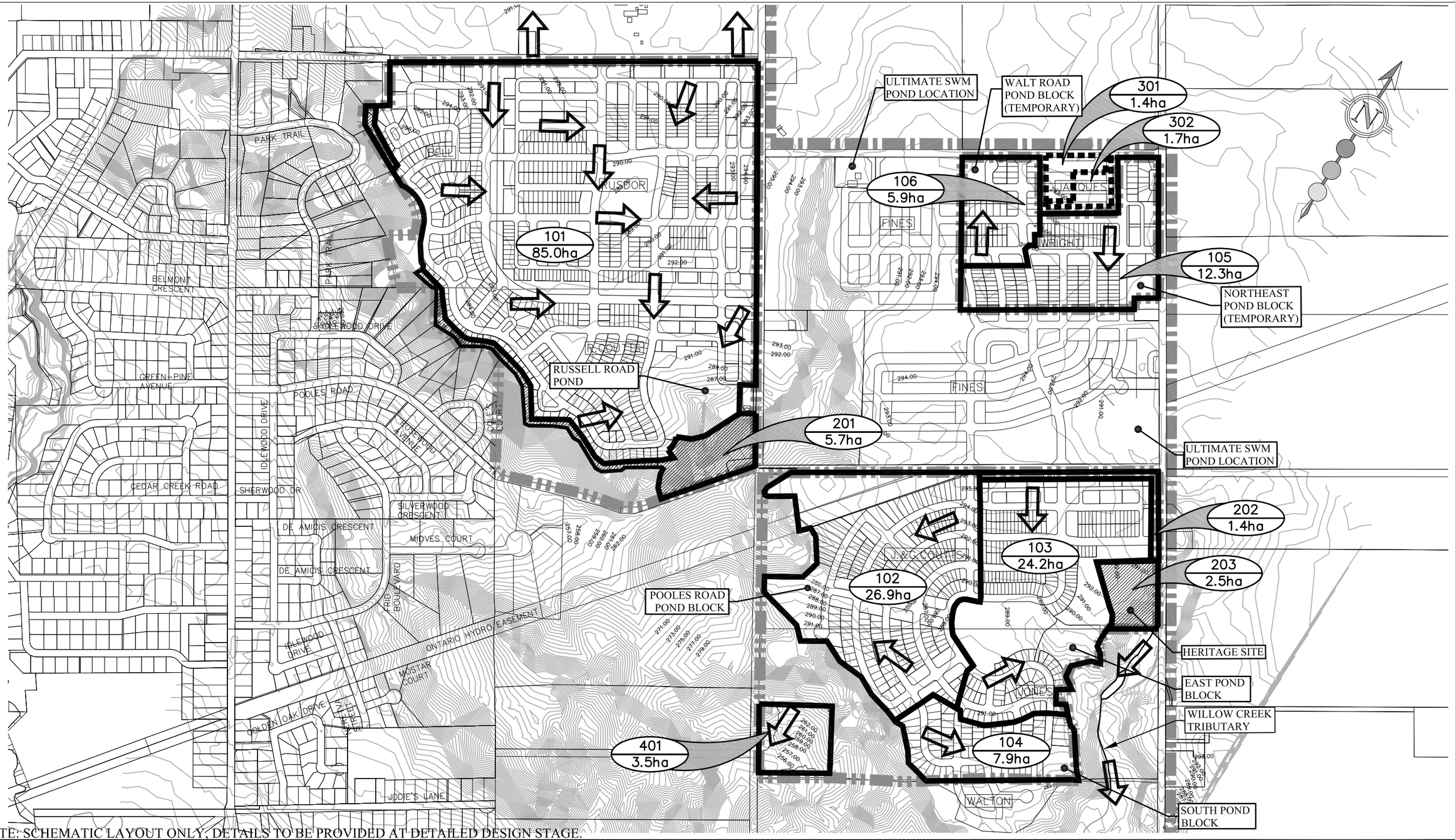
DRAWN BY:	S.F.	CHECKED BY:	J.M.P.
SCALE:	1:1000	DATE:	JUNE 2014
PROJECT No:	1194	FIGURE No:	4.4.4

File: P:\1194 Midhurst Carson Road\Drawings\FSP\Figs\Report Figures\1194D-PREL-POND-SOTH-4.4.4.dwg - Revised by <MBRITTON> : Tue, Aug 05 2014 - 3:57pm

APPENDIX A2

DORAN ROAD
(FOR PRE-DEVELOPMENT MODELLING REFER TO ITEM #2)


Developed Area to Russell Rd Pond
101
Russell Rd Pond
500
Existing Tributary
1
Uncontrolled Drainage
201



NOTE: SCHEMATIC LAYOUT ONLY; DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

MIDHURST DEVELOPMENT
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TEL: (905) 475-1900
FAX: (905) 475-8335

LEGEND:

- LIMIT OF DEVELOPMENT APPLICATION
- LIMIT OF SECONDARY PLAN STUDY
- STORM DRAINAGE BOUNDARY
- EXTERNAL DRAINAGE BOUNDARY
- UNCONTROLLED DRAINAGE
- 101 / 20.0ha — CATCHMENT ID / DRAINAGE AREA
- OVERLAND FLOW DIRECTION

MIDHURST DEVELOPMENT DORAN ROAD INC. (MDDRI)

POST-DEVELOPMENT DRAINAGE PLAN

DRAWN BY: S.F.	CHECKED BY: T.A.P.
SCALE: 1:10000	DATE: SEPTEMBER 2009
PROJECT No: 1168	FIGURE No: 4.2

File: P:\1168 Midhurst – Doran Road\Drawings\FSP\Fig\Report Figures\1168D–PREL–DRNG–4.2.dwg – Revised by <VSZEGHALMI> : Tue, Sep 29 2009 – 10:47am

Doran Road Proposed Conditions
VO2 Parameter Summary

Midhurst - Doran Road
Project Number : 1168
Date: June 2014
Designer Initials: JMP

NASHYD

Number	201
Description	
DT(min)	2
Area (ha)	5.7
CN	48.0
IA(mm)	8.0
TP (hr)	0.261

STANDHYD

Number	101
Description	
DT(min)	2
Area (ha)	85.00
XIMP*	0.33
TIMP	0.50
CN	52.0
IA(mm)	5.0
SLPP(%)	2
LGP(m)	40
MNP	0.25
DPSI (mm)	1.0
SLPI(%)	1.0
LGI(m)	752.8
MNI	0.013

Total Area = 90.7 ha

Initial Abstraction (IA) Values*

Cover	Depth (mm)
Woods	10.00
Pasture/Meadow	8.00
Cultivated	7.0
Lawns	5.0
Wetlands	12/16
Impervious Areas	2

*Values as per Table 10.2 of NVCA Stormwater Technical Guide

DRAINAGE AREA CHARACTERISTICS

Development Type	Area (Ha)	% Imperviousness (TIMP)	% Imperviousness (XIMP)	Impervious Area (Ha)
Singles	66.13	60%	25%	39.68
Townhouses	5.71	90%	30%	5.14
Mixed Use	1.10	85%	85%	0.94
Park	7.62	10%	0%	0.76
Pond	4.44	50%	50%	2.22
Total	**85.00**	**57%**	**25%**	**48.73**

PERMANENT POOL

Level of Protection = 1 (Enhanced)

Weighted Impervious = 57 %

Drainage Area = 85.00 ha

SWMP Type = 4. Wet Pond

Required Permanent Pool (including 40m^3/ha for extended detention)= 195 m^3/ha
Required Permanent Pool (minus 40m^3/ha for extended detention)= 155 m^3/ha

Required Permanent Pool = 13213 m^3

TABLE 3.2 - WATER QUALITY STORAGE REQUIREMENTS
(FROM MOE SWM PLANNING AND DESIGN MANUAL - 2004)

Protection Level	SWMP Type	Storage Volume (m^3/s) for Impervious Level			
		35%	55%	70%	85%
Enhanced (Level 1)	1. Infiltration	25	30	35	40
	2. Wetlands	80	105	120	140
	3. Hybrid Wet Pond/Wetland	110	150	175	195
	4. Wet Pond	140	190	225	250
Normal (Level 2)	1. Infiltration	20	20	25	30
	2. Wetlands	60	70	80	90
	3. Hybrid Wet Pond/Wetland	75	90	105	120
	4. Wet Pond	90	110	130	150
Basic (Level 3)	1. Infiltration	20	20	20	20
	2. Wetlands	60	60	60	60
	3. Hybrid Wet Pond/Wetland	60	70	75	80
	4. Wet Pond	60	75	85	95
	5. Dry Pond (ContinuousFlow)	90	150	200	240

EXTENDED DETENTION

Using the 25mm - 4 hour Chicago Storm

Erosion Control Volume (V) = Runoff Depth (mm) x Drainage Area (ha) x 10 (m^3) / (mm)(ha)

Erosion Control Volume (V) = 8.35 mm x 85.00 ha x 10 m^3 / mm·ha

Erosion Control Volume (V) = 7098 m^3

Using 40m^3/ha

Extended Detention Volume (V) = 40m^3/ha x Drainage Area (ha)

Extended Detention Volume (V) = 40 m^3/ha 85.00 ha

Extended Detention Volume (V) = 3400 m^3

Governing Volume (V) = 7098 m^3

Peak Flowrate (Q_p) = Extended Detention Volume (m^3) / Detention Time (hr) x 1 (hr) / 3600 (s) x 1.5 (peaking factor)

Peak Flowrate (Q_p) = 7098 m^3 / 72 hr x 1 (hr) / 3600 (s) x 1.5 (peaking factor)

Peak Flowrate (Q_p) = 0.041 m^3/s

RUSSELL ROAD POND

STAGE STORAGE TABLE

Elevation (m)	Area (m^2)	Avg Area (m^2)	ΔH (m)	ΔVolume (m^3)	Total Volume (m3)	Active Storage (m3)	Depth (m)	
278.5	1478				0		0	
		2299	0.5	1150				
279.0	13584				1150		0.5	
		14478	0.5	7239				
279.5	15372				8389		1	
		16462	0.5	8231				
280.0	**17551**				**16619**	**0**	**1.5**	**N.W.L.**
		18580	0.5	9290				
280.5	19608				25909	9290	2	
		22409	1.8	40335				
282.3	25209				66244	49625	3.8	
		26049	0.3	7815				
282.6	26889				74059	57440	4.1	

Permanent Pool Volume Required =	13213	m^3	
Permanent Pool Volume Provided =	16619	m^3	25.78% Extra
Extended Detention volume required =	7098	m^3	
Extended Detention waterlevel =	280.38	m	
5 year control volume required =	12007	m^3	
5 year control waterlevel =	280.62	m	
5 year active fluctuation =	0.62	m	
100 year control volume required =	46133	m^3	
100 year waterlevel =	282.14	m	
Freeboard =	0.46	m	

1. Area Sizing

Forebay

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
278.50	1478				0	0
		1817	0.5	909		
279.00	2157				909	0.5
		2514	0.5	1,257		
279.50	2870				2,165	1
		3305	0.5	1,653		
280.00	3740				3,818	1.5

Total Permanent Pool

Elevation (m)	Area (m^2)	Average Area (m^2)	Height (m)	Volume (m^3)	Cumulative Volume (m^3)	Depth (m)
278.50	1478				0	0
		2294	0.5	1,147		
279.00	13584				1,147	0.5
		14478	0.5	7,239		
279.50	15372				8,386	1
		16462	0.5	8,231		
280.00	17551				16,617	1.5

Minimum Criteria (per MOE guidelines)

Forebay area is **21** % of total Permanent Pool area
Maximum Forebay are **33** % of total Permanent Pool area
Therefore the minimum criteria per MOE guidelines is satisfied

2. Forebay Settling Length

Dist = $(r \times Q_p / V_s)^{0.5}$ where: Dist = forebay length (m)

r = length to width ratio

Dist = **(3 x 0.038 / 0.0003)^0.5** = 3.00

Q_p = peak flow rate from pond during 25 mm design storm (m^3/s)

Dist = **19.5** = 0.038

V_s = settling velocity (m/s)

= 0.0003

Minimum forebay length is (m) **19.5**

Actual forebay length is (m) **82.8**

CRITERIA SATISFIED

3. Forebay Dispersion Length

Dist = $(8 \times Q) / (d \times V_f)$ where: Dist = forebay length (m)

Q = inlet flow rate (m^3/s) (10-year flow)

Dist = **(8 x 6.475) / (1.5 x 0.5)** = 6.475

d = depth of permanent pool in forebay (m)

Dist = **69.1** = 1.5

V_f = desired velocity in forebay (m/s)

0.5

Minimum forebay length is (m) **69.1**

Actual forebay length is (m) **82.8**

CRITERIA SATISFIED

4. Minimum Forebay Bottom Width

Width = **Dist / 8** where: Width = minimum forebay bottom width (m)

Dist = forebay length (m)

Dist = **105 / 8** = 105

Dist = **13.1**

Minimum bottom width is (m) **13.1**

Actual bottom width is (m) **15.5**

CRITERIA SATISFIED

5. Maximum Velocity Check

V = **Q/A** where: V = velocity (m/s)

Q = inlet flow rate (m^3/s) (10-year flow)

V = **6.475 / 53** = 6.475

A = average cross-sectional area of entire forebay (m^2) (see **Page 3**)

V = **0.12** = 53.0

Maximum velocity permitted is (m/s) **0.15**

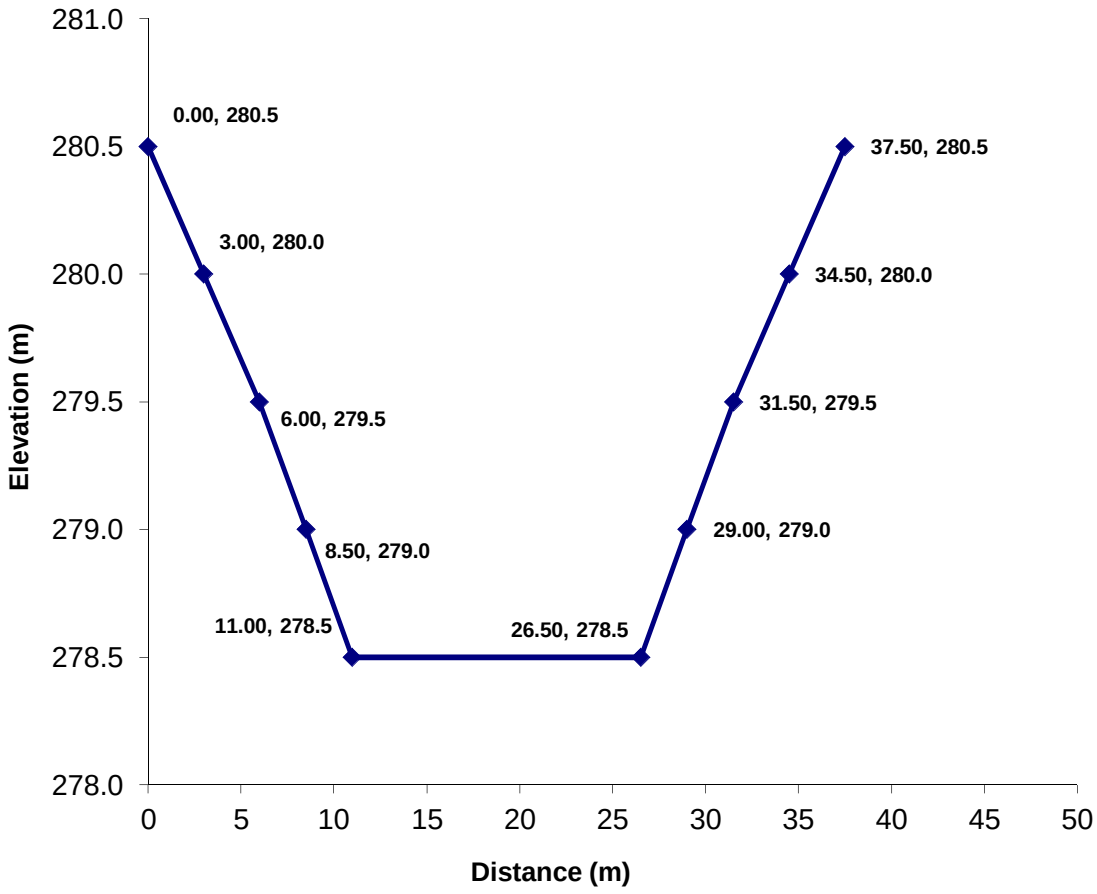
Actual velocity is (m/s) **0.12**

CRITERIA SATISFIED

Distance (m)	Elevation (m)
0.00	280.5
3.00	280.0
6.00	279.5
8.50	279.0
11.00	278.5
26.50	278.5
29.00	279.0
31.50	279.5
34.50	280.0
37.50	280.5

Area (m^2) = 53.00

Average Forebay Cross-Section



POND BLOCK = 4.39ha
PERMANENT POOL REQUIRED = 13,213m³
PERMANENT POOL PROVIDED = 16,619m³
NORMAL WATER LEVEL (NWL) = 280.00m
EXTENDED DETENTION REQUIRED = 7,098m³
EXTENDED DETENTION LEVEL = 280.38m
100yr ACTIVE STORAGE REQUIRED = 46,133m³
100yr HIGH WATER LEVEL (HWL) = 282.14m
FREEBOARD = 0.46m
MAXIMUM ACTIVE STORAGE PROVIDED = 57,440m³
(WITH 0.46m FREEBOARD)

RUSSELL ROAD

POOLES ROAD

PARK

SWM POND
NWL = 280.00

SEDIMENT FOREBAY

SEDIMENT FOREBAY

INLET STRUCTURE

4.0m WIDE MAINTENANCE ACCESS ROAD

OVERLAND FLOW ROUTE

OVERLAND FLOW ROUTE

LIMIT OF DEVELOPMENT

4.0m WIDE FLAT BERM

MAX 3:1 TO MATCH EXISTING

EMERGENCY SPILLWAY

DICB

OUTLET CONTROL STRUCTURE

4.0m WIDE MAINTENANCE ACCESS ROAD

TO EXISTING MUNICIPAL OUTLET

NOTE: SCHEMATIC LAYOUT ONLY, DETAILS TO BE PROVIDED AT DETAILED DESIGN STAGE.

MIDHURST DEVELOPMENT DORAN ROAD INC.
3190 STEELES AVE EAST, SUITE 300
MARKHAM, ONTARIO L3R 1G9
TEL: (905) 477-1177
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30 CENTURIAN DRIVE, SUITE 100
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LEGEND:

- LIMIT OF DEVELOPMENT APPLICATION
- MAX. 3:1 SLOPE
- 290.00 EXISTING CONTOUR
- × 166.50 PROPOSED GRADE
- × 287.59 EX EXISTNG GRADE
- 291.70 POND CONTOUR
- OVERLAND FLOW
- PROPOSED MAINTENACE ACCESS ROAD
- PROPOSED EMERGENCY SPILLWAY
- PROPOSED OVERLAND FLOW ROUTE
- PROPOSED STORM SEWER

MIDHURST DEVELOPMENT DORAN ROAD INC. (MDDRI)

PRELIMINARY SWM POND GRADING - RUSSELL ROAD POND

DRAWN BY: S.F.	CHECKED BY: J.M.P.
SCALE: 1:1500	DATE: JUNE 2014
PROJECT No: 1168	FIGURE No: 4.4.1

File: P:\1168 Midhurst – Doran Road\Drawings\FSP\Fig\Report Figures\1168–PREL–POND–RUSL–4.4.1.dwg – Revised by <MBRITTON> : Tue, Aug 05 2014 – 4:45pm

Appendix H

Water Quantities for Matheson Creek

SUMMARY DOCUMENT FOR OMB PROCEEDINGS

PROPOSED MIDHURST HEIGHTS DEVELOPMENT

TOWNSHIP OF SPRINGWATER

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
40 HURON STREET, SUITE 301
COLLINGWOOD, ONTARIO
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AUGUST 2014



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1.0 INTRODUCTION AND BACKGROUND

C.F. Crozier & Associates was retained by Midhurst Rose Alliance Inc. to provide engineering services to support the Zoning Bylaw Amendment and Draft Plan of Subdivision applications for the proposed Midhurst Heights Development in the Township of Springwater. The Midhurst Heights Development consists of an amalgamation of three properties known as Midhurst Rose Alliance, Midhurst Rose Alliance Cooney, and Midhurst Rose Alliance O'Brien, having a combined area of approximately 97ha. The Midhurst Heights Development is irregular in shape with several outparcels. The development is generally located east of Gill Road, north of Doran Road and west of Russell Road in the Township of Springwater. The site location is illustrated on Figure 1.

C.F. Crozier & Associates is part of a team of consultants providing support for the ZBA and Draft Plan approval of Midhurst Heights. The other members of the consulting team include:

- MNT Consulting Group (engineering)
- Weston Consulting (planning)
- Azimuth Environmental Consulting (ecology and natural heritage)
- GEO Morphix (geomorphology)
- Terraprobe Limited (geotechnical)

Weston Consulting prepared the most recent version of the Midhurst Heights Draft Plan, dated May 27, 2014. The Draft Plan contemplates development of:

- A total of 1440 residential units, comprised of:
    - 991 single-family detached,
    - 360 townhomes,
    - 82 4/6 plex,
    - 1 existing and 6 future residential full lots,
- Two future well sites, a water treatment plant and a sewage pumping station;
- A stormwater management facility;
- 3 park blocks;
- A future school site; and,
- A commercial block.

The development contains local roads (20m ROW), as well as two collector roads (23m ROW) connecting to the surrounding boundary road network and to future development lands to the north and south of the Midhurst Heights Development. The Draft Plan is reflected as Figure 2.

1.1 Planning Context

The Midhurst Heights Development forms part of the Midhurst Secondary Plan area, and is one of several communities within the Secondary Plan to be currently allocated population. A total of 300 ha are currently released for development, including the Midhurst Heights Development and several proposed developments owned by Geranium Corporation. Additional development lands within the Secondary Plan area will not be allocated population for some time (estimated 15 to 25 years).

A body of landowners that own development lands within the Secondary Plan area has been formed as a basis for collaborative efforts between the developers, and is known as the Midhurst Landowner Group (MLG). Midhurst Rose Alliance is a member of the MLG.

1.2 Project History

The Zoning By-law Amendment and Draft Plan of Subdivision applications for the Midhurst Heights Development were initially made in July 2008. The planning applications were supported by several technical reports, including a Master Servicing Report authored by Richardson Foster Ltd.

Since that time, updates to servicing and stormwater management strategies, as well as the Draft Plan itself, have been undertaken. An updated Draft Plan was submitted in April 2013, supported by updated stormwater management and servicing design by MNT Consulting Group Inc. Concurrently, Geranium Corporation (another member of the MLG) submitted Draft Plan Applications for their developments. The Nottawasaga Valley Conservation Authority (NVCA) issued comments to both Midhurst Rose Alliance and Geranium Corporation with respect to the proposed developments.

The NVCA comment letter related to the Midhurst Heights Development raised several site-specific issues including updates to the species at risk assessment, stream erosion and geomorphology, and the delineation of external drainage areas. The NVCA also stated that the west outlet, previously identified as the primary outlet for the stormwater management facility, was not a suitable outlet for stormwater from the site. Furthermore, and common to both the Midhurst Rose Alliance and Geranium Corporation applications, the NVCA requested that a Master Drainage Plan (MDP) be prepared to support the Draft Plan Approval process and to assess the cumulative impact of the developments in the Midhurst Secondary Plan area. It was at this juncture that C.F. Crozier & Associates Inc. was retained to build upon MNT's previous engineering analysis and satisfy the requirements of the NVCA and Township of Springwater.

1.3 Crozier Study and Master Drainage Planning Approach

Crozier and MNT staff attended a site walk with NVCA, Township of Springwater, and Ainley & Associates on May 8th 2014. A subsequent meeting was held on May 14th 2014. These meetings served to clarify the approach to the MDP to be undertaken by Ainley Group on behalf of the Township of Springwater. It was determined that MNT and Crozier would contribute technical material to the MDP on behalf of Midhurst Rose Alliance, and SCS Consulting Group would do the same on behalf of Geranium Corporation. A two-phased approach to the MDP was defined.

Phase 1 of the drainage planning process was considered for the purposes of Draft Plan approval of the individual developments within the Midhurst Secondary Plan area, and served to establish general targets for water balance, thermal regime, water quality, erosion, and phosphorus loading for the Matheson Creek Subwatershed and assess the flexibility within the proposed Draft Plans to achieve the required targets. Phase 2 of the process is to be undertaken following Draft Plan approval of the developments, and will consist of the amalgamation of Phase 1 results into a consolidated Master Drainage Plan. This may result in optimization of the functional designs provided in Phase 1. It will also involve cumulative impact assessments with respect to erosion, flooding, water quality, thermal impacts and phosphorus loading on a watershed basis. Refinement of site-specific water balances will also be completed at this time.

In support of Phase 1, Crozier prepared a Comment Response Letter, submitted to the NVCA on May 27th 2014. The Comment Response Letter and appended technical memo discussed peak flows from the site, quantity control and water balance, and erosion control. The following specific concerns were also addressed:

- Establish an alternative primary outlet for the site at the tributary of Matheson Creek crossing at Gill Road;
- Provide feasibility analysis and conceptual design of onsite Low Impact Development Stormwater Management practices (LIDs);
- Provide updated hydrologic modeling for pre-development and post-development scenarios (with and without LIDs);
- Provide updated pre and post-development catchment delineations; and
- Address NVCA comments related to thermal impacts to Matheson Creek, and several other SWM-related issues.

Based on verbal comments provided by NVCA and Ainley Group on June 20th, 2014, a second comment response was provided by Crozier on June 26th 2014. This submission provided supplemental hydrologic modeling accounting for future development and interim conditions, and addressed the following issues:

- Confirm that the pond adheres to the MOE preferred pond side slopes;
- Demonstrate impervious area percentages calculations used for hydrologic modeling;
- Provide further conceptual detail of LIDs;
- Demonstrate appropriate sizing of the pond from both quantity and quality perspectives in the context of various external development scenarios; and,
- Provide further details for the proposed Gill Road outlet pipe.

Ainley & Associates provided a formal comment letter which captured the June 20th discussions as well as other items on June 30, 2014. The majority of the comments in this letter had been addressed in the Crozier June 26th submission. A formal response to these comments is provided in Appendix D.

Concurrent with the Crozier study, several other documents have been prepared over the last several months to support Phase 1 of the analysis for the Midhurst Heights development, including:

- Azimuth Environmental Consulting Inc. – Thermal impacts of proposed stormwater management outlets, Midhurst Heights Development, Township of Springwater;
- Hutchinson Environmental Sciences Ltd. – Phosphorus Budget for Midhurst Secondary Plan Area;
- GEO Morphix Ltd. – Opinion Regarding Stormwater Management and Instream Erosion, Midhurst Rose Alliance;
- Terraprobe – Comments Regarding Preliminary Geotechnical Feasibility, Proposed SWM Facility – Midhurst Rose Alliance Subdivision, Springwater, Ontario; and
- Terraprobe – Comments Regarding Groundwater Levels, Proposed SWM Facility – Midhurst Rose Alliance Subdivision, Springwater, Ontario.

Furthermore, an updated Draft Plan and associated planning reports have been prepared by Weston Consulting (note that revisions to the Draft Plan do not impact the conclusions drawn from the technical studies noted above).

Review of this material led to the development of Minutes of Settlement and Draft Plan Conditions for the Midhurst Heights Development which were agreed upon by the NVCA, Township, and developers at an OMB Settlement Hearing on July 3, 2014.

1.4 Objective and Contents of the Summary Document

The purpose of this document is to provide a comprehensive summary of all work performed to support Draft Plan Approval of the Midhurst Heights Development preceding the OMB Settlement Hearing, in fulfillment of Clause 12 of the Minutes of Settlement. Included in this document are the water and wastewater servicing strategies from the original Master Servicing Report by MNT, and the updated stormwater design prepared by Crozier & Associates in consultation with MNT. It is intended that this summary will form part of an overall Phase 1 summary report to be prepared by Ainley Group on behalf of the Township. The overall report will also integrate content provided by SCS Consulting group, as well as other environmental and geomorphologic consultants.

Based on the results obtained from the Phase 1 study, commentary has also been provided with respect to analysis that is recommended for the Master Drainage Plan (Phase 2).

2.0 WATER SERVICING

The following excerpts related to general water servicing are taken from the Master Servicing Report (MNT Consulting, 2013). The water servicing described herein represents the most recently submitted material to support the Midhurst Heights Draft Plans:

> *"The Master Plan determined that the preferred solution for water for the Secondary Plan area is a single new water treatment facility located on proposed development lands with at least three (3) new well sites and reservoirs. The system is designed such that integration with the existing Midhurst water system can be made. The proposed water treatment facility has been conceptually located within the Midhurst Rose Alliance lands. A water treatment plant block has been provided along Gill Road and two (2) well sites have been provided within the eastern portions of the proposed Draft Plan. The well site locations are consistent with water which has been developed on the Midhurst Rose Alliance lands as provided within the Master Plan supporting Hydrogeological works. The EA process for Phases 3 & 4 will provide design details regarding the water system.*
>
> *The cumulative water demands calculated for each phase of development described above are summarized in Table 3 below. Subject to final design, an allowance for commercial and existing residential lots has been included in the 2,002 lots of equivalent water consumption. The design parameters listed in Table 3 are consistent with the MOE 2008 Design Guidelines for Drinking Water Systems [Design Guidelines] and Township of Springwater Engineering Standards. Fire flows and peaking factors were taken from Tables 3-1 and 8-1 of the Design Guidelines.*
>
> *Notwithstanding the unit densities proposed in Section 1.6, a (conservative) household density of 3.2 people per residential unit was used to estimate equivalent populations with respect to water demand and sewage production. A water demand of 450 litres per capita per day*

[L/cap/day] was used to project the total water demand of each development phase. The draft plan illustrates that the residential development will consist of a blend of mixed residential units including single family, bungalow townhomes, townhomes and 4 and 6 plex units. This will ultimately result in a somewhat lower average household density. The design household density of 3.2 people per residential unit will provide a conservative approach that will be refined at the detailed design phase.

DESIGN PARAMETERS		
Household Density	*cap/unit*	3.2
Water Demand	*L/cap.d*	450
Fire Flow	*L/s*	38
Fire Flow Duration	*hrs*	2
Maximum Day Factor		2
Peak Rate Factor		3
RESIDENTIAL POPULATION		
Additional Equivalent Residential Units	*units*	100
Total Equivalent Residential Units	*units*	1,500
Total Serviced Population	*cap*	1,600
CALCULATED DESIGN FLOWS		
Total Average Daily Demand (ADD)	m^3/d	2,304
	L/s	26.7
Maximum Daily Demand (MDD)	m^3/d	4,608
	L/s	53.3
MDD + Fire Flow (MDD + FF)	*L/s*	91.3
Peak Hourly Demand (PDF)	m^3/d	6,912
	L/s	80.1

* The number of Total Equivalent Residential Units includes an allowance for future development of vacant lots and commercial growth.

The EA process for Phases 3 & 4 will provide design details regarding the water system."

The following excerpt related to the internal water servicing for the Midhurst Heights development.

"The internal water system for the subject property is to be looping throughout the proposed development and will meet Township standards. Trunk watermains are anticipated on the collector roads with diameters up to 300 mm. Local distribution on the main roads are expected to be 150 mm diameter. Actual watermain sizes will be confirmed at the detailed design stage. Locations and timing for connections to the existing Midhurst water system will be confirmed though the final phases of the EA process and will be incorporated into the detailed engineering design.

The water distribution system will be computer modeled at the detailed design stage. Modeling inputs will include the water demands calculated in Table 4 and the operating pressure criteria outlined below, as found in the Guidelines for the Design of Water Distribution Systems (Section 2.3.2).

Minimum Pressure at Peak hour	*273 kPa*	*(40 psi)*
Normal Operating Pressure at Max. Day	*350-550 kPa*	*(50-80 psi)*

Maximum	*700 kPa*	*(100 psi)*
Maximum day + Fire Flow	*138 kPa*	*(20 psi)*

The modeling scenarios will include Average Day Demand, Maximum Day Demand, Maximum Day Demand + Fire Flow, and Peak Hourly Demand for both the proposed and ultimate development scenarios. All model schematics and modeling results will be included with the detailed design report.

Careful detailed design and computer modeling of the water distribution layout will ensure that:

- *All residences within the proposed subdivision will meet the normal operating pressure requirement of 350 to 550 kPa at maximum day flows;*
- *All residences within the proposed subdivision will meet the minimum pressure requirement of 138 kPa at the maximum daily demand + fire flow.*
- *All residences within the proposed subdivision will meet the minimum pressure requirement of 275 kPa at peak hourly flow."*

The water servicing plan previously submitted by MNT is reflected as Figure 3.

3.0 WASTEWATER SERVICING

The following excerpts related to general wastewater servicing are taken from the Master Servicing Report, by MNT Consulting:

"The Master Plan determined that the preferred solution for wastewater for the Secondary Plan area is a single new wastewater treatment facility located on proposed development lands with effluent discharge to Willow Creek at Highway 26. The system is to be designed such that flows from existing Midhurst can be accommodated at the proposed new facility if and when necessary. The proposed treatment facility has been conceptually located within the western Midhurst lands in the Snow Valley Road and Wilson Drive area.

The design sewage flows for each of the development phases will be based on the water demands calculated in Section 3.1. As a conservative estimate, it is assumed that all water supplied will be collected by the sanitary sewer network and delivered to the new wastewater treatment facility. It is proposed to base sewage flows to the wastewater treatment facility on 450 L/cap/day which will include a nominal amount for inflow/infiltration. Based upon historical data for several recently constructed wastewater treatment plants, however, it has been noted that this is a decrease in the actual quantity of sanitary sewage generated from new development. It is thought that this is a reflection of the environmental considerations of new residential construction, such as low flow plumbing fixtures, and environmentally aware consumers.

The projected average daily and peak hourly sewage flows to the wastewater treatment facility during each phase of development from the Midhurst Rose alliance lands are summarized in Table 4 below.

Design Average Daily Flow	m^3/d	2,304
	L/s	26.7
Design Peak Flow	m^3/d	6,912
	L/s	80.1

In order to convey flows to the new wastewater treatment facility and ensure that existing Midhurst can be accommodated in the future, a series of sewage pumping stations are proposed to convey flows along Gill Road, Finlay Mill Road and Snow Valley Road to the location of the new wastewater treatment facility. A sewage pumping station has been provided within the Water Treatment Plant block within the Community Plan. An additional pumping station (no. 4) will be required along Finlay Mill Road at Willow Creek to pump flows to the wastewater treatment facility. This pumping station will be designed to accommodate a large portion of existing Midhurst. The EA process for Phases 3 & 4 will provide the design details for the external sanitary system"

With regards to internal sanitary sewer servicing, the following excerpts are provided:

"It is proposed that sanitary sewers be installed throughout the subject property. The sewer location is to be as per Township of Springwater standards.

The majority of the site can flow via gravity to the proposed sewage pumping station no. 1 with sewer depths ranging from approximately 2.8 m to 7.5 m deep."

The sanitary servicing plan previously submitted by MNT is provided as Figure 4.

4.0 EXISTING DRAINAGE CONDITIONS

The existing drainage conditions in the vicinity of the Midhurst Heights Development were previously assessed by Richardson Foster and MNT Consulting. Crozier refined this analysis through the Phase 1 drainage design work. The summary contained herein represents the most up-to-date information used to support the Midhurst Heights Draft Plans.

4.1 Matheson Creek Subwatershed

The Midhurst Heights Development lands lie within the Matheson Creek Subwatershed, as shown on Figure 5A. Matheson Creek was studied in the Willow Creek Subwatershed Plan (NVCA, 2001), as it is a tributary of Willow Creek. The Matheson Creek Subwatershed was found to have an approximate contributing drainage area of 95km^2 (9,500ha). Matheson Creek has been identified as having significant reaches of cold and cool water fish habitats, and supports both brook and brown trout fisheries (NVCA, 2001).

4.2 Site

The subject lands currently consist of agricultural land with some wooded and pasture area. Soils are comprised generally of 300mm of topsoil overlying silt soils with sand and trace gravel, based on preliminary investigations by Ian D. Wilson Associates. (MNT, 2013). Simcoe County Soils Mapping identifies

the soils onsite as Vasey sandy loam and Dundonald sandy loam, which are classified by MTO Design Charts as AB type soils.

The site currently drains to the north and west property lines via several drainage draws across the site. For the purposes of this report, two overall outlets are defined as the "North" and "West" outlets to differentiate drainage contributing to each property line. Runoff from the Midhurst Heights Development area and from several contributing external areas drain to these two outlets. The drainage patterns and the pre-development drainage areas are shown on Figure 5B.

Overall site drainage is from southeast to northwest. Elevations range from approximately 291.5m in the southeast to 279.0m in the northwestern portion of the site.

4.3 External Lands

There are five external catchments which drain through the Midhurst Heights lands in the existing condition. Catchments EXT1 and EXT2 are located to east of the development, on the east side of Russell Road. Runoff from these catchments currently flows across Russell Road and contributes to the North outlet.

Catchments EXT3, EXT4 and EXT5 are located on the south side of Doran Road, and drain across the road to the site. Runoff from EXT3 ultimately contributes to the West outlet, while runoff from EXT4 and EXT5 contributes to the North outlet. Catchment EXT4 and EXT5 are characterized by large closed depression areas that allow runoff to collect and infiltrate without contributing significant flows to the Midhurst Heights Development area in most rainfall events. Delineation and storage volumes associated with these catchments were obtained from SCS Consulting Group, as further discussed in Section 4.4.

Current land uses of the external areas are principally agricultural. Soil conditions for the external catchment are generally similar as those in the development area.

4.4 Hydrologic Modeling of Existing Conditions

Pre-development modeling of the Midhurst Heights lands and external contributing areas was completed using the SWMHYMO hydrologic model. The 25mm event, Timmins Regional event and 2 through 100 year SCS and Chicago events were all simulated to obtain existing peak flows and volumes at each of the North and West site outlets

Pre-development hydrologic modeling parameters were generally maintained from the Master Servicing Report by MNT Consulting Group Inc. (April 2013), save for the delineation and modeling of contributing lands south of Doran Road. The hydrologic parameters are provided in Appendix A.

To account for the lands south of Doran, the delineation and depression storage quantities were obtained from SCS Consulting and integrated into the pre-development model, as shown on Figure 5. The Master Servicing Report by MNT had previously identified 17.2 ha of land south of Doran Road draining into the Midhurst Heights lands, designated as EXT3. Through further examination of contour mapping and site observation, SCS Consulting Group concluded that approximately 63.4ha of land south of Doran are contained within the Matheson Creek subwatershed. However, the existence of two large closed depression areas prevents these lands from contributing significant flows and volumes to the Midhurst Heights lands during most storm events, save and except rainfall events of a 25 year SCS return period or

greater. These lands were subdivided into catchment areas EXT3, EXT4, and EXT5 mentioned above. Depression areas were simulated using the DUALHYD command in SWMHYMO.

The land-use specific curve numbers, initial abstraction values, and runoff coefficients shown in Table 1 were used to calculate area-weighted values for each pre-development catchment area.

Table 1: CN, IA and RC values for specific land uses (MNT, 2013)

Land Use	Curve Number	Initial Abstraction (mm)	Runoff Coefficient
Pasture/Lawn	59	5	0.10
Wooded	46	10	0.08
Cultivated	68	7	0.22
Wetland	50	9	0.05
Impervious	100	2	0.95

The time of concentration values used in the pre-development modeling were calculated using the NVCA standard method of applying the Bransby-Williams or Airport method, and comparing results to the Uplands method to obtain the longest calculated time of concentration.

The results of the pre-development modeling for the North and West site outlets are summarized in Table 2 below.

Table 2: Summary of Pre-development Peak Flow Rates and Runoff Volumes

		West Outlet		North Outlet		Total	
	Storm	*Qpeak (m^3/s)*	*Runoff Vol (m^3)*	*Qpeak (m^3/s)*	*Runoff Vol (m^3)*	*Qpeak (m^3/s)*	*Runoff Vol (m^3)*
	25mm	0.16	1600	0.31	3200	0.47	4700
Chicago	2 year	0.23	2300	0.45	4700	0.68	6900
	5 year	0.50	5100	0.99	10400	1.49	15500
	10 year	0.72	7400	1.42	15000	2.14	22400
	25 year	1.04	10600	2.05	21600	3.09	32200
	50 year	1.31	13300	2.58	27100	3.88	40400
	100 year	1.60	16200	3.16	33100	4.75	49300
SCS	2 year	0.44	5900	0.87	12000	1.30	17900
	5 year	0.98	12700	1.93	25800	2.91	38600
	10 year	1.42	18100	2.80	37600	4.21	55700
	25 year	2.04	25800	4.04	59800	6.08	85500
	50 year	2.55	31900	5.73	184200	7.78	109600
	100 year	3.09	38400	8.55	96300	11.51	134700
	Timmins	3.86	80200	11.26	217000	15.11	297200

Pre-development hydrologic parameter sheets are attached in Appendix A. Digital modeling files are provided on the enclosed CD.

5.0 STORMWATER SERVICING - PROPOSED DRAINAGE CONDITIONS

5.1 SWM Criteria and Phase 1 Approach

As discussed in Section 1.3 above, drainage analysis for the Secondary Plan area is being completed in two phases. Phase 1, which is the subject of this summary document, will be considered for the purposes of Draft Plan approval of the development. The NVCA has defined a general approach to Phase 1 of the MDP:

- General targets for water balance, thermal regime, water quality, erosion and phosphorus will be established;
- Analysis of existing and proposed conditions will be undertaken at the Draft Plan level for each development and contributing external catchments (i.e. watershed-scale assessment not yet required);
- Downstream receivers are assumed to be highly sensitive in all respects, and that the focus of analysis is to provide an assessment of the flexibility of the Draft Plans to meet the general targets. This should provide a measure of certainty that the identified targets can be met, if not exceeded;
- Functional SWM design and modeling of proposed developments is to be undertaken with two objectives:
    1. Assess the ability of the proposed pond block to accommodate NVCA requirements for extended detention and peak flow control in the absence of on-site infiltration practices, and;
    2. Assess the infiltration capacity of the site with the implementation of infiltration practices in addition to pond block configuration determined as part of the first objective. Design based on the two objectives provides for a treatment train approach with conservative pond block sizing.
- Cumulative Impact assessments will be deferred to Phase 2 (Master Drainage Plan), subsequent to Draft Plan approval, provided the results of the above analysis confirm that the Draft Plan design provides sufficient flexibility to meet the identified targets including discharge to a highly sensitive receiver.

The NVCA has identified specific SWM criteria to support the Phase 1 approach detailed above. These criteria represent specific targets related to the stormwater quantity control, quality control, and water balance objectives that are addressed by the work contained within this summary document. Other targets identified by NVCA, such as those specifically related to nutrient loading and Adaptive Management Plan are addressed under separate cover.

- There should be no increase in peak flows at each outlet for all storm events from the 2 year through the 100 year for 4 hour Chicago and 24 hour SCS storms.
- There should be no increase in the volume of post development runoff from the pre development runoff both on an annual basis and a per storm basis. Increases in volume may be permitted for infrequent events.
- Demonstrate the ability of the SWM system to achieve 48 hours drawdown time for the 25mm event runoff.
- Maximize the amount of water which can be infiltrated, with the target of infiltrating the runoff for the 25mm event.

- 80% TSS removal per the MOE Stormwater Management and Drainage Manual, 2003, should be achieved.
- An Adaptive Management Plan (AMP) should be prepared. The plan should identify parameters being monitored and monitoring locations, as well as explain how the results of monitoring will be implemented will be implemented.
- Temperature standards should be developed for all outlets based on existing aquatic ecosystems or potential improvements to the aquatic systems.

5.2 SWM Approach for Site and External Development

To achieve the SWM targets described in Section 5.1, the runoff generated by the proposed development will be collected and treated in a stormwater management "end-of-pipe" facility previously designed by MNT Consulting Group as a wet pond constructed in the northwest portion of the Midhurst Heights Development. MNT's original storm servicing and grading plan and wet pond design are shown in Figures 6 and 7, respectively. Low Impact Development (LID) stormwater management practices will also be implemented throughout the subdivision to assist in meeting water balance objectives and to provide primary water quality controls.

To provide a conservative approach to the SWM design, the SWM pond has been confirmed to be appropriately sized to achieve the SWM quantity and quality criteria identified in Section 5.1 without the use of LIDs on the site. This represents the worst case scenario for runoff volumes and peak flows to the pond. The LIDs therefore provide a "bonus" to the stormwater quantity and quality control. The precipitation in all storm events has also been modified to simulate potential effects of climate change. This is discussed in more detail in Section 5.3.

The primary outlet for the SWM pond previously identified in the Master Servicing Report (MNT, 2013) was determined to be unsuitable by the NVCA, as it does not exhibit defined bed and banks and is not a permanently flowing watercourse. A preferred outlet for the pond consisting of the Matheson Creek Tributary at Gill Road, located approximately 3 km north of the site was subsequently deemed acceptable by the NVCA. The tributary exhibits a defined watercourse feature with permanent flows. Stormwater flows up to and including the 100 year event will be conveyed via pipe to this outlet. The outlet pipe has been designed with sufficient capacity to accommodate future development of external lands. More details are provided in Section 5.2.4 and Section 5.6.

5.2.1 Quantity Control

The SWM pond has been designed to accommodate stormwater runoff from the Midhurst Heights Development, as well as several external catchments to the south and to the east of the site. The pond has been sized to allow for post-to-pre peak flow control at both the North and West outlet, and for the overall upstream catchment area, for the 2 to 100 year SCS and Chicago storm events. The pond design also matches pre-development flows in the Timmins storm.

The potential future development of certain portions of the contributing external lands has been accounted for in the design of the SWM pond. The Geranium lands to the south of Doran Road are included in the Secondary Plan area, have been allocated population, and are intended to be developed. Correspondence with SCS Consulting has indicated that stormwater runoff from these lands will be redirected southward in the ultimate development condition, and will not contribute to the flows from the

Midhurst Heights Development. It is not anticipated that catchments EXT1 and EXT2 to the east of the site will be developed in the near future, as they are not part of the Secondary Plan area. Lands between the Midhurst Heights site and Doran Road (known as the Frankcom Lands) may be developed in the future. Similarly, lands to the north of Midhurst Heights (Johns Lands), although not currently allocated population, may be developed in the future and hence are accommodated in the overall area drainage strategy.

More detail on the development scenarios considered is available in Section 5.2.4 below.

5.2.2 Quality and Erosion Control

The proposed end-of-pipe wet pond will provide water quality control to the MOE Enhanced protection level, corresponding to 80% Total Suspended Solids (TSS) removal rate. Based on the design approach of first sizing the pond without consideration of upstream LIDs, and then adding site LIDs as a "bonus", the treatment train will far exceed the requirements of MOE Enhanced protection.

The SWM facility has been designed to provide a 72 hour drawdown time for the 25mm event runoff, exceeding the 48 hours drawdown requested by the NVCA, to protect the receiving watercourse from erosion.

Quality and erosion control analysis has been performed for the various external development scenarios to ensure that quality control for future development has been accommodated in the overall SWM strategy.

5.2.3 Low Impact Development (LIDs)

The water balance objective of the Midhurst Heights Development is to replicate existing long-term infiltration, runoff and evapotranspiration quantities on the site. A detailed stormwater best management practices evaluation has therefore been completed for the Midhurst Heights site, with the intention to implement infiltration-based LIDs on the site.

The site soils consist of silty sand till; groundwater is located 20 to 30m below grade (Wilson Associates, 2006). As a result, infiltration measures can be confirmed as being appropriate for the site.

The LIDs practices recommended for this development include:

- Lot-level soakaway pits;
- Infiltration galleries/bioretention in park blocks; and,
- Infiltration gallery in SWM pond block.

These practices have been selected based on their relative long term acceptance within neighboring southern municipalities where water balance and sensitive receivers have been of concern as it relates to urban development, and are documented in the MOE Stormwater Management Planning and Design Manual (MOE, 2003) and the Low Impact Development Stormwater Management Planning and Design Guide (CVC/TRCA, 2010) as viable infiltration practices for use in Ontario.

To be conservative, the use of pervious pipes and right-of-way controls have not been accounted for due to the risk for long term road settlement, as well as high capital costs and frequent maintenance costs. SCS Consulting has undertaken an assessment of right-of-way controls on behalf of the MLG, submitted under

separate cover. The applicability of pervious pipe and R.O.W controls will be further examined during detailed design. Further discussion on the feasibility and design of site LIDs is available in Section 5.4.

5.2.4 Development Scenarios

The Master Drainage Plan approach to the stormwater management in the Secondary Plan requires assessment of the ability of the Midhurst Heights SWM pond to service future external developments under various build-out scenarios. The future development of the Frankcom lands (EXT4A and EXT4B) and the Johns Lands (204A, 204B, and 204C) have been accounted for as described in Table 3 below. The assessment also accounts for development of the Geranium lands south of Doran Road under various scenarios. Note that each scenario is broken into two sub-cases, to assess the SWM pond performance both with and without the impacts of onsite LIDs. Figure 8 illustrates the post-development catchments.

Note that for the purposes of Phase 1, a conservative approach has been taken to the treatment of the Geranium lands south of Doran Road, specifically accommodating the Geranium (pre-development) flow in the Rose-Alliance SWM pond during interim conditions. Assessment of drainage bypass routes during detailed design may allow for bypassing of some or all flows from the Geranium lands around the Midhurst Heights Development in the interim development case. The assessment contained herein provides the most conservative assessment of pond storage requirements.

Table 3: Descriptions of Development Scenarios

	ID	Description
Post Development Scenario	1-A	• LIDs are neglected on the site; • Catchments EXT4A and EXT4B (Frankcom) have been fully developed and drain to the pond. The existing institutional portion of EXT4A continues to drain uncontrolled to Gill Road (1.25 ha). • Geranium lands south of Doran Road are developed, but drain southward away from the site, and do not contribute to the SWM pond. • John's lands (Catchments 204A, 204B, and 204C) are undeveloped and do not contribute to the pond. Runoff from EXT1 bypasses the site and John's Lands, draining to the North outlet as in the existing condition. (See Figure 9)
	1-B	• Identical to Scenario 1-A, but LIDs have been accounted for both on the site and external developments, and function at 75% capacity.
Post Development Interim Scenario	2-A	• LIDs are neglected on the site; • Catchments EXT4A and EXT4B have been fully developed and drain to the pond. The existing institutional portion continues to drain uncontrolled to Gill Road (1.25 ha) • Geranium lands south of Doran Road have not yet been developed and continue to drain north across Doran Road, contributing to the SWM pond in the 25 year SCS event or greater. • John's Lands (Catchments 204A, 204B, and 204C) are undeveloped and do not contribute to the pond. Runoff from EXT1 bypasses the site and John's Lands, draining to the North outlet as in the existing condition. (See Figure 9)
	2-B	• Identical to Scenario 2-A, but LIDs have been accounted for both on the site and external developments, and function at 75% capacity.
Ultimate Condition	3-A	• LIDs are neglected on the site; • Catchments EXT4A and EXT4B have been fully developed and drain to the pond. The existing institutional portion of EXT4A continues to drain uncontrolled to Gill Road (1.25 ha) • Geranium lands south of Doran Road are developed, but drain southward away from the site, and do not contribute to the SWM pond. • The John's Lands (Catchments 204A, 204B, and 204C) have been developed and now contribute to the pond. The pond has been expanded to account for the additional contributing area associated with the John's lands. Runoff from EXT1 bypasses the site and John's Lands, draining to the North outlet as in the existing condition. (See Figure 9) A concept sketch illustrating the Johns Lands development is included in Appendix B.
	3-B	• Identical to Scenario 3-A, but LIDs have been accounted for both on the site and external developments, and function at 75% capacity.

5.3 Hydrologic Modeling and Design of Site SWMF Without LIDS

The post-development modeling of the Midhurst Heights Development and external contributing areas was completed using the SWMHYMO hydrologic model. The CALIB NASHYD command was used to

simulate hydrographs for undeveloped areas, while the CALIB STANDHYD command was applied to developed areas. The SWM facility was simulated using the ROUTE RESERVOIR command.

The 25mm event, Timmins event and 2 through 100 year SCS and Chicago events were simulated to obtain peak flows and volumes contributing the North, West, and Gill Road site outlets. As per comments made by the NVCA, the precipitation depths for the Intensity-Duration-Frequency (IDF) curves for the 2 through 100 year SCS and Chicago storms were increased by 15%to account for potential future increases in precipitation due to climate change. These changes were not applied to the 25mm and Timmins events. The precipitation values are shown in Appendix B.

Impervious percentages for the post-development modeling were obtained from Master Servicing Report prepared by MNT Consulting, April 2013. For developed areas, the total impervious area (Timp) is 60%, while the directly-connected impervious area (Ximp) is 30%. These values were applied in all scenarios, and the John's and Frankcom future development areas. The impervious area calculations are available in Appendix B.

Applicable curve numbers, initial abstractions, and runoff coefficients for specific land uses were maintained from the pre-development model, and are shown in Table 1 in Section 4.4. The pervious portion of the development areas was assumed to be lawn.

5.3.1 Post-Development - Scenario 1-A

Water quality storage requirements for each scenario were determined based on extrapolating the MOE storage criteria for Enhanced treatment (80% TSS removal) for wet ponds and the total catchment imperviousness (MOE, Table 3.2). Table 4 below compares the required permanent pool volumes to those provided by the SWM pond. The pond design sheets are provided in Appendix B. Water quality volume calculations are also shown in Appendix B.

Table 4: MOE Required Water Quality ED and PP Volumes, and Provided Volumes for Scenario 1-A

	Extended Detention Volume (m^3)	Permanent Pool Volume (m^3)
Required	11780	14910
Provided	12900	24950

The SWM pond therefore exceeds the MOE water quality requirements for Enhanced protection for this development scenario.

The post-development peak flow rates generated by all storm events in this scenario are summarized in Table 5 below.

Table 5: Scenario 1-A Post Development Modeling Results

		West Outlet		North Outlet		Gill Road Outlet		Total	
		Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol
	Storm	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)
	25 mm	0.14	500	0.19	1700	0.06	11800	0.30	14000
Chicago	2 year	0.22	900	0.38	3500	0.09	17700	0.56	22200
	5 year	0.32	1800	0.80	7500	0.32	29000	1.13	38300
	10 year	0.41	2400	1.12	10700	0.52	37000	1.66	50100
	25 year	0.51	3300	1.59	15200	0.69	47500	2.46	66000
	50 year	0.61	4000	1.98	18900	0.80	55700	3.06	78600
	100 year	0.72	4700	2.41	22900	0.99	64300	3.67	91900
SCS	2 year	0.26	2000	0.74	8700	0.22	31900	1.04	42600
	5 year	0.51	3800	1.60	18000	0.60	53900	2.45	75800
	10 year	0.70	5200	2.28	25400	0.78	69700	3.47	100300
	25 year	0.98	7100	3.24	35800	1.61	90800	4.81	133600
	50 year	1.20	8500	4.01	44100	2.98	107000	7.27	159600
	100 year	1.44	10000	4.81	52700	4.12	123500	9.62	186200
	Timmins	1.17	18900	4.35	88000	6.64	184900	11.72	291800

With the implementation of the proposed SWM pond, post-development peak flows will be reduced to below the pre-development flows at the West and North outlets, and for the overall site for all storm events, up to and including the Timmins event. Hydrologic parameter sheets and SWMHYMO modeling input and output are available in Appendix B and the enclosed CD.

5.3.2 Post-Development Interim Scenario – Scenario 2-A

The MOE water quality volume requirements were calculated for the post-development interim scenario. The total imperviousness has been calculated to account for the additional area south of Doran Road which contributes to the pond in this scenario. Table 6 below compares the required permanent pool volumes to those provided by the SWM pond. The pond design has been modified slightly from the design in Scenario 1-A by increasing the height of the berm by 0.3m to accommodate the additional flows. The pond design sheets are provided in Appendix B. Water quality volume calculations are also shown in Appendix B.

Table 6: MOE Required Water Quality ED and PP Volumes, and Provided Volumes for Scenario 2-A

	Extended Detention Volume (m^3)	Permanent Pool Volume (m^3)
Required	11880	10440
Provided	12900	24950

The SWM pond therefore exceeds the MOE water quality requirements for enhanced protection in the post-development interim condition.

The post-development peak flow rates generated by all storm events in Scenario 2-A are summarized in Table 5 below.

Table 7: Scenario 2-A Modeling Results

		West Outlet		North Outlet		Gill Road Outlet		Total	
		Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol
	Storm	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)
	25 mm	0.14	500	0.19	1700	0.06	11900	0.30	14200
Chicago	2 year	0.22	900	0.38	3500	0.09	17900	0.56	22400
	5 year	0.32	1800	0.80	7500	0.34	29500	1.13	38800
	10 year	0.41	2400	1.12	10700	0.53	37700	1.67	50800
	25 year	0.51	3300	1.59	15200	0.71	48500	2.47	67000
	50 year	0.61	4000	1.98	18900	0.82	57000	3.07	79800
	100 year	0.72	4700	2.41	22900	1.29	68900	3.68	96400
SCS	2 year	0.26	2000	0.74	8700	0.23	32500	1.05	43100
	5 year	0.51	3800	1.60	18000	0.62	55100	2.46	76900
	10 year	0.70	5200	2.28	25400	0.79	76400	3.48	107000
	25 year	0.98	7100	3.24	35800	2.15	106000	4.82	148800
	50 year	1.20	8500	4.01	44100	3.57	128900	7.25	181500
	100 year	1.44	10000	4.81	52700	5.29	152400	9.85	215200
	Timmins	2.76	35600	4.35	88000	8.34	225300	15.20	348900

With the implementation of the proposed SWM facility, post-development peak flows will be reduced to below the pre-development flows at the West and North outlets, and for the overall site for all storm events, up to and including the Timmins event. Hydrologic parameter sheets and SWMHYMO modeling input and output are available in Appendix B and the enclosed CD.

5.3.3 Ultimate Scenario – Scenario 3-A

It has been anticipated that the development of the John's Lands will trigger expansion of the SWM facility in order to match the post-development peak flows to the pre-development flows for the additional developed area. To account for this, the available storage has been increased by 25% in the SWMHYMO model for Scenario 3-A. This 25% increase in provided volume corresponds approximately to the proportion of the total site area occupied by the John's Lands relative to the overall pond catchment area (ie. the required expansion is in keeping with the relative size of the John's lands). The expanded pond design sheet is available in Appendix B. In this scenario, discharge from the SWM facility for the 25mm through 100 year event is directed to the Gill Road outlet. Discharges exceeding the capacity of the Gill Road Outlet pipe are directed to the North and West outlets in the Timmins event.

The MOE water quality storage requirements for the Johns Lands will also be addressed through the pond expansion. It is expected that the increase in required permanent pool and ED volumes will be in line with the 25% increase in total available storage.

The results of the modeling for Scenario 3-A are shown in Table 8 below.

Table 8: Scenario 3-A Modeling Results

		West Outlet		North Outlet		Gill Road Outlet		Total	
		Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol
	Storm	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)
	25 mm	0.14	300	0.10	1000	0.07	15600	0.18	17000
Chicago	2 year	0.22	500	0.21	2100	0.10	23500	0.31	26000
	5 year	0.32	800	0.43	4500	0.39	38300	0.75	43600
	10 year	0.40	1100	0.61	6300	0.57	48700	1.14	56100
	25 year	0.50	1400	0.87	9000	0.74	62500	1.59	72900
	50 year	0.59	1600	1.08	11200	0.86	73300	1.92	86200
	100 year	0.69	1900	1.31	13600	1.63	84500	2.62	100000
SCS	2 year	0.20	900	0.37	5100	0.28	42100	0.55	48200
	5 year	0.38	1600	0.81	10700	0.67	70900	1.45	83200
	10 year	0.52	2100	1.15	15200	0.84	91500	1.98	108800
	25 year	0.71	2700	1.65	21500	2.12	119000	3.68	143200
	50 year	0.86	3200	2.05	26500	3.54	140200	5.66	169900
	100 year	1.03	3700	3.11	33200	5.10	160200	8.32	197200
	Timmins	0.70	7900	6.07	86000	6.57	210800	13.33	304700

The SWM facility as designed above meets the water quantity objectives outlined for Phase 1 for the West, North and Gill Road outlets for all storm events, up to and including the Timmins storm. Hydrologic parameter sheets and SWMHYMO modeling input and output are available in Appendix B and the enclosed CD.

5.4 Hydrologic Modeling and Conceptual Design of Site LIDs

As previously identified, the use of LIDs on the site for water balance and quality control is appropriate. The LIDs practices recommended for this development include:

- Lot-level soakaway pits;
- Infiltration galleries/bioretention in park blocks; and,
- Infiltration gallery in SWM block.

Based on soils information provided by Wilson and Associates (see Appendix C), preliminary design parameters such as typical infiltration rates and maximum storage depths were determined for the subject site. For the lot-level soakaway pits and infiltration galleries the maximum depth of stone reservoirs was found to be 1.4m to achieve drawdown time targets. This was calculated using a design infiltration rate of 12mm/h, which includes a safety factor of 2.5. It was determined that a lot level soakaway pit designed to capture the first 25mm of runoff from a residential rooftop was reasonably sized to fit on a typical residential lot. In the case of the multiplex units, the design volume of the soakaways was doubled due to larger lot area. As a conservative measure, LIDs were neglected in the commercial block. Calculations are provided in Appendix C.

The storage volumes of the lot-level soakaway pits were applied on a per-lot basis to the impervious portion of each catchment area as an initial abstraction value in the SWMHMYO model. In the case of Frankcom (EXT4A and EXT4B) and the Johns (204A, 204B, 204C), the assumed number of lots available for lot-level soakaway pits was calculating by area prorating the number of lots in the Midhurst Heights Development, and assuming similar density.

For the Frankcom and John's future developments, the area of park blocks was calculated using the Township of Springwater standard, which requires that a minimum of 5% of the total developed area be dedicated to parkland. It was assumed that up to 25% of the area of each park (onsite and external developments) would be available for LIDs infiltration practices such as bioretention or infiltration galleries. The storage and outflow associated with park block infiltration practices were simulated in SWMHYMO using DUALHYD commands, where major system storage was set to the available park block storage, and minor system outflow was equal to the calculated infiltration flow. Calculations are available in Appendix C.

Finally, an infiltration gallery was modeled within the SWM pond block. To be conservative, it was assumed that only the area below the 6m wide access road around the perimeter would be available for use as an infiltration gallery. Similar to the park block controls, the total available storage and infiltration flow rate associated with the proposed infiltration gallery was determined and simulated as a DUALHYD command in SWMHYMO. Flows and volumes in excess of the capacity of the infiltration gallery were directed to the pond itself. Appendix C includes conceptual designs for LIDs practices in the park blocks and pond block.

The post-development catchments were discretized to reflect the potential contributing areas to each park block infiltration gallery. Thus, storage within each modeled park block was applied only to the area of the development that would realistically contribute to that park. This process ensures that infiltration and storage capacity of the infiltration galleries is accurately represented by the model.

As a conservative measure, all LIDs are modeled at 75% of their capacity to account for any possible reduction in their efficiency over time.

The following sections discuss modeling of LIDs for post-development, post-development interim, and ultimate development conditions.

5.4.1 Post Development Scenario - Scenario 1-B

Results of the Scenario 1-B modeling are summarized in Table 9. The model is identical to the Scenario 1-A model, but includes the addition of LIDs practices functioning at 75% of their capacity. LIDs have also been accounted for in the Frankcom development for this scenario.

Table 9: Scenario 1-B Modeling Results

		West Outlet		North Outlet		Gill Road Outlet		Total	
		Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol
	Storm	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)
	25 mm	0.13	500	0.19	1700	0.00	0	0.25	2200
Chicago	2 year	0.22	900	0.38	3500	0.03	5400	0.49	9800
	5 year	0.32	1700	0.80	7500	0.08	16600	1.05	25900
	10 year	0.41	2400	1.12	10700	0.19	24500	1.47	37600
	25 year	0.51	3200	1.59	15200	0.50	35000	2.10	53400
	50 year	0.61	3900	1.98	18900	0.65	43200	2.74	66000
	100 year	0.72	4700	2.41	22900	0.76	51800	3.44	79300
SCS	2 year	0.26	2000	0.74	8700	0.08	17100	0.98	27700
	5 year	0.51	3800	1.60	18000	0.36	38700	2.10	60500
	10 year	0.70	5100	2.28	25400	0.60	54300	3.17	84900
	25 year	0.98	7000	3.24	35800	0.83	75200	4.63	117900
	50 year	1.20	8500	4.01	44100	1.61	91300	5.71	143800
	100 year	1.44	10000	4.81	52700	2.76	107700	7.74	170400
	Timmins	1.08	17400	4.35	88000	6.50	172100	11.49	277400

Comparing the pre and post development runoff volumes from the site, it is evident that the peak flows from the site are reduced from those in Scenario 1-A. In fact, there is no runoff from controlled areas of the development in the 25mm event. These results indicate that achieving long-term water balance and erosion control on the site is feasible with the implementation of infiltration practices. Hydrologic parameter sheets and SWMHYMO modeling input and output are available in Appendix C and the enclosed CD.

5.4.2 Post Development Interim Scenario – Scenario 2-B

Results of the Scenario 2-B modeling are summarized in Table 10. The model is identical to the Scenario 2-A model, but includes the addition of LIDs practices functioning at 75% of their capacity. LIDs have also been accounted for in the Frankcom development for this scenario.

Table 10: Scenario 2-B Modeling Results

		West Outlet		North Outlet		Gill Road Outlet		Total	
		Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol
	Storm	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)
	25 mm	0.13	500	0.19	1700	0.00	0	0.25	2200
Chicago	2 year	0.22	900	0.38	3500	0.03	5600	0.49	10000
	5 year	0.32	1700	0.80	7500	0.09	17100	1.06	26300
	10 year	0.41	2400	1.12	10700	0.22	25200	1.47	38200
	25 year	0.51	3200	1.59	15200	0.52	36000	2.11	54400
	50 year	0.61	3900	1.98	18900	0.66	44400	2.76	67200
	100 year	0.72	4700	2.41	22900	0.80	56200	3.46	83700
SCS	2 year	0.26	2000	0.74	8700	0.08	17700	0.98	28300
	5 year	0.51	3800	1.60	18000	0.39	39900	2.10	61700
	10 year	0.70	5100	2.28	25400	0.64	60800	3.19	91400
	25 year	0.98	7000	3.24	35800	1.13	90200	4.65	133000
	50 year	1.20	8500	4.01	44100	2.74	113100	5.72	165600
	100 year	1.44	10000	4.81	52700	4.22	136500	8.00	199200
	Timmins	2.66	32500	4.35	88000	8.29	214000	14.86	334500

Comparing the pre and post development runoff volumes from the site, it is evident that the peak flows from the site are reduced from those in Scenario 2-A. In fact, there is no runoff from controlled areas of the development in the 25mm event. These results indicate that achieving long-term water balance and erosion control on the site is feasible with the implementation of infiltration practices. Hydrologic parameter sheets and SWMHYMO modeling input and output are available in Appendix C and the enclosed CD.

5.4.3 Ultimate Scenario – Scenario 3-B

Results of the Scenario 3-B modeling are summarized in Table 11. The model is identical to the Scenario 3-A model, but includes the addition of LIDs practices functioning at 75% of their capacity. LIDs have also been accounted for in the Frankcom and Johns developments for this scenario.

To account for the previously discussed pond expansion, the available space for an infiltration gallery under the pond access road has been prorated based on the additional area contributed by the Johns lands to meet infiltration targets.

Table 11: Scenario 3-B Modeling Results

		West Outlet		North Outlet		Gill Road Outlet		Total	
		Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol	Qpeak	Runoff Vol
	Storm	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)	(m^3/s)	(m^3)
	25 mm	0.13	300	0.10	1000	0.00	0	0.13	1300
Chicago	2 year	0.22	500	0.21	2100	0.03	7100	0.24	9600
	5 year	0.32	800	0.43	4500	0.09	21800	0.54	27100
	10 year	0.40	1000	0.61	6300	0.24	32200	0.78	39600
	25 year	0.50	1400	0.87	9000	0.54	46000	1.33	56300
	50 year	0.59	1600	1.08	11200	0.69	56700	1.72	69500
	100 year	0.69	1900	1.31	13600	0.81	67900	2.09	83400
SCS	2 year	0.20	900	0.37	5100	0.08	22500	0.46	28500
	5 year	0.38	1500	0.81	10700	0.43	50800	1.08	63000
	10 year	5.15	2000	1.52	15200	0.67	71100	1.77	88300
	25 year	0.71	2700	1.65	21500	0.93	98400	2.52	122500
	50 year	0.86	3200	2.05	26500	2.17	119400	3.96	149100
	100 year	1.03	3700	2.47	31800	3.50	140800	6.02	176300
	Timmins	0.49	6900	5.33	79400	6.24	199500	12.06	285700

As in the previous two scenarios, the addition of LIDs practices reduces the runoff volumes to all outlets when compared to the ultimate scenario without LIDs. Complete infiltration of the 25mm runoff from controlled areas is again achieved. Hydrologic parameter sheets and SWMHYMO modeling input and output are available in Appendix C and the enclosed CD.

5.5 Thermal, Ecological and Geomorphic Impacts Assessment

The thermal, ecological, geomorphic and phosphorus loading effects of the Midhurst Heights Development have been assessed in several studies.

Hutchinson Environmental Sciences Ltd. has prepared a memorandum evaluating the cumulative impacts of the Midhurst Secondary Plan developments on the phosphorus budget in the Willow Creek Subwatershed. The memorandum identifies that the pre-development phosphorus loading is 144 kg/yr, which is increased to 1258 kg/yr in the post-development condition. Through quality control measures in the SWM ponds and LIDs, the increase in annual phosphorus load associated with the development of the Secondary Plan may be reduced to 60 kg/yr. This increase will be mitigated through the phosphorus off-setting opportunities previously identified by Greenland Environmental (2013). The complete document is submitted under separate cover.

The thermal and ecological impacts of the Midhurst Heights Development on the Matheson Creek Subwatershed were assessed by Azimuth Environmental Consulting Inc. Their letter states that the flow from the Midhurst Heights Development is not expected to be large enough to significantly impact thermal regimes beyond that experienced elsewhere throughout the watershed. The letter is available in Appendix E. Azimuth cited no particular concerns with respect to ecological impacts of the site SWM strategy.

SCS Consulting prepared a summary of thermal considerations related to SWM facility design on behalf of the MLG, submitted under separate cover. The proposed Midhurst Heights pond implements several of the recommended thermal mitigation strategies as outlined in their summary, including bottom draw discharge of minor events, cooling through the 3km long Gill Road outlet pipe, and capture/infiltration of over 90% of all rainfall events on site through implementation of LIDs.

GEO Morphix Ltd. has reviewed the preliminary stormwater management plans for the Midhurst Rose Alliance in the context of instream erosion and their impact on river processes based on hydrologic modeling results completed by C.F. Crozier & Associates on May 27th 2014. The report provides several recommendations moving forward to mitigate potential impacts on natural heritage features, including:

- All stream reaches should be field assessed, and field characterization of sensitive reaches should be computed.
- A continuous surface water model should be developed to assess different SWM strategies. Results of the model should be used for erosion analysis to allow for the optimization of LIDs and SWM practices.
- The proposed LID strategy and end-of-pipe SWM facilities will mitigate in-stream erosion potential.
- Monitoring of in-stream erosion should for part of the proposed adaptive management approach and overall SWM strategy.

Appendix E contains the complete *Opinion Regarding Stormwater Management and Instream Erosion, Midhurst Rose Alliance* letter for a detailed analysis of the recommended mitigation strategies.

5.6 Gill Road Outlet Pipe Design

As previously discussed, an alternative outlet for the SWM pond was established to meet NVCA criteria. The proposed outlet pipe for the SWM pond will run north from the site within the Gill Road ROW for approximately 3km, and will outlet at the crossing of Matheson Creek at Gill Road. Figure 10 shows the preliminary profile of the proposed outlet pipe. Through detailed design, the final configuration and sizing of the Gill Road Outlet will be confirmed including such considerations as:

- Construction methods, based on investigation of soil stability, depth to invert, and existing road profile;
- Constraints associated with crossing of the rail line;
- Improvements to the existing road profile of Gill Road;
- Accommodation of external flows that currently drain across Gill Road;
- Refinement and optimization of site design with respect to flow distributions to the West, North and Gill Road outlets to meet water balance objectives and minimize infrastructure requirements;
- Cost-benefit analysis of onsite controls vs. outlet sizing;
- Feasibility of bypassing external flows from lands south of Doran in interim conditions and associated cost/benefit analysis,
- Potential to incorporate infiltration practices along the Gill Road outlet route.

The Gill Road outlet pipe has been preliminarily sized as a 1600mm diameter sewer to convey flows from the proposed Midhurst Heights SWM pond for the 25mm event, and 2 through 100 year Chicago and SCS storms. Flows from the pond in the Timmins event which exceed the capacity of the Gill Road outlet pipe

will be directed to the West and North outlets, according to the appropriate development scenario. Sizing calculations have been based on modeling results from the various development scenarios using the "No LIDs" cases, to provide the most conservative results.

Allowance has been made for peak flows in the post-development, post-development interim, and the ultimate conditions. Table 12 summarizes the flow to the Gill Road Outlet in the 100 year and Timmins events for each scenario.

Table 12: Flows to Gill Road Outlet for Various Development Scenarios

Scenario	Description	100 Year Flow to Gill Road Pipe (m^3/s)	Timmins Flow to Gill Road Pipe (m^3/s)
Post-development	Midhurst Heights and Frankcom Lands Contribute to SWMF	4.1	6.6
Post-development Interim	Midhurst Heights, Frankcom Lands and undeveloped lands south of Doran Road contribute to SWMF	5.3	8.3
Ultimate Development	Midhurst Heights, Frankcom Lands and Johns lands contribute to expanded SWMF	5.1	6.6

The preliminary sizing calculations of the Gill Road outlet pipe are provided in Appendix B, based on the Post-development Interim scenario. Should it be determined that the lands south of Doran Road can bypass the site in the interim condition, this size may be reduced through detailed design.

5.7 External Lands Flow Conveyance Design

As noted throughout the descriptions of the hydrologic modeling methodology, it has been assumed that external rural catchment EXT1 (east of the site, and outside of the Secondary Plan Area) will bypass the site and continue to contribute to the North outlet as in existing conditions. Figure 9 shows the preliminary design of the flow conveyance system to capture and bypass runoff emanating from EXT1 for events up to and including the Timmins Regional event. The interceptor ditches and 1050mm diameter bypass pipe have been designed to convey flows northward within the Russell Road ROW and westward within the Craig Road allowance to discharge to the North outlet.

6.0 NATURAL HERITAGE ASSESSMENT

In an email dated July 18, 2014 NVCA requested a summary of natural heritage studies and policies that have been implemented historically on the Midhurst Heights Development lands be completed as part of the OMB Summary Document. The summary is to address such topics as:

- Existing natural heritage designations
- Forests and Wetlands, and associated habitat functions
- Watercourses, including association with groundwater recharge and discharge; fish habitat
- Significant Wildlife Habitat
- Natural Heritage Corridors within and adjacent to the Secondary Plan area
- Identification of natural heritage enhancement opportunities

Further details are available in the full summary, submitted by Azimuth Environmental Consultants under separate cover.

7.0 MASTER DRAINAGE PLAN (PHASE 2) RECOMMENDATIONS

Phase 2 of the drainage planning process involves the development of a Master Drainage Plan for the overall Midhurst Heights Secondary Plan area. The following general recommendations are made with respect to the completion of the MDP:

- Further monitoring work and technical assessment of site environmental features and proposed outlets should be undertaken, including thermal monitoring, erosion threshold assessment, water quality monitoring and flow monitoring.
- Based on the results of monitoring, a set of specific targets and thresholds should be developed to inform the Adaptive Management Plan. The AMP should be refined to include action plans and recommended mitigation strategies in the event that impacts occur.
- More detailed analysis of LID constraints (soils, groundwater), and performance in long-term modeling should be conducted. LID design should be adjusted according to the findings.
- A cumulative impact assessment of all developments proposed within the Willow Creek Subwatershed should be undertaken, including event-based and continuous hydrologic modeling. Results should be compared to hazards, water quality, thermal and erosion threshold analyses described above to confirm no net anticipated impact.
- An Operations and Maintenance Plan and Infrastructure Management Plan should be developed to assist the Township in future operations and maintenance of onsite LIDs practices, SWM facilities and associated infrastructure.
- Opportunities and concept plans to educate the community with respect to Master Planning approach and technologies should be identified.

The following site-specific recommendations are made with respect to the Master Drainage Plan for the Midhurst Heights Development:

- Hydrologic assessment and SWM/grading design should be refined to more closely achieve water balance objectives across the site, and at the existing North and West outlets.
- Potential options for managing flows emanating from Geranium lands south of Doran Road (ie. in the interim condition) should be explored to minimize proposed infrastructure requirements and more closely replicate existing conditions.
- Given the unique site SWM design and potential to retain runoff from the 25mm event onsite, an assessment of the suitability of a wet-pond design to service the Midhurst Heights development should be undertaken. The potential implementation of various types of quantity/quality control should be explored to optimize end-of-pipe performance.

The results of all of the above-noted analyses should be used to confirm or adjust the site SWM design as required to strive for the overall objective of "no net impact".

8.0 CONCLUSIONS

As evidenced through the above analysis, the proposed pond block is sufficiently sized to accommodate post-development to pre-development peak flow control and 72 hour detention of the 25mm event runoff volume with allowances for climate change and future development of external contributing lands. It also exceeds the requirements for MOE Enhanced protection with respect to water quality.

Through the implementation of onsite infiltration practices long term post-to-pre development water balance will be achieved. This will in turn address erosion, water quality and thermal impact concerns associated with the proposed development.

Sanitary and water servicing of the development is consistent with the overall servicing plans for the Midhurst Secondary Plan area.

Respectfully submitted,

C.F. CROZIER & ASSOCIATES INC.

Christopher F. Crozier, P.Eng.
Principal

C.F. CROZIER & ASSOCIATES INC.

Kaitlin Wilmshurst, E.I.T

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APPENDIX A

Pre-development Hydrologic Modeling and Design

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME	**101**
D.A. AREA (ha)	**28.0**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 101

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present			Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN		Area	A*CN
Vasey and Dundonald		AB	100	27.97	0.84	100		0.84	84
				0				0	0
				0				0	0
				0				0	0
Total Area				27.97					

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	8.95	46	0.00		0.00		2.80	59	15.38	68	27.1	1623
0	0.00		0.00		0.00		0.00		0.00		0.0	0.00
0	0.00		0.00		0.00		0.00		0.00		0.0	0.00
0	0.00		0.00		0.00		0.00		0.00		0.0	0.00
Subtotal Area	8.95		0.00		0.00		2.80		15.38			

Composite Area Calculations	Total Pervious Area	27.1	
	Total Impervious Area	0.84	
	% Impervious	3.0	
	Composite Curve Number	61.0	
	Total Area Check	28.0	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	9.0	89.5	0.08	9		0		0		0	0.72
Meadow	8	0.0	0		0		0		0		0	0.00
Wetland	16	0.0	0		0		0		0		0	0.00
Lawn	5	2.8	14	0.10	3		0		0		0	0.28
Cultivated	7	15.4	107.66	0.22	15		0		0		0	3.38
Impervious	2	0.8	1.68	0.95	1		0		0		0	0.80
Composite IA		28.0	7.6	Composite Runoff Coefficient								0.19

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	760	8.512	1.12%	2.7	0.29	0.74	0.50	0.50	0.51	0.34	1.32	0.88

Appropriate calculated time to peak:	0.88	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME	**102**
D.A. AREA (ha)	**66.1**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 102

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	66.14	2.65	100	2.65	265
				0			0	0
				0			0	0
				0			0	0
Total Area				66.14				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	9.9	46	0.0		0.7	50	6.6	59	46.3	68	63.5	4028
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
Subtotal Area	9.9		0.0		0.7		6.6		46.3			

Composite Area Calculations	Total Pervious Area	63.5	
	Total Impervious Area	2.65	
	% Impervious	4.0	
	Composite Curve Number	64.9	
	Total Area Check	66.1	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	9.9	99.2	0.08	10		0		0		0	0.79
Meadow	8	0.0	0.0		0		0		0		0	0.00
Wetland	16	0.7	10.6	0.05	1		0		0		0	0.03
Lawn	5	6.6	33.1	0.10	7		0		0		0	0.66
Cultivated	7	46.3	324.1	0.22	46		0		0		0	10.19
Impervious	2	2.7	5.3	0.95	3		0		0		0	2.52
Composite IA		66.1	7.1	Composite Runoff Coefficient								0.21

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	1450	18.7	1.29%	2.7	0.31	1.31	0.88	0.88	0.86	0.58	1.68	1.13

Appropriate calculated time to peak:	1.13	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME	**103**
D.A. AREA (ha)	**42.2**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 103

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	42.2	2.12	100	2.12	212
				0			0	0
				0			0	0
				0			0	0
Total Area				42.2				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	6.3	46	0.00		0.00		6.3	59	27.5	68	40.1	2530
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
Subtotal Area	6.3		0.0		0.0		6.3		27.5			

Composite Area Calculations		
	Total Pervious Area	40.1
	Total Impervious Area	2.12
	% Impervious	5.0
	Composite Curve Number	65.0
	Total Area Check	42.2

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	6.3	63.0	0.08	6		0		0		0	0.50
Meadow	8	0.0	0.0		0		0		0		0	0.00
Wetland	16	0.0	0.0	0.05	0		0		0		0	0.00
Lawn	5	6.3	31.5	0.10	6		0		0		0	0.63
Cultivated	7	27.5	192.4	0.22	27		0		0		0	6.05
Impervious	2	2.1	4.2	0.95	2		0		0		0	2.01
Composite IA		42.2	6.9	Composite Runoff Coefficient								0.22

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	900	8.73	0.97%	2.7	0.27	0.94	0.63	0.63	0.59	0.40	1.45	0.97

Appropriate calculated time to peak:	0.97	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME	**104**
D.A. AREA (ha)	**28.8**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment 104

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present			Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN		Area	A*CN
Vasey and Dundonald		AB	100	28.8	0.88	100		0.88	88
				0				0	0
				0				0	0
				0				0	0
Total Area				28.8					

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	4.2	46	0.0		0.9	50	8.4	59	14.4	68	27.9	1714
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
Subtotal Area	4.2		0.0		0.9		8.4		14.4			

	Composite Area Calculations	Total Pervious Area	27.9
		Total Impervious Area	0.88
		% Impervious	3.1
		Composite Curve Number	62.6
		Total Area Check	28.8

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	4.2	42.00	0.08	4		0		0		0	0.34
Meadow	8	0.0	0.00		0		0		0		0	0.00
Wetland	16	0.9	14.08	0.05	1		0		0		0	0.04
Lawn	5	8.4	42.20	0.10	8		0		0		0	0.84
Cultivated	7	14.4	100.80	0.22	14		0		0		0	3.17
Impervious	2	0.9	1.76	0.95	1		0		0		0	0.84
Composite IA		28.8	6.97	Composite Runoff Coefficient								0.18

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	1050	14	1.33%	2.7	0.31	0.94	0.63	0.63	0.67	0.45	1.47	0.99

Appropriate calculated time to peak:	0.99	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME **EXT1**
D.A. AREA (ha) **54.2**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment EXT1

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	54.2	1.63	100	1.63	163
				0			0	0
				0			0	0
				0			0	0
Total Area				54.2				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	8.1	46	0.0		0.0		30.9	59	13.6	68	52.6	3118
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
Subtotal Area	8.1		0.0		0.0		30.9		13.6			

	Composite Area Calculations	Total Pervious Area	52.6
		Total Impervious Area	1.63
		% Impervious	3.0
		Composite Curve Number	60.5
		Total Area Check	54.2

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	8.1	81.00	0.08	8		0		0		0	0.648
Meadow	8	0.0	0.00		0		0		0		0	0
Wetland	16	0.0	0.00	0.05	0		0		0		0	0
Lawn	5	30.9	154.60	0.10	31		0		0		0	3.092
Cultivated	7	13.6	94.85	0.22	14		0		0		0	2.981
Impervious	2	1.6	3.26	0.95	2		0		0		0	1.5485
Composite IA		54.2	6.16	Composite Runoff Coefficient								0.1526

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	1000	11.5	1.15%	2.7	0.29	0.96	0.64	0.64	0.62	0.42	1.55	1.04

Appropriate calculated time to peak:	1.04	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME **EXT2**
D.A. AREA (ha) **11.6**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment EXT2

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present			Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN		Area	A*CN
Vasey and Dundonald		AB	100	11.6	0.35	100		0.35	35
				0				0	0
				0				0	0
				0				0	0
Total Area				11.6					

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.0		0.0		0.0		0.0		11.3	68	11.3	765
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
Subtotal Area	0.0		0.0		0.0		0.0		11.3			

	Composite Area Calculations	Total Pervious Area	11.3
		Total Impervious Area	0.35
		% Impervious	3.0
		Composite Curve Number	69.0
		Total Area Check	11.6

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0.00	0.08	0		0		0		0	0.00
Meadow	8	0	0.00		0		0		0		0	0.00
Wetland	16	0	0.00	0.05	0		0		0		0	0.00
Lawn	5	0	0.00	0.10	0		0		0		0	0.00
Cultivated	7	11.25	78.75	0.22	11		0		0		0	2.48
Impervious	2	0.35	0.70	0.95	0		0		0		0	0.33
Composite IA		11.6	6.85	Composite Runoff Coefficient								0.24

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	425	3.5	0.82%	2.7	0.25	0.48	0.32	0.32	0.33	0.22	1.02	0.69

Appropriate calculated time to peak:	0.69	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME **EXT3**
D.A. AREA (ha) **4.8**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment EXT3

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	4.8			0.00	0
				0			0	0
				0			0	0
				0			0	0
Total Area				4.8				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.00		0.00		0.00		0.00		4.80	68	4.80	326
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		4.80			

Composite Area Calculations		
	Total Pervious Area	4.80
	Total Impervious Area	0.00
	% Impervious	0.00
	Composite Curve Number	68.0
	Total Area Check	4.8

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	4.80	33.60	0.22	4.80		0		0		0	1.06
Impervious	2	0.00	0.00	0.95	0.00		0		0		0	0.00
Composite IA		4.80	7.00	Composite Runoff Coefficient								0.22

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	250	5	2.00%	2.7	0.38	0.18	0.12	0.12	0.18	0.12	0.60	0.40

Appropriate calculated time to peak:	0.40	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME **EXT4**
D.A. AREA (ha) **48.1**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment EXT4

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present			Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN		Area	A*CN
Vasey and Dundonald		AB	100	48.1	0.52	100		0.52	52
				0				0	0
				0				0	0
				0				0	0
Total Area				48.1					

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.00		0.00		0.00		0.00		47.58	68	47.58	3235
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		47.58			

	Composite Area Calculations	Total Pervious Area	47.58
		Total Impervious Area	0.52
		% Impervious	1.08
		Composite Curve Number	68.3
		Total Area Check	48.1

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.0	0.0		0		0		0		0	0
Meadow	8	0.0	0.0		0		0		0		0	0
Wetland	16	0.0	0.0		0		0		0		0	0
Lawn	5	0.0	0.0		0		0		0		0	0
Cultivated	7	47.6	333.1	0.22	47.58		0		0		0	10.47
Impervious	2	0.5	1.0	0.95	0.52		0		0		0	0.49
Composite IA		48.1	6.9	Composite Runoff Coefficient								0.23

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	400	3	0.75%	2.7	0.23	0.48	0.32	0.32	0.27	0.18	1.04	0.70

Appropriate calculated time to peak:	0.70	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME **EXT5**
D.A. AREA (ha) **10.5**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment EXT5

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	10.5			0	0
				0			0	0
				0			0	0
				0			0	0
Total Area				10.5				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.00		0.00		0.00		0.00		10.50	68	10.50	714
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		10.50			

	Composite Area Calculations	Total Pervious Area	10.5
		Total Impervious Area	0
		% Impervious	0.0
		Composite Curve Number	68.0
		Total Area Check	10.5

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	10.5	73.5	0.22	10.50		0		0		0	2.31
Impervious	2	0	0	0.95	0.00		0		0		0	0
Composite IA		10.5	7	Composite Runoff Coefficient								0.22

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	200	1.5	0.75%	2.7	0.23	0.24	0.16	0.16	0.16	0.11	0.74	0.50

Appropriate calculated time to peak:	0.50	Appropriate Method:	Airport

APPENDIX B

Post Development Hydrologic Modeling and Design (no LIDs)

CROZIER & ASSOCIATES
Consulting Engineers

Project:	Midhurst Heights
Project No.:	845-3675
File:	Climate Change Precipitation
Design by:	A. French
Date:	May 20 2014

Climate Change Adjustment Factor: 15%

SCS Storms

Return Period	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
Original	44.2	64.6	78.1	95.2	107.9	120.5
Adjusted	50.83	74.29	89.815	109.48	124.085	138.575

Chicago Storms

Original

Duration	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
5 min	97.6	130.1	151.8	179	199.2	219.4
10 min	66.4	85.9	98.8	115.1	127.1	139.1
15 min	54.5	70.6	81.2	94.6	104.6	114.5
30 min	34.9	45.4	52.4	61.2	67.8	74.3
1 H	20.6	26.9	31	36.3	40.2	44.1
2 H	12.4	18.2	22	26.9	30.5	34.1
6 H	5.4	7.9	9.6	11.8	13.3	14.9
12 H	3	4.4	5.3	6.4	7.3	8.1
24 H	1.8	2.7	3.3	4	4.5	5

Adjusted

Duration	2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
5 min	112.24	149.615	174.57	205.85	229.08	252.31
10 min	76.36	98.785	113.62	132.365	146.165	159.965
15 min	62.675	81.19	93.38	108.79	120.29	131.675
30 min	40.135	52.21	60.26	70.38	77.97	85.445
1 H	23.69	30.935	35.65	41.745	46.23	50.715
2 H	14.26	20.93	25.3	30.935	35.075	39.215
6 H	6.21	9.085	11.04	13.57	15.295	17.135
12 H	3.45	5.06	6.095	7.36	8.395	9.315
24 H	2.07	3.105	3.795	4.6	5.175	5.75

Note: All precipitation values are in millimetres (mm)

Table 5 - ESTIMATED PERCENTAGE OF IMPERMEABLE SURFACE (TIMP) - CATCHMENT 201

Feature	Area		
60 ft Single Rooftops	315 m^2 x 9 Units =	2,835	m^2
50 ft Single Rooftops	250 m^2 x 108 Units =	27,000	m^2
40 ft Single Rooftops	250 m^2 x 440 Units =	110,000	m^2
40 ft Bungalow Townhouse Rooftops	250 m^2 x 130 Units =	32,500	m^2
35 ft Single Rooftops	250 m^2 x 429 Units =	107,250	m^2
25 ft Townhouse Rooftops	250 m^2 x 211 Units =	52,750	m^2
Driveway to Road (excluding multiplexes)	45 m^2 x 1,327 Lots =	59,715	m^2
4/6 Multiplexes (Imp. based on 0.70 Runoff Coefficient)	19,860 m^2 x 81.4% =	14,180	m^2
Commercial Area (Imp. based on 0.80 Runoff Coefficient)	15,410 m^2 x 85.7% =	13,206	m^2
Walking Path Area (Imp. based on 0.40 Runoff Coefficient)	6,810 m^2 x 28.6% =	1,948	m^2
Total Roadway (23 m wide ROW) 10.5 m (roadway and curb & gutter) + 1.5 m (sidewalk)	(12 m paved ROW) x (2,600 m total ROW length) =	31,200	m^2
Total Roadway (17.5 m wide ROW) 10 m (roadway and curb & gutter) + 1.5 m (sidewalk)	(11.5 m paved ROW) x (9,400 m total ROW length) =	108,100	m^2
External Roads along Property Boundary (20 m ROW with no sidewalk or curb & gutter, only half the road is considered)	(5 m paved ROW) x (1,500 m length)	7,500	m^2
Total Area of Catchment 201		947,600	m^2
Total Impermeable		568,184	m^2
Total Impervious Percentage (TIMP)	60.0% (60% used in model calculations)		
Directly Connected Impervious Area		233,901	m^2
(XIMP) – Driveways & Roads	24.7% (30% used in model calculations)		

CROZIER & ASSOCIATES
Consulting Engineers

Project #:	845-3675
Project:	Midhurst Heights
Date:	July 21 2014
By:	A.F.

Water Quality Requirements for Pond - Scenario 1-A

Areas Contributing	*Area (ha)*	*% Imp*
Developed (MRA)	99.4	60
EXT 2	11.6	0
Frankcom	21.8	60
South of Doran	0.0	0
TOTAL	132.8	55

25mm Event Volume (m^3) (From SWMHYMO)	11779
MOE Total WQ Volume (m^3/ha)	190
MOE ED Volume (m^3/ha)	40
MOE ED Volume (m^3)	5312
MOE PP Volume (m^3/ha)	150
MOE PP Volume (m^3)	14910
Pond Required ED Volume (m^3)	11779
Pond Required PP Volume (m^3)	14910
Provided ED Volume (m^3)	12898
Provided PP Volume (m^3)	24950

CROZIER & ASSOCIATES
Consulting Engineers

Project #:	845-3675
Project:	Midhurst Heights
Date:	24-Jun-14
By:	K.W.

Water Quality Requirements for Pond - Scenario 2-A

Areas Contributing	*Area (ha)*	*% Imp*
Developed (MRA)	99.4	60
EXT 2	11.6	0
Frankcom	21.8	60
South of Doran	63.4	0
TOTAL	196.2	37

25mm Event Volume (m^3) (From SWMHYMO)	11882
MOE Total WQ Volume (m^3/ha)	145
MOE ED Volume (m^3/ha)	40
MOE ED Volume (m^3)	7848
MOE PP Volume (m^3/ha)	105
MOE PP Volume (m^3)	10437
Pond Required ED Volume (m^3)	11882
Pond Required PP Volume (m^3)	10437
Provided ED Volume (m^3)	12898
Provided PP Volume (m^3)	24950

CROZIER & ASSOCIATES Consulting Engineers

Project Name:	Midhurst Heights	**D.A. NAME**	**201A**
Project Number:	845-3675	**D.A. AREA (ha)**	**11.47**
Date:	May 21 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 201A

Curve Number Calculation

Soil Types Present:

Type	ID	Hydrologic Group	% Area	Area
Vasey and Dundonald		AB	100	11.47
				0
				0
				0
Total Area Check				11.47

Impervious Landuses Present:

	Directly Connected		Indirectly Connected		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	3.44	98	3.44	98	6.88	674.44
0		98		98	0	0
0		98		98	0	0
0		98		98	0	0
Subtotal Area	3.44		3.44			

Pervious Landuses Present:

	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0		0		0		4.59	59	0		4.59	270.69
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		4.59		0			

Pervious Area Calculations	Total Pervious Area	4.59	
	Composite Pervious Curve Number	59	
Impervious Area Calculations	Total Directly Connected Area	3.44	
	Total Indirectly Connected Area	3.44	
	Total Impervious Area	6.88	
	% X imp	30.0	
	% T imp	60.0	
	Total Area Check	11.47	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	4.59	22.94
Cultivated	7	0	0

Scenario 1 - No LIDS

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	1	277	0.013

Scenario 2 - Fully Functioning LIDS

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	9.9	1	277	0.013

Scenario 3 - Partially Functioning LIDS (25% Not Functional)

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	7.9	1	277	0.013

CROZIER & ASSOCIATES Consulting Engineers

Project Name:	Midhurst Heights	**D.A. NAME**	**201B**
Project Number:	845-3675	**D.A. AREA (ha)**	**50.2**
Date:	May 21 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 201B

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey and Dundonald		AB	100	50.2
				0
				0
				0
Total Area Check				50.2

Impervious Landuses Present:					
	Directly Connected		Indirectly Connected		Subtotals
Soils	Area (ha)	CN	Area (ha)	CN	Area A*CN
0	15.06	98	15.06	98	30.12 2951.8
0		98		98	0 0
0		98		98	0 0
0		98		98	0 0
Subtotal Area	15.06		15.06		

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0		0		0		20.08	59	0		20.08	1184.7
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		20.08		0			

Pervious Area Calculations	Total Pervious Area	20.08	
	Composite Pervious Curve Number	59	
Impervious Area Calculations	Total Directly Connected Area	15.06	
	Total Indirectly Connected Area	15.06	
	Total Impervious Area	30.12	
	% X imp	30.0	
	% T imp	60.0	
	Total Area Check	50.2	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	20.08	100.4
Cultivated	7	0	0

Scenario 1 - No LIDS

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	1	579	0.013

Scenario 2 - Fully Functioning LIDS

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	10.9	1	579	0.013

Scenario 3 - Partially Functioning LIDS (25% Not Functional)

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	8.7	1	579	0.013

Project Name:	Midhurst Heights	**D.A. NAME**	**201C**
Project Number:	845-3675	**D.A. AREA (ha)**	**27.8**
Date:	May 21 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 201C

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey and Dundonald		AB	100	27.8
				0
				0
				0
Total Area Check				27.8

Impervious Landuses Present:						
	Directly Connected		Indirectly Connected		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	8.34	98	8.34	98	16.68	1634.6
0		98		98	0	0
0		98		98	0	0
0		98		98	0	0
Subtotal Area	8.34		8.34			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0		0		0		11.12	59	0		11.12	656.08
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		11.12		0			

Pervious Area Calculations	Total Pervious Area	11.12	
	Composite Pervious Curve Number	59	
Impervious Area Calculations	Total Directly Connected Area	8.34	
	Total Indirectly Connected Area	8.34	
	Total Impervious Area	16.68	
	% X imp	30.0	
	% T imp	60.0	
	Total Area Check	27.8	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	11.12	55.6
Cultivated	7	0	0

Scenario 1 - No LIDS

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	1	431	0.013

Scenario 2 - Fully Functioning LIDS

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	11.5	1	431	0.013

Scenario 3 - Partially Functioning LIDS (25% Not Functional)

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	9.1	1	431	0.013

Project Name:	Midhurst Heights	**D.A. NAME**	**201D**
Project Number:	845-3675	**D.A. AREA (ha)**	**4.37**
Date:	May 21 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 201D

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey and Dundonald		AB	100	4.37
				0
				0
				0
Total Area Check				4.37

Impervious Landuses Present:						
	Directly Connected		Indirectly Connected		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	1.31	98	1.31	98	2.62	256.96
0		98		98	0	0
0		98		98	0	0
0		98		98	0	0
Subtotal Area	1.31		1.31			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0		0		0		1.75	59	0		1.75	103.13
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		1.75		0			

Pervious Area Calculations	Total Pervious Area	1.75	
	Composite Pervious Curve Number	59	
Impervious Area Calculations	Total Directly Connected Area	1.31	
	Total Indirectly Connected Area	1.31	
	Total Impervious Area	2.62	
	% X imp	30.0	
	% T imp	60.0	
	Total Area Check	4.37	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.75	8.74
Cultivated	7	0	0

Scenario 1 - No LIDS

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	1	171	0.013

Scenario 2 - Fully Functioning LIDS

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	8.7	1	171	0.013

Scenario 3 - Partially Functioning LIDS (25% Not Functional)

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	7.0	1	171	0.013

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Project Name:	Midhurst Heights	**D.A. NAME**	**202**
Project Number:	845-3675	**D.A. AREA (ha)**	**2.78**
Date:	May 21 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment 202

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey and Dundonald		AB	100	2.78
				0
				0
				0
Total Area Check				2.78

Impervious Landuses Present:					
	Directly Connected		Indirectly Connected		Subtotals
Soils	Area (ha)	CN	Area (ha)	CN	Area A*CN
0	0.83	98	0.83	98	1.67 163.46
0		98		98	0 0
0		98		98	0 0
0		98		98	0 0
Subtotal Area	0.83		0.83		

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0		0		0		1.11	59	0		1.11	65.608
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		1.11		0			

Pervious Area Calculations	Total Pervious Area	1.11	
	Composite Pervious Curve Number	59	
Impervious Area Calculations	Total Directly Connected Area	0.83	
	Total Indirectly Connected Area	0.83	
	Total Impervious Area	1.67	
	% X imp	30.0	
	% T imp	60.0	
	Total Area Check	2.78	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	1.11	5.56
Cultivated	7	0	0

Scenario 1 - No LIDS

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	1	136	0.013

Scenario 2 - Fully Functioning LIDS

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	7.9	1	136	0.013

Scenario 3 - Partially Functioning LIDS (25% Not Functional)

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	6.4	1	136	0.013

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Project Name:	Midhurst	**D.A. NAME**	**203**
Project Number:	845-3675	**D.A. AREA (ha)**	**5.48**
Date:	May 21 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment 203

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	5.48	2.74	100	2.74	274
				0			0	0
				0			0	0
				0			0	0
Total Area				5.48				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	CN	Area	A*CN
0	0.00		0.00		0.00		2.74	59	0.00		2.74	162
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		2.74		0.00			

Composite Area Calculations	Total Pervious Area	2.74	
	Total Impervious Area	2.74	
	% Impervious	50.0	
	Composite Curve Number	79.5	
	Total Area Check	5.48	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	2.74	13.7	0.10	2.74		0		0		0	0.274
Cultivated	7	0	0		0		0		0		0	0
Impervious	2	2.74	5.48	0.95	2.74		0		0		0	2.60
Composite IA		5.48	3.5	Composite Runoff Coefficient								0.525

Time to Peak Inputs						Uplands			Bransby		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	20	5	25.00%	4.6	2.30	0.00	0.00	0.00	0.01	0.01	0.05	0.03

Appropriate calculated time to peak:	0.01	Appropriate Method:	Bransby

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Project Name:	Midhurst Heights	**D.A. NAME**	**204A**
Project Number:	845-3675	**D.A. AREA (ha)**	**9.2**
Date:	May 21 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment 204A

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present			Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN		Area	A*CN
Vasey and Dundonald		AB	100	9.2	0	100		0	0
				0				0	0
				0				0	0
				0				0	0
Total Area				9.2					

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.00		0.00		0.00		0.00		9.20	68	9.20	626
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		9.20			

Composite Area Calculations	Total Pervious Area	9.2	
	Total Impervious Area	0	
	% Impervious	0.0	
	Composite Curve Number	68.0	
	Total Area Check	9.2	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	9.2	64.4	0.22	9		0		0		0	2.02
Impervious	2	0	0		0		0		0		0	0.00
Composite IA		9.2	7.0	Composite Runoff Coefficient								0.22

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	450	10	2.22%	2.7	0.40	0.31	0.21	0.21	0.29	0.20	0.78	0.52

Appropriate calculated time to peak:	0.52	Appropriate Method:	Airport

Project Name:	Midhurst Heights	**D.A. NAME**	**204B**
Project Number:	845-3675	**D.A. AREA (ha)**	**18.67**
Date:	May 21 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment 204B

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	18.67	0	100	0	0
				0			0	0
				0			0	0
				0			0	0
Total Area				18.67				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	1.87	46	0.00		0.00		0.00		16.80	68	18.67	1228
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	1.87		0.00		0.00		0.00		16.80			

Composite Area Calculations	Total Pervious Area	18.67	
	Total Impervious Area	0	
	% Impervious	0.0	
	Composite Curve Number	65.8	
	Total Area Check	18.67	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	1.867	18.67	0.08	2		0		0		0	0.1494
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	16.803	117.621	0.22	17		0		0		0	3.70
Impervious	2	0	0	0.95	0		0		0		0	0.00
Composite IA		18.67	7.3	Composite Runoff Coefficient								0.21

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	500	20	4.00%	2.7	0.54	0.26	0.17	0.17	0.27	0.18	0.69	0.46

Appropriate calculated time to peak:	0.46	Appropriate Method:	Airport

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Project Name:	Midhurst Heights	**D.A. NAME**	**204C**
Project Number:	845-3675	**D.A. AREA (ha)**	**12.14**
Date:	May 21 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment 204C

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	12.14	0.52	100	0.52	52
				0			0	0
				0			0	0
				0			0	0
Total Area				12.14				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.00		0.00		0.00		0.00		11.62	68	11.62	790
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		11.62			

Composite Area Calculations	Total Pervious Area	11.62	
	Total Impervious Area	0.52	
	% Impervious	4.3	
	Composite Curve Number	69.4	
	Total Area Check	12.14	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	11.62	81.34	0.22	12		0		0		0	2.56
Impervious	2	0.52	1.04	0.95	1		0		0		0	0.49
Composite IA		12.14	6.8	Composite Runoff Coefficient								0.25

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	375	14	3.73%	2.7	0.52	0.20	0.13	0.13	0.21	0.14	0.58	0.39

Appropriate calculated time to peak:	0.39	Appropriate Method:	Airport

Project Name:	Midhurst Heights	**D.A. NAME**	**EXT4A**
Project Number:	845-3675	**D.A. AREA (ha)**	**1.25**
Date:	June 19 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment EXT4A

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey and Dundonald		AB	100	1.25
				0
				0
				0
Total Area Check				1.25

Catchment is 50% impervious

Impervious Landuses Present:						
	Directly Connected		Indirectly Connected		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.00	98	0.63	98	0.63	61.25
0		98		98	0	0
0		98		98	0	0
0		98		98	0	0
Subtotal Area	0.00		0.63			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0		0		0		0.63	59	0		0.63	36.875
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		0.63		0			

Pervious Area Calculations	Total Pervious Area	0.63	
	Composite Pervious Curve Number	59	
Impervious Area Calculations	Total Directly Connected Area	0.00	
	Total Indirectly Connected Area	0.63	
	Total Impervious Area	0.63	
	% X imp	0.0	
	% T imp	50.0	
	Total Area Check	1.25	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	0.63	3.125
Cultivated	7	0	0

Scenario 1 - No LIDS

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	100	0.25
Impervious	2.0	1	91	0.013

Project Name:	Midhurst Heights	**D.A. NAME**	**EXT4B**
Project Number:	845-3675	**D.A. AREA (ha)**	**21.75**
Date:	June 19 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment EXT4B

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey and Dundonald		AB	100	21.75
				0
				0
				0
Total Area Check				21.75

Impervious Landuses Present:						
	Directly Connected		Indirectly Connected		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	6.53	98	6.53	98	13.05	1278.9
0		98		98	0	0
0		98		98	0	0
0		98		98	0	0
Subtotal Area	6.53		6.53			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0		0		0		8.70	59	0		8.70	513.3
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		8.70		0			

Pervious Area Calculations	Total Pervious Area	8.70	
	Composite Pervious Curve Number	59	
Impervious Area Calculations	Total Directly Connected Area	6.53	
	Total Indirectly Connected Area	6.53	
	Total Impervious Area	13.05	
	% X imp	30.0	
	% T imp	60.0	
	Total Area Check	21.75	

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	8.70	43.5
Cultivated	7	0	0

Scenario 1 - No LIDS

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	1	381	0.013

Scenario 2 - Fully Functioning LIDS

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	10.7	1	381	0.013

Scenario 3 - Partially Functioning LIDS (25% Not Functional)

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	8.5	1	381	0.013

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Project	Midhurst Heights
Project	845-3675
Date:	May 22 2014
By:	A.A.F

D.A. NAME	**EXT1**
D.A. AREA (ha)	**54.2**

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment EXT1

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	54.2	1.63	100	1.63	163
				0			0	0
				0			0	0
				0			0	0
Total Area				54.2				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	8.1	46	0.0		0.0		30.9	59	13.6	68	52.6	3118
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
Subtotal Area	8.1		0.0		0.0		30.9		13.6			

Composite Area Calculations	Total Pervious Area	52.6	
	Total Impervious Area	1.63	
	% Impervious	3.0	
	Composite Curve Number	60.5	
	Total Area Check	54.2	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	8.1	81.00	0.08	8		0		0		0	0.648
Meadow	8	0.0	0.00		0		0		0		0	0
Wetland	16	0.0	0.00	0.05	0		0		0		0	0
Lawn	5	30.9	154.60	0.10	31		0		0		0	3.092
Cultivated	7	13.6	94.85	0.22	14		0		0		0	2.981
Impervious	2	1.6	3.26	0.95	2		0		0		0	1.5485
Composite IA		54.2	6.16	Composite Runoff Coefficient								0.1526

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	1000	11.5	1.15%	2.7	0.29	0.96	0.64	0.64	0.62	0.42	1.55	1.04

Appropriate calculated time to peak:	1.04	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3675
Date:	May 22 2014
By:	A.A.F

D.A. NAME	**EXT2**
D.A. AREA (ha)	**11.6**

Hydrologic Parameters: CALIB NASHYD Command
Post Development Drainage Area: Catchment EXT2

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	11.6	0.35	100	0.35	35
				0			0	0
				0			0	0
				0			0	0
Total Area				11.6				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.0		0.0		0.0		0.0		11.3	68	11.3	765
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
0	0.0		0.0		0.0		0.0		0.0		0.0	0.00
Subtotal Area	0.0		0.0		0.0		0.0		11.3			

Composite Area Calculations	Total Pervious Area	11.3
	Total Impervious Area	0.35
	% Impervious	3.0
	Composite Curve Number	69.0
	Total Area Check	11.6

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0.00	0.08	0		0		0		0	0.00
Meadow	8	0	0.00		0		0		0		0	0.00
Wetland	16	0	0.00	0.05	0		0		0		0	0.00
Lawn	5	0	0.00	0.10	0		0		0		0	0.00
Cultivated	7	11.25	78.75	0.22	11		0		0		0	2.48
Impervious	2	0.35	0.70	0.95	0		0		0		0	0.33
Composite IA		11.6	6.85	Composite Runoff Coefficient								0.24

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	425	3.5	0.82%	2.7	0.25	0.48	0.32	0.32	0.33	0.22	1.02	0.69

Appropriate calculated time to peak:	0.69	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME	**EXT3**
D.A. AREA (ha)	**4.8**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment EXT3

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	4.8			0.00	0
				0			0	0
				0			0	0
				0			0	0
Total Area				4.8				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.00		0.00		0.00		0.00		4.80	68	4.80	326
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		4.80			

Composite Area Calculations	Total Pervious Area	4.80	
	Total Impervious Area	0.00	
	% Impervious	0.00	
	Composite Curve Number	68.0	
	Total Area Check	4.8	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	4.80	33.60	0.22	4.80		0		0		0	1.06
Impervious	2	0.00	0.00	0.95	0.00		0		0		0	0.00
Composite IA		4.80	7.00	Composite Runoff Coefficient								0.22

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	250	5	2.00%	2.7	0.38	0.18	0.12	0.12	0.18	0.12	0.60	0.40

Appropriate calculated time to peak:	0.40	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME	**EXT4**
D.A. AREA (ha)	**48.1**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment EXT4

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	48.1	0.52	100	0.52	52
				0			0	0
				0			0	0
				0			0	0
Total Area				48.1				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.00		0.00		0.00		0.00		47.58	68	47.58	3235
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		47.58			

	Composite Area Calculations	Total Pervious Area	47.58
		Total Impervious Area	0.52
		% Impervious	1.08
		Composite Curve Number	68.3
		Total Area Check	48.1

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0.0	0.0		0		0		0		0	0
Meadow	8	0.0	0.0		0		0		0		0	0
Wetland	16	0.0	0.0		0		0		0		0	0
Lawn	5	0.0	0.0		0		0		0		0	0
Cultivated	7	47.6	333.1	0.22	47.58		0		0		0	10.47
Impervious	2	0.5	1.0	0.95	0.52		0		0		0	0.49
Composite IA		48.1	6.9	Composite Runoff Coefficient								0.23

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	400	3	0.75%	2.7	0.23	0.48	0.32	0.32	0.27	0.18	1.04	0.70

Appropriate calculated time to peak:	0.70	Appropriate Method:	Airport

CROZIER & ASSOCIATES Consulting Engineers

Project	Midhurst Heights
Project	845-3567
Date:	May 22 2014
By:	A.A.F

D.A. NAME	**EXT5**
D.A. AREA (ha)	**10.5**

Hydrologic Parameters: CALIB NASHYD Command
Pre Development Drainage Area: Catchment EXT5

Curve Number Calculation

Soil Types Present:					Impervious Landuses Present		Subtotals	
Type	ID	Hydrologic Group	% Area	Area	Area	CN	Area	A*CN
Vasey and Dundonald		AB	100	10.5			0	0
				0			0	0
				0			0	0
				0			0	0
Total Area				10.5				

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0.00		0.00		0.00		0.00		10.50	68	10.50	714
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
0	0.00		0.00		0.00		0.00		0.00		0.00	0.00
Subtotal Area	0.00		0.00		0.00		0.00		10.50			

Composite Area Calculations	Total Pervious Area	10.5	
	Total Impervious Area	0	
	% Impervious	0.0	
	Composite Curve Number	68.0	
	Total Area Check	10.5	

Initial Abstraction and Tp Calculations

Initial Abstraction				Composite Curve Number								
Landuse	IA (mm)	Area (ha)	A * IA	Vasey and		0		0		0		
				RC	Area	RC	Area	RC	Area	RC	Area	A*RC
Woodland	10	0	0		0		0		0		0	0
Meadow	8	0	0		0		0		0		0	0
Wetland	16	0	0		0		0		0		0	0
Lawn	5	0	0		0		0		0		0	0
Cultivated	7	10.5	73.5	0.22	10.50		0		0		0	2.31
Impervious	2	0	0	0.95	0.00		0		0		0	0
Composite IA		10.5	7	Composite Runoff Coefficient								0.22

Time to Peak Inputs						Uplands			Bransby Williams		Airport	
Flow Path Description	Length (m)	Drop (m)	Slope (%)	$V/S^{0.5}$	Velocity (m/s)	Tc (hr)	Tp(hr)	TOTAL Tp (hr)	Tc (hr)	Tp(hr)	Tc (hr)	Tp(hr)
	200	1.5	0.75%	2.7	0.23	0.24	0.16	0.16	0.16	0.11	0.74	0.50

Appropriate calculated time to peak:	0.50	Appropriate Method:	Airport

Project Name:	Midhurst Heights	**D.A. NAME**	**John's Lands**
Project Number:	845-3675	**D.A. AREA (ha)**	**40.01**
Date:	May 21 2014		
By:	A.A.F		

Hydrologic Parameters: CALIB STANDHYD Command
Post Development Drainage Area: Catchment John's Lands

Curve Number Calculation

Soil Types Present:				
Type	ID	Hydrologic Group	% Area	Area
Vasey and Dundonald		AB	100	40.01
				0
				0
				0
Total Area Check				40.01

Impervious Landuses Present:						
	Directly Connected		Indirectly Connected		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	12.00	98	12.00	98	24.01	2352.588
0		98		98	0	0
0		98		98	0	0
0		98		98	0	0
Subtotal Area	12.00		12.00			

Pervious Landuses Present:												
	Woodland		Meadow		Wetland		Lawn		Cultivated		Subtotals	
Soils	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area (ha)	CN	Area	A*CN
0	0		0		0		16.00	59	0		16.00	944.236
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
0	0		0		0		0		0		0	0
Subtotal Area	0		0		0		16.00		0			

Pervious Area Calculations	Total Pervious Area	16.00
	Composite Pervious Curve Number	59
Impervious Area Calculations	Total Directly Connected Area	12.00
	Total Indirectly Connected Area	12.00
	Total Impervious Area	24.01
	% X imp	30.0
	% T imp	60.0
	Total Area Check	40.01

Initial Abstraction and Tp Calculations

Landuse	IA (mm)	Area (ha)	A * IA
Woodland	10	0	0
Meadow	8	0	0
Wetland	16	0	0
Lawn	5	16.00	80.02
Cultivated	7	0	0

Scenario 1 - No LIDS

Land Use	IA (mm)	Slope (%)	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	2.0	1	516	0.013

Scenario 2 - Fully Functioning LIDS

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious		1	516	0.013

Scenario 3 - Partially Functioning LIDS (25% Not Functional)

Land Use	IA (mm)	Slope	Travel Length (m)	Manning's n
Pervious	5.0	2	30	0.25
Impervious	8.5	1	516	0.013

MIDHURST
Stormwater Management Pond

Project Number: 1282
Date: June 2014

Hydraulic Calculation Sheet
Storage Stage Discharge Calculations

Extended Detention Orifice		
RADIUS=	0.120	m
Outlet Dia=	240.0	mm
Height=	1.00	m

Weir 1 Details		
Height	2.7000	m
Length	5.4000	m
Coefficient	1.8560	(Trapezoidal)

Secondary Orifice		
RADIUS=	0.300	m
Outlet Dia=	600.0	mm
Height=	1.50	m

Weir 3 Details		
Height	3.2000	m
Length	0.0000	m
Coefficient	1.8560	(Trapezoidal)

Weir 2 Details		
Height	3.3000	m
Length	12.5000	m
Coefficient	1.8560	(Trapezoidal)

SCENARIO 1A/1B - SSD CALCULATIONS FOR THE "EXPANDED FRANKCOM" POST-DEVELOPMENT MODEL

TOTAL STORAGE m^3	ACTIVE DETENTION STORAGE m^3	WATER DEPTH m	EXTENDED DETENTION ORIFICE m^3/s	SECONDARY ORIFICE m^3/s	OUTFLOW WEIR 1 m^3/s	GILL RD TOTAL PIPE FLOW m^3/s	WEST OUT OUTFLOW WEIR 2 m^3/s	NORTH OUT OUTFLOW WEIR 3 m^3/s	TOTAL OUTFLOW m^3/s	Elevation m	
0	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.50	BOTTOM OF POND
1,107	0	0.05	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.55	
2,230	0	0.10	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.60	
3,369	0	0.15	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.65	
4,523	0	0.20	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.70	
5,693	0	0.25	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.75	
6,879	0	0.30	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.80	
8,081	0	0.35	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.85	
9,298	0	0.40	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.90	
10,530	0	0.45	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.95	
11,779	0	0.50	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.00	
13,041	0	0.55	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.05	
14,315	0	0.60	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.10	
15,602	0	0.65	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.15	
16,901	0	0.70	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.20	
18,211	0	0.75	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.25	
19,534	0	0.80	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.30	
20,869	0	0.85	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.35	
22,216	0	0.90	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.40	
23,576	0	0.95	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.45	
24,947	0	1.00	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.50	PERM. POOL
26,331	1,384	1.05	0.001	0.000	0.000	0.001	0.000	0.000	0.0013	279.55	
27,727	2,780	1.10	0.005	0.000	0.000	0.005	0.000	0.000	0.0054	279.60	
29,135	4,188	1.15	0.022	0.000	0.000	0.022	0.000	0.000	0.0215	279.65	
30,556	5,609	1.20	0.035	0.000	0.000	0.035	0.000	0.000	0.0351	279.70	
31,989	7,042	1.25	0.045	0.000	0.000	0.045	0.000	0.000	0.0448	279.75	
33,434	8,487	1.30	0.053	0.000	0.000	0.053	0.000	0.000	0.0527	279.80	
34,892	9,945	1.35	0.060	0.000	0.000	0.060	0.000	0.000	0.0596	279.85	
36,362	11,415	1.40	0.066	0.000	0.000	0.066	0.000	0.000	0.0657	279.90	
37,845	12,898	1.45	0.071	0.000	0.000	0.071	0.000	0.000	0.0713	279.95	
39,340	14,393	1.50	0.077	0.000	0.000	0.077	0.000	0.000	0.0765	280.00	
40,877	15,930	1.55	0.081	0.00	0.000	0.081	0.000	0.000	0.0806	280.05	
42,428	17,481	1.60	0.086	0.007	0.000	0.093	0.000	0.000	0.0932	280.10	
43,990	19,043	1.65	0.090	0.020	0.000	0.110	0.000	0.000	0.1099	280.15	
45,565	20,618	1.70	0.095	0.035	0.000	0.130	0.000	0.000	0.1297	280.20	
47,153	22,206	1.75	0.099	0.054	0.000	0.152	0.000	0.000	0.1522	280.25	
48,753	23,806	1.80	0.102	0.075	0.000	0.177	0.000	0.000	0.1772	280.30	
50,365	25,418	1.85	0.106	0.174	0.000	0.280	0.000	0.000	0.2796	280.35	
51,990	27,043	1.90	0.110	0.245	0.000	0.355	0.000	0.000	0.3551	280.40	
53,627	28,680	1.95	0.113	0.301	0.000	0.414	0.000	0.000	0.4137	280.45	
55,277	30,330	2.00	0.116	0.347	0.000	0.464	0.000	0.000	0.4636	280.50	
56,939	31,992	2.05	0.120	0.388	0.000	0.508	0.000	0.000	0.5078	280.55	
58,614	33,667	2.10	0.123	0.425	0.000	0.548	0.000	0.000	0.5480	280.60	
60,301	35,354	2.15	0.126	0.459	0.000	0.585	0.000	0.000	0.5852	280.65	
62,001	37,054	2.20	0.129	0.491	0.000	0.620	0.000	0.000	0.6199	280.70	
63,713	38,766	2.25	0.132	0.521	0.000	0.653	0.000	0.000	0.6526	280.75	
65,437	40,490	2.30	0.135	0.549	0.000	0.684	0.000	0.000	0.6837	280.80	
67,174	42,227	2.35	0.138	0.576	0.000	0.713	0.000	0.000	0.7133	280.85	
68,924	43,977	2.40	0.140	0.601	0.000	0.742	0.000	0.000	0.7416	280.90	
70,685	45,738	2.45	0.143	0.626	0.000	0.769	0.000	0.000	0.7689	280.95	
72,460	47,513	2.50	0.146	0.649	0.000	0.795	0.000	0.000	0.7952	281.00	
74,246	49,299	2.55	0.148	0.672	0.000	0.821	0.000	0.000	0.8206	281.05	
76,046	51,099	2.60	0.151	0.694	0.000	0.845	0.000	0.000	0.8452	281.10	
77,857	52,910	2.65	0.154	0.716	0.000	0.869	0.000	0.000	0.8691	281.15	
79,681	54,734	2.70	0.156	0.736	0.000	0.892	0.000	0.000	0.8923	281.20	
81,518	56,571	2.75	0.159	0.756	0.112	1.027	0.000	0.000	1.0270	281.25	
83,367	58,420	2.80	0.161	0.776	0.317	1.254	0.000	0.000	1.2540	281.30	
85,228	60,281	2.85	0.163	0.795	0.582	1.541	0.000	0.000	1.5408	281.35	
87,102	62,155	2.90	0.166	0.814	0.896	1.876	0.000	0.000	1.8761	281.40	
88,988	64,041	2.95	0.168	0.832	1.253	2.253	0.000	0.000	2.2530	281.45	
90,887	65,940	3.00	0.170	0.850	1.647	2.667	0.000	0.000	2.6673	281.50	
92,798	67,851	3.05	0.173	0.868	2.075	3.115	0.000	0.000	3.1155	281.55	
94,722	69,775	3.10	0.175	0.885	2.535	3.595	0.000	0.000	3.5951	281.60	
96,658	71,711	3.15	0.177	0.902	3.025	4.104	0.000	0.000	4.1041	281.65	
98,607	73,660	3.20	0.179	0.918	3.543	4.641	0.000	0.000	4.6408	281.70	
100,568	75,621	3.25	0.181	0.935	4.088	5.204	0.000	0.000	5.2038	281.75	
102,541	77,594	3.30	0.183	0.951	4.658	5.792	0.000	0.000	5.7918	281.80	
104,527	79,580	3.35	0.185	0.966	5.252	6.404	0.259	0.000	6.6632	281.85	
106,526	81,579	3.40	0.187	0.982	5.870	7.039	0.734	0.000	7.7726	281.90	
108,536	83,589	3.45	0.190	0.997	6.510	7.696	1.348	0.000	9.0440	281.95	
110,560	85,613	3.50	0.192	1.012	7.171	8.375	2.075	0.000	10.4500	282.00	

MIDHURST
Stormwater Management Pond

Project Number: 1282
Date: June 2014

Hydraulic Calculation Sheet
Storage Stage Discharge Calculations

Extended Detention Orifice		
RADIUS=	0.120	m
Outlet Dia=	240.0	mm
Height=	1.00	m

Weir 1 Details		
Height	2.7000	m
Length	5.4000	m
Coefficient	1.8560	(Trapezoidal)

Secondary Orifice		
RADIUS=	0.300	m
Outlet Dia=	600.0	mm
Height=	1.50	m

Weir 3 Details		
Height	3.2000	m
Length	0.0000	m
Coefficient	1.8560	(Trapezoidal)

Weir 2 Details		
Height	3.3000	m
Length	12.0000	m
Coefficient	1.8560	(Trapezoidal)

SCENARIO 2A/2B - SSD CALCULATIONS FOR THE EXPANDED FRANKCOM AND LANDS SOUTH OF DORAN (POST DEVT INTERIM CONDITION)

TOTAL STORAGE m^3	ACTIVE DETENTION STORAGE m^3	WATER DEPTH m	EXTENDED DETENTION ORIFICE m^3/s	SECONDARY ORIFICE m^3/s	OUTFLOW WEIR 1 m^3/s	GILL RD TOTAL PIPE FLOW m^3/s	WEST OUT OUTFLOW WEIR 2 m^3/s	NORTH OUT OUTFLOW WEIR 3 m^3/s	TOTAL OUTFLOW m^3/s	Elevation m	
0	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.50	BOTTOM OF POND
1,107	0	0.05	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.55	
2,230	0	0.10	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.60	
3,369	0	0.15	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.65	
4,523	0	0.20	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.70	
5,693	0	0.25	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.75	
6,879	0	0.30	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.80	
8,081	0	0.35	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.85	
9,298	0	0.40	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.90	
10,530	0	0.45	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.95	
11,779	0	0.50	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.00	
13,041	0	0.55	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.05	
14,315	0	0.60	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.10	
15,602	0	0.65	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.15	
16,901	0	0.70	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.20	
18,211	0	0.75	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.25	
19,534	0	0.80	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.30	
20,869	0	0.85	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.35	
22,216	0	0.90	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.40	
23,576	0	0.95	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.45	
24,947	0	1.00	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.50	PERM. POOL
26,331	1,384	1.05	0.001	0.000	0.000	0.001	0.000	0.000	0.0013	279.55	
27,727	2,780	1.10	0.005	0.000	0.000	0.005	0.000	0.000	0.0054	279.60	
29,135	4,188	1.15	0.022	0.000	0.000	0.022	0.000	0.000	0.0215	279.65	
30,556	5,609	1.20	0.035	0.000	0.000	0.035	0.000	0.000	0.0351	279.70	
31,989	7,042	1.25	0.045	0.000	0.000	0.045	0.000	0.000	0.0448	279.75	
33,434	8,487	1.30	0.053	0.000	0.000	0.053	0.000	0.000	0.0527	279.80	
34,892	9,945	1.35	0.060	0.000	0.000	0.060	0.000	0.000	0.0596	279.85	
36,362	11,415	1.40	0.066	0.000	0.000	0.066	0.000	0.000	0.0657	279.90	
37,845	12,898	1.45	0.071	0.000	0.000	0.071	0.000	0.000	0.0713	279.95	
39,340	14,393	1.50	0.077	0.000	0.000	0.077	0.000	0.000	0.0765	280.00	
40,877	15,930	1.55	0.081	0.00	0.000	0.081	0.000	0.000	0.0806	280.05	
42,428	17,481	1.60	0.086	0.007	0.000	0.093	0.000	0.000	0.0932	280.10	
43,990	19,043	1.65	0.090	0.020	0.000	0.110	0.000	0.000	0.1099	280.15	
45,565	20,618	1.70	0.095	0.035	0.000	0.130	0.000	0.000	0.1297	280.20	
47,153	22,206	1.75	0.099	0.054	0.000	0.152	0.000	0.000	0.1522	280.25	
48,753	23,806	1.80	0.102	0.075	0.000	0.177	0.000	0.000	0.1772	280.30	
50,365	25,418	1.85	0.106	0.174	0.000	0.280	0.000	0.000	0.2796	280.35	
51,990	27,043	1.90	0.110	0.245	0.000	0.355	0.000	0.000	0.3551	280.40	
53,627	28,680	1.95	0.113	0.301	0.000	0.414	0.000	0.000	0.4137	280.45	
55,277	30,330	2.00	0.116	0.347	0.000	0.464	0.000	0.000	0.4636	280.50	
56,939	31,992	2.05	0.120	0.388	0.000	0.508	0.000	0.000	0.5078	280.55	
58,614	33,667	2.10	0.123	0.425	0.000	0.548	0.000	0.000	0.5480	280.60	
60,301	35,354	2.15	0.126	0.459	0.000	0.585	0.000	0.000	0.5852	280.65	
62,001	37,054	2.20	0.129	0.491	0.000	0.620	0.000	0.000	0.6199	280.70	
63,713	38,766	2.25	0.132	0.521	0.000	0.653	0.000	0.000	0.6526	280.75	
65,437	40,490	2.30	0.135	0.549	0.000	0.684	0.000	0.000	0.6837	280.80	
67,174	42,227	2.35	0.138	0.576	0.000	0.713	0.000	0.000	0.7133	280.85	
68,924	43,977	2.40	0.140	0.601	0.000	0.742	0.000	0.000	0.7416	280.90	
70,685	45,738	2.45	0.143	0.626	0.000	0.769	0.000	0.000	0.7689	280.95	
72,460	47,513	2.50	0.146	0.649	0.000	0.795	0.000	0.000	0.7952	281.00	
74,246	49,299	2.55	0.148	0.672	0.000	0.821	0.000	0.000	0.8206	281.05	
76,046	51,099	2.60	0.151	0.694	0.000	0.845	0.000	0.000	0.8452	281.10	
77,857	52,910	2.65	0.154	0.716	0.000	0.869	0.000	0.000	0.8691	281.15	
79,681	54,734	2.70	0.156	0.736	0.000	0.892	0.000	0.000	0.8923	281.20	
81,518	56,571	2.75	0.159	0.756	0.112	1.027	0.000	0.000	1.0270	281.25	
83,367	58,420	2.80	0.161	0.776	0.317	1.254	0.000	0.000	1.2540	281.30	
85,228	60,281	2.85	0.163	0.795	0.582	1.541	0.000	0.000	1.5408	281.35	
87,102	62,155	2.90	0.166	0.814	0.896	1.876	0.000	0.000	1.8761	281.40	
88,988	64,041	2.95	0.168	0.832	1.253	2.253	0.000	0.000	2.2530	281.45	
90,887	65,940	3.00	0.170	0.850	1.647	2.667	0.000	0.000	2.6673	281.50	
92,798	67,851	3.05	0.173	0.868	2.075	3.115	0.000	0.000	3.1155	281.55	
94,722	69,775	3.10	0.175	0.885	2.535	3.595	0.000	0.000	3.5951	281.60	
96,658	71,711	3.15	0.177	0.902	3.025	4.104	0.000	0.000	4.1041	281.65	
98,607	73,660	3.20	0.179	0.918	3.543	4.641	0.000	0.000	4.6408	281.70	
100,568	75,621	3.25	0.181	0.935	4.088	5.204	0.000	0.000	5.2038	281.75	
102,541	77,594	3.30	0.183	0.951	4.658	5.792	0.000	0.000	5.7918	281.80	
104,527	79,580	3.35	0.185	0.966	5.252	6.404	0.249	0.000	6.6529	281.85	
106,526	81,579	3.40	0.187	0.982	5.870	7.039	0.704	0.000	7.7432	281.90	
108,536	83,589	3.45	0.190	0.997	6.510	7.696	1.294	0.000	8.9901	281.95	
110,560	85,613	3.50	0.192	1.012	7.171	8.375	1.992	0.000	10.3670	282.00	

MIDHURST
Stormwater Management Pond

Project Number: 1282
Date: June 2014

Hydraulic Calculation Sheet
Storage Stage Discharge Calculations

Extended Detention Orifice		
RADIUS=	0.120	m
Outlet Dia=	240.0	mm
Height=	1.00	m

Weir 1 Details		
Height	2.7000	m
Length	5.4000	m
Coefficient	1.8560	(Trapezoidal)

Secondary Orifice		
RADIUS=	0.300	m
Outlet Dia=	600.0	mm
Height=	1.50	m

Weir 3 Details		
Height	3.2000	m
Length	30.0000	m
Coefficient	1.8560	(Trapezoidal)

Weir 2 Details		
Height	3.3000	m
Length	12.5000	m
Coefficient	1.8560	(Trapezoidal)

SCENARIO 3A/3B - EXPANDED FRANKCOM AND DEVELOPED JOHNS LANDS (ULTIMATE CONDITION)

Original ACTIVE DETENTION STORAGE m^3	Modified DETENTION STORAGE m^3	WATER DEPTH m	EXTENDED DETENTION ORIFICE m^3/s	SECONDARY ORIFICE m^3/s	OUTFLOW WEIR 1 m^3/s	GILL RD TOTAL PIPE FLOW m^3/s	WEST OUT OUTFLOW WEIR 2 m^3/s	NORTH OUT OUTFLOW WEIR 3 m^3/s	TOTAL OUTFLOW m^3/s	Elevation m	
0	0	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.50	BOTTOM OF POND
0	0	0.05	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.55	
0	0	0.10	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.60	
0	0	0.15	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.65	
0	0	0.20	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.70	
0	0	0.25	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.75	
0	0	0.30	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.80	
0	0	0.35	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.85	
0	0	0.40	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.90	
0	0	0.45	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	278.95	
0	0	0.50	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.00	
0	0	0.55	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.05	
0	0	0.60	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.10	
0	0	0.65	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.15	
0	0	0.70	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.20	
0	0	0.75	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.25	
0	0	0.80	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.30	
0	0	0.85	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.35	
0	0	0.90	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.40	
0	0	0.95	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.45	
0	0	1.00	0.000	0.000	0.000	0.000	0.000	0.000	0.0000	279.50	PERM. POOL
1,384	1,729	1.05	0.001	0.000	0.000	0.001	0.000	0.000	0.0013	279.55	
2,780	3,474	1.10	0.005	0.000	0.000	0.005	0.000	0.000	0.0054	279.60	
4,188	5,235	1.15	0.022	0.000	0.000	0.022	0.000	0.000	0.0215	279.65	
5,609	7,011	1.20	0.035	0.000	0.000	0.035	0.000	0.000	0.0351	279.70	
7,042	8,802	1.25	0.045	0.000	0.000	0.045	0.000	0.000	0.0448	279.75	
8,487	10,609	1.30	0.053	0.000	0.000	0.053	0.000	0.000	0.0527	279.80	
9,945	12,431	1.35	0.060	0.000	0.000	0.060	0.000	0.000	0.0596	279.85	
11,415	14,269	1.40	0.066	0.000	0.000	0.066	0.000	0.000	0.0657	279.90	
12,898	16,122	1.45	0.071	0.000	0.000	0.071	0.000	0.000	0.0713	279.95	
14,393	17,991	1.50	0.077	0.000	0.000	0.077	0.000	0.000	0.0765	280.00	
15,930	19,913	1.55	0.081	0.00	0.000	0.081	0.000	0.000	0.0806	280.05	
17,481	21,851	1.60	0.086	0.007	0.000	0.093	0.000	0.000	0.0932	280.10	
19,043	23,804	1.65	0.090	0.020	0.000	0.110	0.000	0.000	0.1099	280.15	
20,618	25,773	1.70	0.095	0.035	0.000	0.130	0.000	0.000	0.1297	280.20	
22,206	27,757	1.75	0.099	0.054	0.000	0.152	0.000	0.000	0.1522	280.25	
23,806	29,757	1.80	0.102	0.075	0.000	0.177	0.000	0.000	0.1772	280.30	
25,418	31,773	1.85	0.106	0.174	0.000	0.280	0.000	0.000	0.2796	280.35	
27,043	33,804	1.90	0.110	0.245	0.000	0.355	0.000	0.000	0.3551	280.40	
28,680	35,851	1.95	0.113	0.301	0.000	0.414	0.000	0.000	0.4137	280.45	
30,330	37,913	2.00	0.116	0.347	0.000	0.464	0.000	0.000	0.4636	280.50	
31,992	39,991	2.05	0.120	0.388	0.000	0.508	0.000	0.000	0.5078	280.55	
33,667	42,084	2.10	0.123	0.425	0.000	0.548	0.000	0.000	0.5480	280.60	
35,354	44,193	2.15	0.126	0.459	0.000	0.585	0.000	0.000	0.5852	280.65	
37,054	46,317	2.20	0.129	0.491	0.000	0.620	0.000	0.000	0.6199	280.70	
38,766	48,457	2.25	0.132	0.521	0.000	0.653	0.000	0.000	0.6526	280.75	
40,490	50,613	2.30	0.135	0.549	0.000	0.684	0.000	0.000	0.6837	280.80	
42,227	52,784	2.35	0.138	0.576	0.000	0.713	0.000	0.000	0.7133	280.85	
43,977	54,971	2.40	0.140	0.601	0.000	0.742	0.000	0.000	0.7416	280.90	
45,738	57,173	2.45	0.143	0.626	0.000	0.769	0.000	0.000	0.7689	280.95	
47,513	59,391	2.50	0.146	0.649	0.000	0.795	0.000	0.000	0.7952	281.00	
49,299	61,624	2.55	0.148	0.672	0.000	0.821	0.000	0.000	0.8206	281.05	
51,099	63,873	2.60	0.151	0.694	0.000	0.845	0.000	0.000	0.8452	281.10	
52,910	66,138	2.65	0.154	0.716	0.000	0.869	0.000	0.000	0.8691	281.15	
54,734	68,418	2.70	0.156	0.736	0.000	0.892	0.000	0.000	0.8923	281.20	
56,571	70,714	2.75	0.159	0.756	0.112	1.027	0.000	0.000	1.0270	281.25	
58,420	73,025	2.80	0.161	0.776	0.317	1.254	0.000	0.000	1.2540	281.30	
60,281	75,352	2.85	0.163	0.795	0.582	1.541	0.000	0.000	1.5408	281.35	
62,155	77,694	2.90	0.166	0.814	0.896	1.876	0.000	0.000	1.8761	281.40	
64,041	80,052	2.95	0.168	0.832	1.253	2.253	0.000	0.000	2.2530	281.45	
65,940	82,425	3.00	0.170	0.850	1.647	2.667	0.000	0.000	2.6673	281.50	
67,851	84,814	3.05	0.173	0.868	2.075	3.115	0.000	0.000	3.1155	281.55	
69,775	87,219	3.10	0.175	0.885	2.535	3.595	0.000	0.000	3.5951	281.60	
71,711	89,639	3.15	0.177	0.902	3.025	4.104	0.000	0.000	4.1041	281.65	
73,660	92,075	3.20	0.179	0.918	3.543	4.641	0.000	0.000	4.6408	281.70	
75,621	94,526	3.25	0.181	0.935	4.088	5.204	0.000	0.623	5.8263	281.75	
77,594	96,993	3.30	0.183	0.951	4.658	5.792	0.000	1.761	7.5526	281.80	
79,580	99,475	3.35	0.185	0.966	5.252	6.404	0.259	3.235	9.8980	281.85	
81,579	101,973	3.40	0.187	0.982	5.870	7.039	0.734	4.980	12.7527	281.90	
83,589	104,487	3.45	0.190	0.997	6.510	7.696	1.348	6.960	16.0040	281.95	
85,613	107,016	3.50	0.192	1.012	7.171	8.375	2.075	9.149	19.5991	282.00	

Worksheet for 1650mm 1.2%

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01200	m/m
Normal Depth	1.65	m
Diameter	1.65	m

Results

Discharge	9.98	m³/s
Flow Area	2.14	m²
Wetted Perimeter	5.18	m
Hydraulic Radius	0.41	m
Top Width	0.00	m
Critical Depth	1.53	m
Percent Full	100.0	%
Critical Slope	0.01039	m/m
Velocity	4.67	m/s
Velocity Head	1.11	m
Specific Energy	2.76	m
Froude Number	0.00	
Maximum Discharge	10.74	m³/s
Discharge Full	9.98	m³/s
Slope Full	0.01200	m/m
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	m
Length	0.00	m
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	m
Profile Description		
Profile Headloss	0.00	m
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	m/s

Worksheet for 1650mm 1.2%

GVF Output Data

Upstream Velocity	Infinity	m/s
Normal Depth	1.65	m
Critical Depth	1.53	m
Channel Slope	0.01200	m/m
Critical Slope	0.01039	m/m

AGRICULTURAL/VACANT LANDS

CRAIG ROAD

285.05

AGRICULTURAL/VACANT LANDS

EXISTING RESIDENTIAL

283.65

REGIONAL EVENT EMERGENCY SPILL

JOHNS LANDS

283.15

285.85

287.55

289.65

FORBES

EXISTING RESIDENTIAL

AREA OF SWM POND EXPANSION PERM POOL = 279.50

284.25

287.40

STREET 'D'

STREET 'J'

STREET 'O'

PARK

STREET 'A'

STREET 'Q'

PROP. DICB'S TO TO COLLECT LOCAL DRAINAGE

WATER TREATMENT PLANT W/SEWAGE PUMPING STATION

PARKETTE

FOREBAY

MAIN CELL

STREET 'G'

STREET 'H'

STREET 'P'

STREET 'B'

STREET 'A'

STREET 'M'

STREET 'L'

STREET 'N'

FUTURE DEVELOPEMENT

STREET 'X'

STREET 'Y'

STREET 'R'

STREET 'V'

STREET 'W'

STREET 'S'

STREET 'T'

STREET 'U'

WALKING TRAIL

FUTURE RESIDENTIAL

STREET 'C'

GILL ROAD

STREET 'E'

STREET 'F'

RUSSELL ROAD

100 0m 100 200 300

SCALE: 1:4000

MIDHURST HEIGHTS SITE GRADING DESIGN FROM MNT CONSULTING GROUP.

Project

MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing

JOHNS LANDS
CONCEPTUAL DEVELOPMENT

CROZIER & ASSOCIATES Consulting Engineers
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446 3510 T
705 446 3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project
L.W.	K.W.	845-3675
Scale	Date	Check By	Drawing
1:4000	06/24/2014	C.F.C.	FIG B-1

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\3675 FSR.dwg, FIG B-1, 8/1/2014 10:12:22 AM, lwaters

APPENDIX C

Post-Development Hydrologic Parameters and Design (with LIDs)

Infiltration Rate and Max Depth of Stone Reservoirs

From the site soils investigations conducted by Wilson and Associates, hydraulic conductivity values vary across the site. Using a typical value of 10^{-5}cm/s and applying Table C1 from the Low Impact Development and Stormwater Management Planning and Design Guide (CVC, 2010), anticipated infiltration rates are approximately 30mm/h.

The minimum recommended safety factor of 2.5 is applied, for a design infiltration rate of 12mm/h.

CVC suggests a design drawdown time for LIDs practices of 48 hours.

$$Max\ Depth = \frac{Infiltration\ rate\ \times drawdown\ time}{void\ ratio}$$

$$Max\ Depth = \frac{\frac{0.012m}{h} \times 48h}{0.4}$$

$$Max\ Depth = 1.44m$$

(use design depth 1.4m for all stone reservoirs)

Sizing of Lot Level Soakaway Pits

Using a typical 12.2m by 33m lot, assume that the objective is to capture the 25mm event from the roof. Assume 40% building coverage.

$$V_{roof} = 12.2m \times 33m \times 0.40 \times 0.025m$$

$$V_{roof} = 3.5m^3$$

Max Area Check:

$$A_{storage} = \frac{3.5m^3}{1.4m\ \times 0.4}$$

$$A_{storage} = \frac{3.5m^3}{1.4m\ \times 0.4}$$

$$A_{storage} = 6.25m^2\ or\ 1.6\%\ of\ lot\ area\ (reasonable)$$

Therefore, it is assumed that each single family lot will contain 3.5m^3 storage in the soakaway pit(s). Soakaway pit volume may be split between the rear and front of lot depending on roof drainage design.

It is assumed that each multi-family (4/6 plex) block will contain the equivalent of two 3.5m^3 pits (possibly located under parking areas).

CROZIER & ASSOCIATES Consulting Engineers

Project Name: Midhurst Heights
Project Number: 845-3675
Date: May 26 2014
By: K.W./A.A.F

LIDS Practices- Equivalent Initial Abstraction and Park/Pond Block Storage / Discharge Values (75% CAPACITY)

Scenario 1-B / 2-B

Assumptions

General: void ratio of clearstone reservoirs	0.4	(CVC, 2010)
General: average storage depth in clearstone reservoirs	1.4	m (see calculations wrt drawdown time)
Lot level soakaway pits: Typical Volume (m^3)	3.5	m^3
Park blocks: maximum percentage area useable for LIDS	25	%
Park/pond blocks: design infiltration rate	12	mm/h
Pond block area useable for exfiltration (area below access road)	7000	m^2
Commercial Block soakaway pit volume (per m^2 of Commercial Area)	0.0	m^3

LIDS Storage Calculations

Catchment ID	Total Area	Area of Park	Number of Single Family Lots	Number of Multi-Unit Blocks	Commercial Area	Storage In Commercial Block Soakaways		Storage in Lot Level Soakaways		Total Initial Abstraction	Storage Available In Park/Pond Blocks	Flow Rate by Exfiltration from Park/Pond Block
	(ha)	(m^2)			(m^2)	m^3	IA imp (mm)	(m^3)	IA imp (mm)	mm	(m^3)	(m^3/s)
201A	11.47	13200	141	7	10200	0	0.0	407	5.9	5.9	1386	0.008
201B	50.20	33000	747	9	5200	0	0.0	2008	6.7	6.7	3465	0.021
201C	27.80	0	452	0	0	0	0.0	1187	7.1	7.1	0	0.000
201D	4.37	3400	50	0	0	0	0.0	131	5.0	5.0	357	0.002
POND	5.48	0	0	0	0	0	0.0	0	0.0	0.0	2940	0.018
202	2.78	0	28	0	0	0	0.0	74	4.4	4.4	0	0.000
EXT4B	21.75	10875	324	0	0	0	0.0	850	6.5	6.5	1142	0.007

Notes: Park areas for External Developments are based on Township of Springwater standard of 5% of developed area.
The number of Single Family Lots for EXT4B was prorated by area.
Storage in Commercial Block Soakaways is neglected to be conservative.

CROZIER & ASSOCIATES Consulting Engineers

Project Name: Midhurst Heights
Project Number: 845-3675
Date: May 26 2014
By: K.W./A.A.F

LIDS Practices- Equivalent Initial Abstraction and Park/Pond Block Storage / Discharge Values (75% CAPACITY)

Scenario 3-B

Assumptions

General: void ratio of clearstone reservoirs	0.4	(CVC, 2010)	
General: average storage depth in clearstone reservoirs	1.4	m (see calculations wrt drawdown time)	
Lot level soakaway pits: Typical Volume (m^3)	3.5	m^3	
Park blocks: maximum percentage area useable for LIDS	25	%	
Park/pond blocks: design infiltration rate	12	mm/h	
Pond block area useable for exfiltration (area below access road)	9107	m^2	Increased by 30% to represent the approximate increase in area caused by John's Lands in Ultimate condition.
Commercial Block soakaway pit volume (per m^2 of Commercial Area)	0.0	m^3	

LIDS Storage Calculations

Catchment ID	Total Area	Area of Park	Number of Single Family Lots	Number of Multi-Unit Blocks	Commercial Area	Storage In Commercial Block Soakaways		Storage in Lot Level Soakaways		Total Initial Abstraction	Storage Available In Park/Pond Blocks	Flow Rate by Exfiltration from Park/Pond Block
	(ha)	(m^2)			(m^2)	m^3	IA imp (mm)	(m^3)	IA imp (mm)	mm	(m^3)	(m^3/s)
201A	11.47	13200	141	7	10200	0	0.0	407	5.9	5.9	1386	0.008
201B	50.20	33000	747	9	5200	0	0.0	2008	6.7	6.7	3465	0.021
201C	27.80	0	452	0	0	0	0.0	1187	7.1	7.1	0	0.000
201D	4.37	3400	50	0	0	0	0.0	131	5.0	5.0	357	0.002
202	2.78	0	28	0	0	0	0.0	74	4.4	4.4	0	0.000
POND	5.48	0	0	0	0	0	0.0	0	0.0	0.0	3825	0.023
John's Lands	40.01	20005	595	0	0	0	0.0	1563	6.5	6.5	2101	0.013
EXT4B	21.75	10875	324	0	0	0	0.0	850	6.5	6.5	1142	0.007

Notes: Park areas for External Developments are based on Township of Springwater standard of 5% of developed area.
The number of Single Family Lots for EXT4B and John's Lands was prorated by area.
Storage in Commercial Block Soakaways is neglected to be conservative.

Terraprobe

Consulting Geotechnical and Environmental Engineering
Construction Materials Engineering, Inspection and Testing

Transmittal
Barrie

Geotechnical Investigation, Engineering, & Design

Pavement Evaluation & Design

Environmental Assessment & Remediation Management Services

Hydrogeology

Dam Safety & Assessment

Building Systems & Sciences

Construction Materials Engineering Inspection & Testing

Earthworks, Design, Inspection & Compaction Testing

CSA Certified Concrete Testing

CCIL Certified Aggregates & Asphalt Testing

CWB Certified Welding Insp.

File Number: 31-14-1033

Date: June 23, 2014
Pages Sent 2

Addressee: C.F. Crozier & Associates Inc.
Attention: **Ms. Kaitlin Wilmshurst, E.I.T.** email: kwilmshurst@cfcrozier.ca

Addressee: Alliance Homes
Attention: **Mr. Alex Troop** email: atroop@alliancehomes.ca

Subject: Comments Regarding Groundwater Levels
Proposed SWM Facility - Midhurst Rose Alliance Subdivision
Springwater, Ontario

Further to your recent email correspondence and our transmittal dated May 12, 2014, we are pleased to provide some additional comments regarding the affect on groundwater levels at and surrounding the proposed SWM facility.

It is our understanding that a parcel of land southeast of the intersection of Gill Road and Craig Road is being considered for a large, 'L'-shaped SWM facility in order to adequately control surface water quality and quantity exiting the proposed subdivision site. The SWM pond is currently proposed to have a permanent pool elevation of 279.50m and a bottom elevation of 278.50m. It is our understanding that the pond will need to be a wet pond in order to provide water quality treatment prior to discharge. Due to the dry, sandy conditions encountered in previous investigations, it is anticipated that a pond liner would be required in order to maintain this elevated permanent pool level.

Previous investigation on the subdivision site by others (Ian D. Wilson Associates Limited, Revised December 6, 2006) would suggest that silty sand to silt & sand soils with clayey silt layers would be anticipated on the SWM facility site. No groundwater levels were encountered in the open test pits excavated to about 1.65 to 1.8m below grade.

Based on the above, we would not anticipate that any significant temporary or long-term dewatering would be required associated with the construction of the proposed SWM pond that would adversely affect neighbouring properties. It is our understanding that additional soil and groundwater investigation will be conducted as the subdivision design proceeds which will allow the designers to better understand the current conditions and mitigate potential adverse affects on the groundwater in the area.

Subsurface investigation to determine soil and groundwater conditions within the proposed pond area and along the discharge alignment will need to be completed including regular monitoring of groundwater levels over an extended period of time. This will help to identify seasonal peak levels as well as the magnitude of fluctuations to be anticipated.

We trust that these preliminary comments will satisfy your present requirements. If you should have any further questions, or require additional information, please do not hesitate to contact this office.

Regards,
Terraprobe Inc.

Blair E. Goss, P.Eng.
Associate

Kirk R. Johnson, P.Geo., P.Eng.
Associate

Terraprobe

Consulting Geotechnical and Environmental Engineering
Construction Materials Engineering, Inspection and Testing

Transmittal
Barrie

Geotechnical Investigation, Engineering, & Design

Pavement Evaluation & Design

Environmental Assessment & Remediation Management Services

Hydrogeology

Dam Safety & Assessment

Building Systems & Sciences

Construction Materials Engineering Inspection & Testing

Earthworks, Design, Inspection & Compaction Testing

CSA Certified Concrete Testing

CCIL Certified Aggregates & Asphalt Testing

CWB Certified Welding Insp.

File Number: 31-14-1033

Date: May 12, 2014
Pages Sent 3

Addressee: MNT Consulting Group, Inc.
Attention: **Ms. Michelle Tremblay, P.Eng.** email: michelle@mntconsulting.ca

Addressee: C.F. Crozier & Associates Inc.
Attention: **Ms. Kaitlin Wilmshurst, E.I.T.** email: kwilmshurst@cfcrozier.ca

Addressee: Alliance Homes
Attention: **Mr. Alex Troop** email: atroop@alliancehomes.ca

Subject: Comments Regarding Preliminary Geotechnical Feasibility Proposed SWM Facility - Midhurst Rose Alliance Subdivision Springwater, Ontario

Further to your recent email correspondence and our visit to the site on May 8, 2014, we are pleased to provide some preliminary comments regarding the feasibility of the proposed SWM facility from a geotechnical perspective.

It is our understanding that a parcel of land southeast of the intersection of Gill Road and Craig Road is being considered for a large, 'L'-shaped SWM facility in order to adequately control surface water quality and quantity exiting the proposed subdivision site. We also understand that stormwater discharge from the pond is proposed to be directed northward along Gill Road and/or the unopened Craig Road allowance by means of open ditches and/or buried piping.

Previous investigation on the subdivision site by others (Ian D. Wilson Associates Limited, Revised December 6, 2006) would suggest that silty sand to silt & sand soils with clayey silt layers would be anticipated on the SWM facility site. However, to our knowledge, no specific investigation for the SWM facility has been completed to date. No groundwater levels were encountered in the open test pits excavated to about 1.65 to 1.8m below grade. Seasonal fluctuations would be anticipated, but peak levels and/or the magnitude of fluctuations to be expected have not yet been confirmed for the pond site.

Terraprobe has had the opportunity to review the Conceptual Stormwater Management Pond drawing (Drawing PND-1, Project 1001) by MNT Consulting Group Inc. The SWM pond is currently proposed to have a permanent pool elevation of 279.50m and a bottom elevation of 278.50m. It is our understanding that the pond will need to be a wet pond in order to provide water quality treatment prior to discharge. Pond liners such as HDPE lining, geosynthetic clay liners and/or natural clay (possibly 0.5m in thickness) could be considered. Additional weight may need to be added to the top of the liner in order to offset buoyancy forces.

If the native soils at depth in the area of the proposed pond are silt & sand to silty sand to clayey silt as encountered in the upper 1.8m, then the coefficient of permeability of the soils would be on the order of 10^{-5} to 10^{-7} cm/s. This will need to be confirmed with site specific investigation and testing as the design progresses.

Based on the proposed pond geometry, including interior side slope inclinations of 4:1 to 7:1 (horizontal to vertical) below the regional storm level, and a permanent pool level above the anticipated high groundwater level, we expect that the structure would be feasible. However, a pond liner will likely be required in order to maintain the desired permanent pool level. Interior slopes above the water level and exterior slopes may be graded to 3:1 to 4:1 (horizontal to vertical) or flatter as shown on the concept drawing.

Subsurface investigation to determine soil and groundwater conditions within the proposed pond area and along the discharge alignment will need to be completed including regular monitoring of groundwater levels over an extended period of time. This will help to identify seasonal peak levels as well as the magnitude of fluctuations to be anticipated.

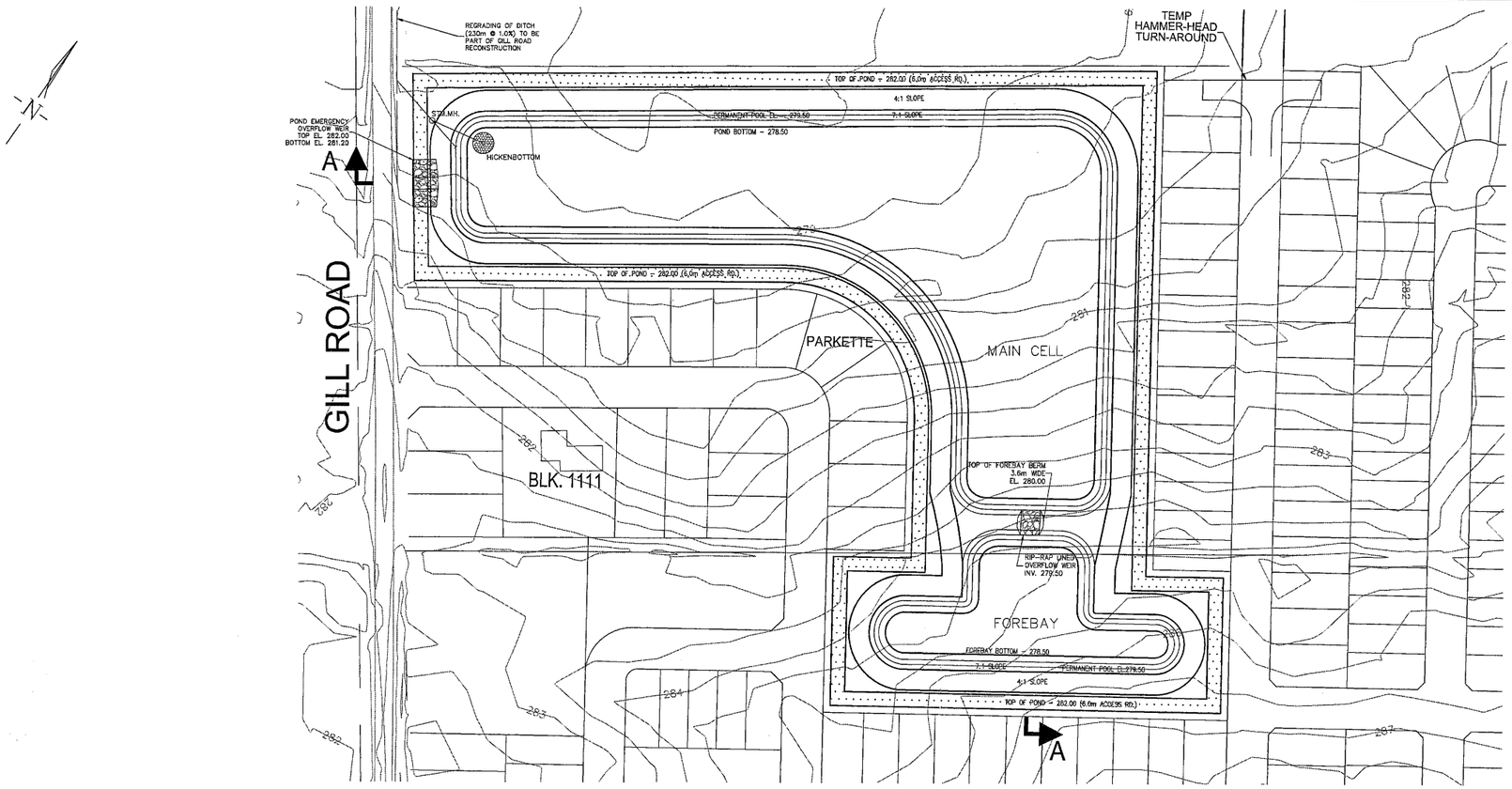
We trust that these preliminary comments will satisfy your present requirements. If you should have any further questions, or require additional information, please do not hesitate to contact this office.

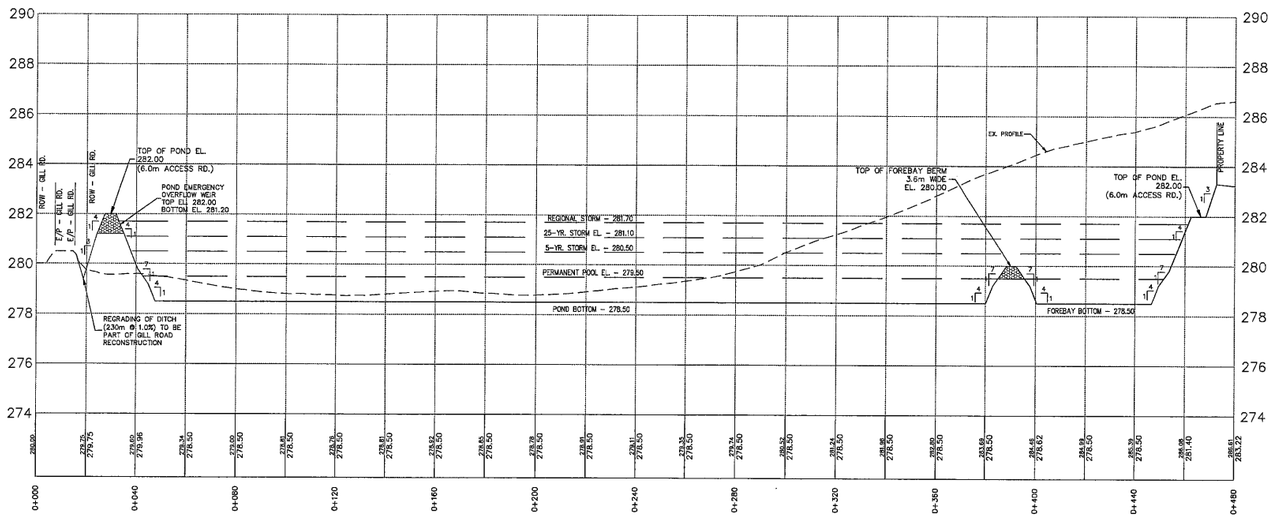
Regards,
Terraprobe Inc.

Blair E. Goss, P.Eng.
Associate

Kirk R. Johnson, P.Geo., P.Eng.
Associate

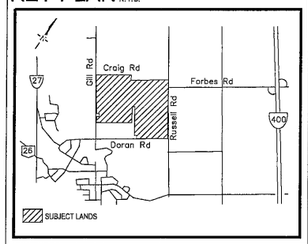
Attached:
Conceptual Stormwater Management Pond, Drawing PND-1, Project 1001, MNT Consulting Group Inc.





SECTION A-A

KEY PLAN N.T.S.



SURVEY NOTES:

TOPOGRAPHICAL INFORMATION PROVIDED BY C.T. STRONGMAN SURVEYING LTD. DRAWING REFERENCE R-126.

GENERAL NOTES:

1. DO NOT SCALE DRAWINGS.
2. ALL DIMENSIONS ARE TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
3. ANY DISCREPANCIES, OMISSIONS, OR ERRORS ARE TO BE REPORTED TO THE CONSULTANT. NO WORK IS TO PROCEED BEFORE CLARIFICATION OF THE DISCREPANCIES, ERRORS, OR OMISSIONS IS RECEIVED FROM THE CONSULTANT.
4. ALL EXISTING CONDITIONS TO BE CHECKED AND VERIFIED ON SITE PRIOR TO CONSTRUCTION.
5. ONLY LATEST APPROVED DRAWINGS TO BE USED FOR CONSTRUCTION.
6. ALL DRAWINGS AND SPECIFICATIONS REMAIN THE PROPERTY OF THE CONSULTANT, AND SHALL BE RETURNED TO THE CONSULTANT UPON REQUEST. IN NO WAY SHALL THE DRAWINGS AND/OR SPECIFICATIONS IN WHOLE OR IN PART BE REPRODUCED OR DISTRIBUTED WITHOUT THE PERMISSION OF THE CONSULTANT.
7. PRIOR TO ANY WORKS ON MUNICIPAL PROPERTY A ROAD OCCUPANCY PERMIT SHALL BE OBTAINED FROM THE TOWNSHIP OF SPRINGWATER.

LEGEND:

——— SUBJECT PROPERTY LINE

ITEM	DESCRIPTION	DATE	BY	APPRV'D
1	1st SUBMISSION	APRIL/2013	M.T.	M.T.

SCHEDULE OF REVISIONS

ENGINEER'S SEAL

PROJECT: MIDHURST HEIGHTS DEVELOPMENT

TITLE: CONCEPTUAL STORMWATER MANAGEMENT POND

mnt consulting group, inc.
5387 Fifth Line
Allliston, Ontario | L9R 1V2
www.mntconsulting.ca

TOWNSHIP OF SPRINGWATER

DRAWN: GEMCAD	SCALE: HOR: 1:1000 VERT: 1:100	DWG. No. PND-1	PROJECT No. 1001
DESIGNED: M.T.			
CHECKED: M.T.	DATE: APRIL/2013		

PN233
Maple Lane

SOILS SUITABILITY AND PRELIMINARY DEVELOPMENT IMPACT EVALUATION PROPOSED RESIDENTIAL DEVELOPMENT MAPLE LANE ESTATES TOWNSHIP OF SPRINGWATER (VESPRA)

WILSON
ASSOCIATES
CONSULTING HYDROGEOLOGISTS

SOILS SUITABILITY AND PRELIMINARY DEVELOPMENT IMPACT EVALUATION PROPOSED RESIDENTIAL DEVELOPMENT MAPLE LANE ESTATES TOWNSHIP OF SPRINGWATER (VESPRA)

Prepared For:
RUDY & Associates Ltd.

Project 2006-03ab
May 26, 2006
Revised December 6, 2006

IAN D. WILSON ASSOCIATES LIMITED
CONSULTING HYDROGEOLOGISTS

Clinton, Ontario

Telephone (519) 233-3500 Fax (519) 233-3501

TABLE OF CONTENTS PAGE

1.0 INTRODUCTION 1

2.0 GEOLOGY AND HYDROGEOLOGY 1

3.0 SOILS INVESTIGATION 2
3.1 Test Pits: 2
3.2 Shallow Groundwater Conditions: 4
3.3 Septic System Design: 4

4.0 PRELIMINARY REASONABLE USE ASSESSMENT 5

5.0 CONCLUSIONS AND RECOMMENDATIONS 7

6.0 STATEMENT OF LIMITATIONS 8

FIGURES

APPENDIX

SOILS SUITABILITY AND PRELIMINARY DEVELOPMENT IMPACT EVALUATION PROPOSED RESIDENTIAL DEVELOPMENT MAPLE LANE ESTATES TOWNSHIP OF SPRINGWATER (VESPRA)

1.0 INTRODUCTION

It is proposed to develop a 345 lot residential subdivision (316 single family units and 29 townhouse units) on a 41.3 hectare (approximate) parcel of land located in parts of Lots 11 and 12, Concession 3, Township of Springwater (former Vespra). Figures 1 and 2 show the location of the proposed development.

It is proposed to service the subdivision with communal sub-surface sewage disposal systems with treatment, the tile beds distributed throughout the property adjacent to various walking trails/paths. The proposed development will be supplied with water through the existing Midhurst water supply system.

The site is bounded to the west by Gill Road (Road Allowance between Concessions 3 and 4) and to the east by Russell Road (Road Allowance between Concessions 2 and 3). The north property line is fenced and follows the dividing line between the south and north halves of Lot 11, Concession 3.

The subject lands exhibit a generally flat relief which is interrupted by two northwest-trending, moderately incised, dry valleys in the north-central and north-eastern portions of the site. The overall slope of the lands is towards the two valleys or to the north or northwest. The lands are cleared and are in agricultural use, except for two small forested areas in the north-central and northeastern portions of the site. Lands surrounding the site are mainly in agricultural use or are undeveloped. Scattered rural residences are located to the west along Gill Road and to the east along Russell Road. Although local National Topographic Series and Ontario Base Maps indicate that streams are situated in the base of the two valleys, no surface water was observed within the valleys on-site or surrounding the site.

A soil and shallow groundwater investigation was conducted by completing fourteen backhoe test pits on January 27, 2006. This report provides a description of the field investigation, soils analysis, septic system suitability, and the results of a development impact analysis applicable to development utilizing communal sewage disposal systems.

2.0 GEOLOGY AND HYDROGEOLOGY

The subject lands are situated within the Simcoe Uplands physiographic region of southern Ontario, being separated from the Simcoe Lowlands by the Algonquin Bluff which is situated nearby to the northwest. The Uplands are characterized by a series of broad, rolling till plains (which were once islands in glacial Lake Algonquin) separated

by steep-sided, flat-floored valleys. The Ontario Geological Survey "Surficial Geology of Southern Ontario" describes the upper soils over the site as sandy silt to silty sand glacial till with some older alluvial deposits of clay, silt, sand and gravel. The Soil Survey of Simcoe County describes the upper soils as sandy loam belonging to the Vasey or Dundonald Soil Series.

According to area water well records, the upper overburden consists of fine-grained deposits described as clay overlying a variable deposit consisting of sand to a gravelly clay. Where present, the granular deposits in the upper overburden appear to be dry, as indicated by a 19.5m deep well nearby to the southwest, reported as dry in gravel. Reported local wells are typically completed in an intermediate-depth granular deposit situated at a depth of about 55 to 60 metres below grade. Static water levels in these wells are very low, in the range of 40 metres below grade, consistent with the highland setting atop the Algonquin Bluff nearby to the northwest.

No local wells have fully penetrated the overburden and little local information is available regarding the lower overburden. However, according to the March 2004 document "Midhurst Secondary Plan - Settlement Capability and Servicing Option Study" prepared by Dixon Hydrogeology Limited, two deep aquifers (lower overburden), known to be capable of substantial yields in the Midhurst/Barrie corridor, may extend to the Gill Road Area north of Midhurst.

According to Ministry of the Environment Map 3135-7 "Bedrock Lithology and Topography, County of Simcoe, Southern Portion", the overburden is approximately 160 metres deep.

The bedrock beneath the site is described as limestone, dolostone and shale of the Middle Ordovician Simcoe Group of Rock.

Groundwater in viable quantities is obtained from granular formations within the overburden (i.e. sands and gravels) or from well fractured zones in the bedrock. According to local water well records, the vast majority of local wells are completed in intermediate-depth overburden granular deposits. The Midhurst Settlement Capability and Servicing Option Study completed in 2004 suggests that one or two aquifers with high yield potential may be present in the lower overburden in the vicinity of Gill Road at the north end of Midhurst. However the drilling of test wells is required to confirm that an aquifer with a yield suitable for municipal water wells is present. The bedrock is not locally utilized as a source of water due to the likelihood of obtaining low yields of aesthetically poorer water and the high cost of drilling to the bedrock. Based on the geologic setting, shallow bored or dug wells will not be viable in the vicinity of the site.

3.0 SOILS INVESTIGATION

3.1 Test Pits:

Fourteen test pits (numbered TP1 to TP7 and TP15 to TP21, completed in combination

with test pit programs on adjacent properties) were excavated using backhoe equipment on January 27, 2006. The soil profile was logged in each hole and representative soil samples were collected from each identified soil horizon for subsequent classification, analysis and storage. Figure 2 shows the approximate test pit locations. The following table provides a summary of the analytical results for selected, representative soil samples.

Table 1 : Summary of Soil Analytical Data

Location/ Sample	Depth (m)	Grain-Size Distribution				"k" (cm/sec)	T-Time (min/cm)
		Clay %	Silt %	Sand %	Gravel %		
1/1	0.9	24	64	12	0	10^{-7}	>50
3/2	0.7	12	40	48	0	$3X10^{-6}$	40 to 45
5/3	0.7	4	39	57	0	$3X10^{-5}$	25 to 30
6/4	0.5	9	27	64	0	$8X10^{-6}$	35 to 40
15/5	0.6	9	33	58	0	$1X10^{-5}$	30 to 35
18/6	0.3	5	27	68	0	$3X10^{-5}$	25 to 30
19/7	0.5	4	36	60	0	$2X10^{-5}$	25 to 30
20/8	0.8	16	42	42	0	10^{-7}	>50
21/9	0.6	traces	33	67	0	$5X10^{-5}$	25 to 30

Note: The above coefficients of permeability ("k" values) and T-times (percolation rates) are estimates based on field observation, laboratory grain-size analysis, experience with similar soils and guidelines of the Ontario Building Code.

Consistent with geologic mapping, the predominant soil type on-site is a silty sand glacial till. This soil exhibits a moderate permeability with a T-time in the range of 25 to 40 minutes per centimetre. A discontinuous, very compact to dense clayey sand and silt was encountered in test pits located in the western and northwestern portions of the site (TP1, TP3, TP20). The T-time of this soil is estimated to be in excess of 50 minutes per centimetre in the vicinity of Test Pits 1 and 20, due to high density and clay content.

Complete test pit logs and grain-size analysis curves are included in the appendix.

3.2 Shallow Groundwater Conditions:

No shallow groundwater or evidence of shallow groundwater (i.e. soil discolouration or mottling) was encountered in any of the fourteen test pits on January 27, 2006. As discussed in Section 2.0, local well records indicate that static water levels in wells are in excess of 30 metres below grade and that a nearby well completed to a depth of 19.5m below grade was dry. As such, based on the highland setting atop the nearby Algonquin Bluff and local geology, seasonally elevated watertable conditions are not anticipated. The watertable surface will likely be in excess of 20 to 30 metres below grade.

3.3 Septic System Design:

Under the Ontario Building Code, for a sewage disposal system to operate effectively, the leaching bed must be located in soil with a percolation rate (T-time) of between 1 and 50 minutes per centimetre and the base of the absorption trenches must be situated at least 0.9m above the high ground water table, bedrock or a soil with a permeability of greater than 50 minutes per centimetre. To achieve a normal, in-ground installation, the high groundwater table, rock or soil with a permeability of greater than 50 min/cm must be situated at least 1.5 to 1.8 metres below grade.

The majority of on-site soils were identified to exhibit T-times of between 25 and 40 minutes per centimetre, except for a small area in the western and northwest periphery of the site. Elevated watertable conditions are not anticipated. Therefore, apart from the dense clayey soils in the western and northwestern portion of the site, in-ground tile beds are considered feasible for the property.

We understand that a total of 345 lots are proposed in total for the subject 41.3ha site. The following provides a basic outline of sewage disposal constraints for the site in the context of the proposed communal sewage system. It is understood that it is proposed to install a 6m wide series of tile beds with three tile runs throughout the site, located mainly along walking trails/paths.

Based on a basic 4-bedroom design sewage flow of 2,000L/day/unit, a total design flow of 690,000 litres per day is specified under the Building Code. The basic sewage loading rate guidelines of the Ontario Building Code are:

T-time of >20 and ≤35 min/cm, loading rate = 8L/m^2/day
T-time of >35 and ≤50 min/cm, loading rate = 6L/m^2/day
T-time of >50 min/cm, loading rate = 4L/m^2/day

It is assumed that standard tile beds will be installed in sewage bed fill (sand) to minimize the required length of sewage tile. If sewage is disposed of in the medium-permeability soils present over much of the development (avoiding the T>50min/cm soils) a loading rate of 8L/m^2/day can be assumed for discussion purposes and the preliminary contact area will be about 8.6ha.

The total sewage bed area is controlled only by three factors, these being native soil T-time, number of units and design sewage flow. If standard tile beds are proposed, to reduce the size of the required tile bed areas, either the number of units have to be reduced or the design flow reduced by requiring smaller houses.

Options which might be considered by the sewage system engineer to reduce the required sewage disposal area are the use of shallow buried trenches or engineered filter beds. As the sewage will be treated in a communal system, shallow buried trenches and filter beds may be technically feasible.

For shallow buried trenches, based on the use of the formula L=Q/50 (updated Building Code Requirement), total trench length would be about 13,800m. Based on a 3-tile layout, about 4,600m of a 6m wide shallow buried trench allotment is required, for an estimated total footprint of about 2.8ha. We recommend that if this option is to be considered further, a specialist in large scale applications of shallow buried trenches be consulted to determine the feasibility of this option.

For engineered filter beds, with treated sewage, the effective area under the Code is not to exceed 100L/m^2/day. Therefore, with a design flow rate of 650,000 litres per day, the total effective area required for filter beds would be about 0.65ha. This does not include the required separation between filter bed cells (5m between pipes) or contact area. As with the shallow buried trenches, we recommend that if this option is to be considered further, a specialist in large scale applications of engineered filter beds be consulted to determine the feasibility of this option.

Site-specific test pits are strongly recommended at the sewage system approval stage to ensure that actual soils conditions at tile beds are identified for design purposes.

4.0 PRELIMINARY REASONABLE USE ASSESSMENT

The Ministry of the Environment (MOE) Reasonable Use Concept (RUC) is applicable to the assessment of impact of large sewage disposal systems (i.e. >10,000 litres per day design capacity), which would include the proposed future system on the site. MOE Guideline B-7 and Procedure B-7-1 outline details of the Ministry's RUC. The critical groundwater contaminant in the context of the RUC is nitrate. The effect of the RUC is to require the nitrate content of groundwater at the downgradient property line not to exceed 25% of the difference between background and the Ontario Drinking Water Standard (10 mg/L).

Due to very low watertable conditions, none of the test pits encountered groundwater. The watertable surface is likely situated in excess of 20 to 30m below grade. For the purposes of this preliminary evaluation, a background nitrate level of 1mg/L is assumed, given the absence of urban development nearby upgradient (east and northeast) of the site. With this assumed background nitrate content, the nitrate content of groundwater at the downgradient property boundary can be increased to about 3.25mg/L under the RUC. The final RUC evaluation will require the completion of deep boreholes to

establish background water quality, confirm directions of flow of the watertable and establish the rate of groundwater flow for use as a dilutant for sewage.

To calculate the potential impact of the proposed communal sewage system on the nitrate content of groundwater at the downgradient property line, a dilution model utilizing the volume of infiltrating precipitation within the possible mixing zone (the entire property, due to the distribution of tile beds), upper groundwater flow within the possible mixing zone and on-site sewage is proposed.

To establish the infiltration rate, the percentage of the local water surplus which may infiltrate is calculated using the Rational Method approach. According to the soil evaluation, the soil profile consists mainly of a silty sand glacial till with some minor lower-permeability soils in the western one-third (infiltration factor 25%), the relief is flat to rolling (infiltration factor 20%) and the cover is mainly cleared (infiltration factor 10%), all resulting in an infiltration factor of 55%. According to a Thornwaite calculation of the average annual water surplus provided by Environment Canada, the average annual water surplus in the Barrie area is 341mm (see appendix). As such, the annual infiltration rate will be 188mm (55% of 341mm), representing 22% of average annual precipitation at the Midhurst weather station (20.6 mm). This value should be reduced by 10% to account for future impervious areas (i.e. roads, roofs, etc...) to 169mm. Accordingly, 7.0×10^7 litres of water will join the shallow groundwater regime annually on-site.

According to the Midhurst Settlement Capability and Servicing Option Study, groundwater flow within the upper aquifer is west to southwestward in the area. Groundwater flow through the upper aquifer (identified in the Midhurst study as A-1), assuming a preliminary mixing zone of 5m depth, a perpendicular width of about 1250m, a gradient of 0.02 (per Midhurst Study) and a coefficient of permeability of 1×10^{-2}cm/sec (assumed, to be confirmed by borehole completion), will be approximately 3.9×10^8 L/year. This flowthrough is assumed to contain an average of 1mg/L nitrate (to be confirmed), for a total input of 3.9×10^8 mg of nitrate per year.

To determine the degree of treatment required to achieve a nitrate content of 3.25mg/L at the downgradient property line, the following mass balance approach is proposed:

Nitrate sources:

Sewage:	2.5×10^8L/year at nitrate concentration "C_s" (2000L/day/lot)
Groundwater:	3.9×10^8 mg/year (assumed)

Dilution Sources:

Sewage	2.5×10^8L/year
Infiltration:	7×10^7 L/year
Groundwater Flow:	3.9×10^8 L/year
Total:	7.1×10^8 L/year

The required degree of treatment can be determined using the mass-balance formula;

Impact = Nitrate sources + Dilution sources

Therefore:

$$3.25mg/L = (2.5x10^8 L/year \times C_s + 3.9x10^8 mg/year) \div 7.1x10^8 L/year$$

$$C_s = 7.7mg/L$$

Therefore, based on the preliminary assumptions outlined above, the sewage treatment system serving the proposed 345 lots will be required to reduce the nitrate content of sewage to 7.7mg/L or lower to meet the Ministry of the Environment's Reasonable Use Concept.

5.0 CONCLUSIONS AND RECOMMENDATIONS

1. The predominant soil type on the site is a silty sand glacial till. A small area of dense clayey silt and sand was identified at three test pits in the western end of the site.

2. The watertable surface was not encountered during the test pit program and, based on local geology, is likely situated at least 20 to 30 metres below grade.

3. Site-specific test pits are strongly recommended at the sewage system approval stage to ensure that soils conditions along the proposed routing of the tile bd system are confirmed for design purposes.

4. Fully in-ground sewage disposal systems are likely to be viable over much of the site. The small area of dense, low permeability soils in the western portion of the site should be avoided for tile bed installation.

5. A discussion on tile bed options is outlined in Section 3.3 of this report, but based on the areas identified for sewage disposal, shallow buried trenches or filter beds may be required. A specialist in large scale applications of engineered filter beds must be consulted to determine the feasibility of these options.

6. Under the current Ministry of the Environment Reasonable Use Concept, preliminary information suggests that sewage treatment will be required to reduce the nitrate content of sewage to 7.7mg/L or lower for the 345 proposed units. A borehole evaluation will be required prior to finalizing the Reasonable Use Assessment to confirm background nitrate levels, directions of groundwater flow and rates of groundwater flow.

7. According to the March 2004 document "Midhurst Secondary Plan - Settlement Capability and Servicing Option Study" prepared by Dixon Hydrogeology Limited,

two deep aquifers (lower overburden), known to be capable of substantial yields in the Midhurst/Barrie corridor, may extend to the Gill Road Area north of Midhurst. As such a potential may exist for the completion of a high capacity municipal well in the area of Gill Road, but this must be confirmed through test drilling.

6.0 STATEMENT OF LIMITATIONS

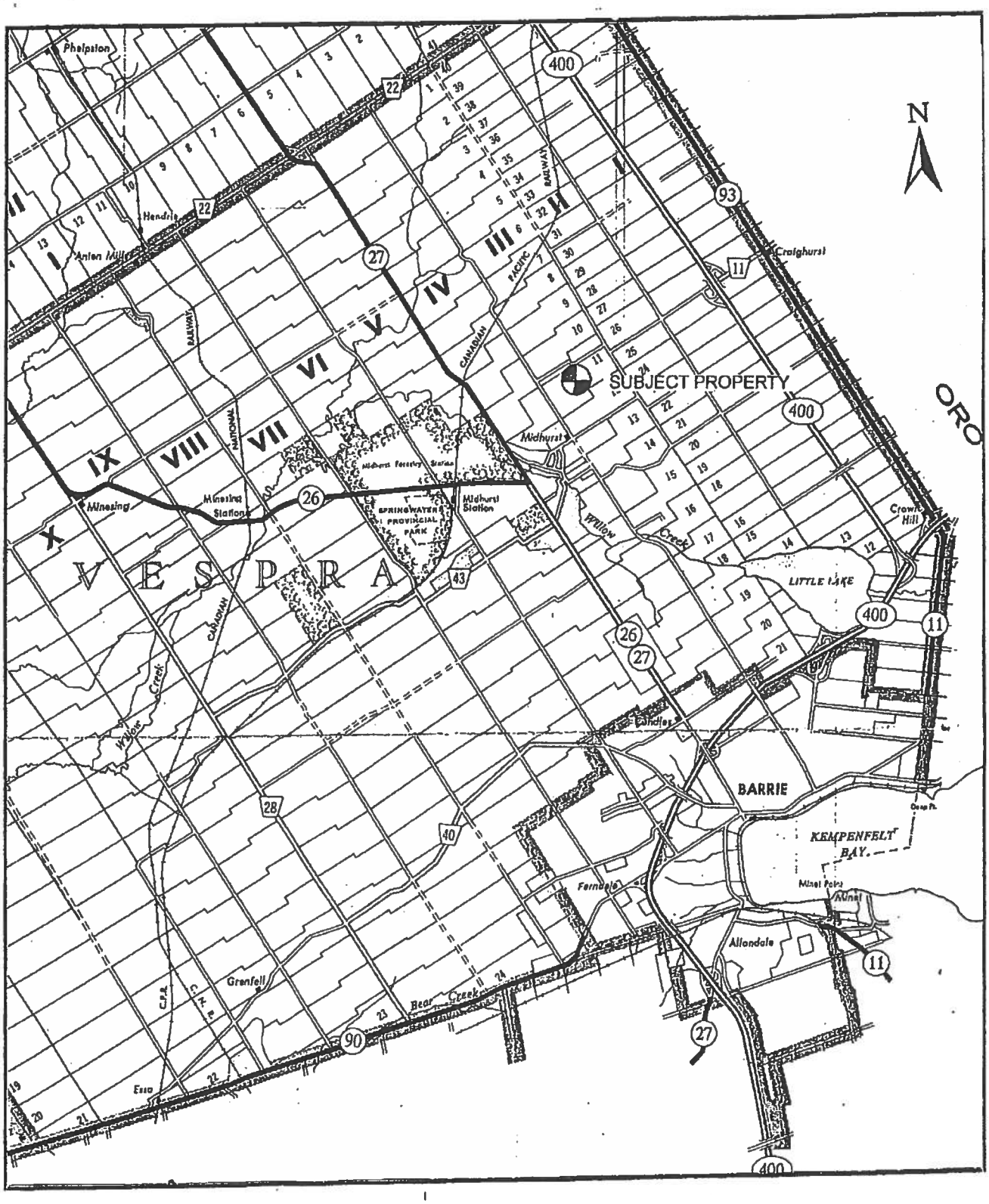
This report was prepared solely to provide conclusions regarding the general suitability of shallow soil and groundwater conditions for sewage disposal and the density of development allowable under current Ministry of the Environment Risk Assessment Guidelines. No conclusions should be drawn from this report regarding the viability of residential development on the subject parcel of land as it relates to any other factors (e.g. water supply, drainage, slope stability, load-bearing engineering, biology, etc...).

IAN D. WILSON ASSOCIATES LIMITED

Geoffrey Rether, P.Geo.

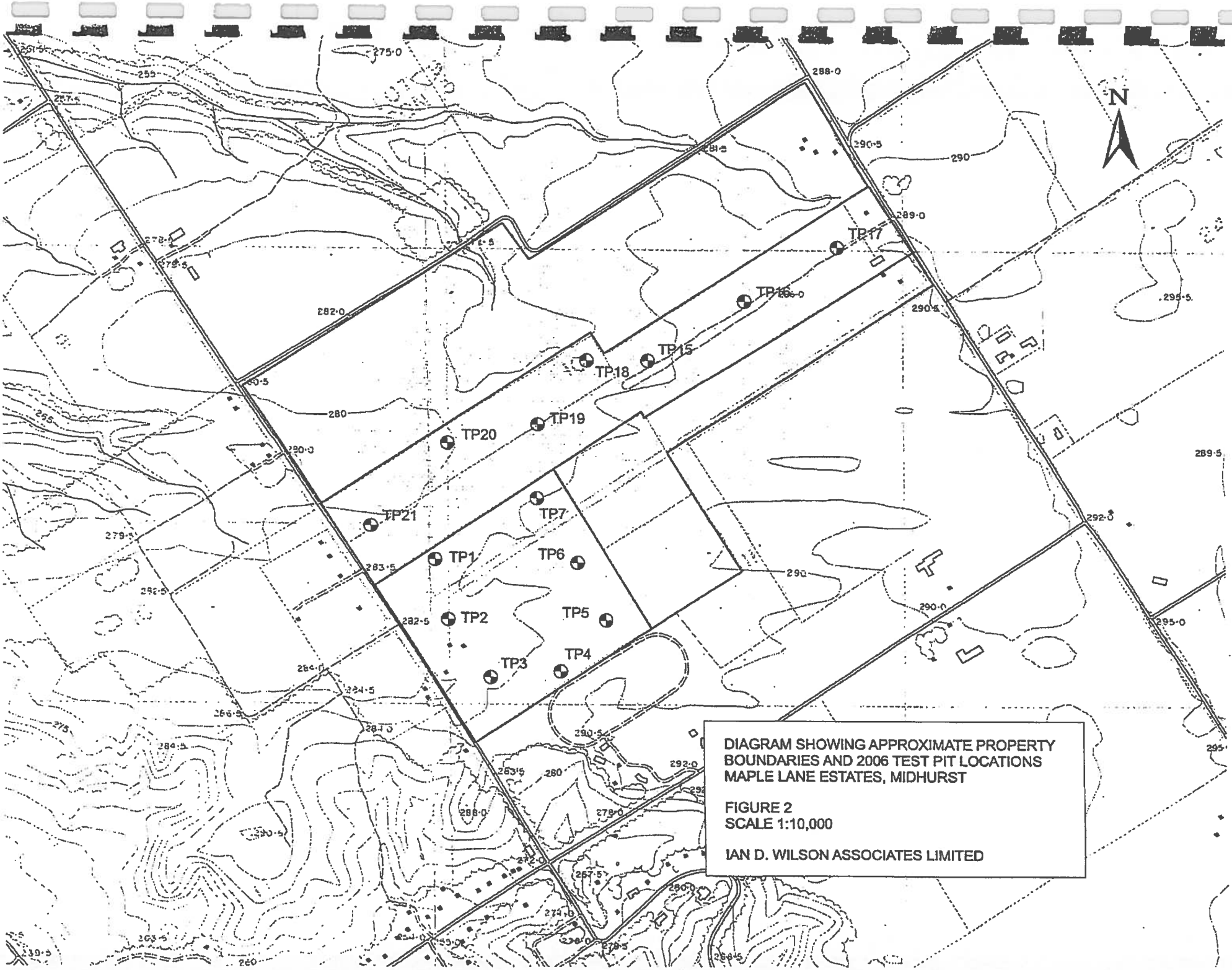
May 26, 2006
Revised December 6, 2006

FIGURES AND APPENDIX



GENERAL LOCATION OF MAPLE LANE ESTATES, MIDHURST

FIGURE 1 SCALE 1:100,000


N
TP17
TP16
TP15
TP18
TP19
TP20
TP21
TP7
TP6
TP1
TP5
TP2
TP4
TP3
DIAGRAM SHOWING APPROXIMATE PROPERTY BOUNDARIES AND 2006 TEST PIT LOCATIONS
MAPLE LANE ESTATES, MIDHURST
FIGURE 2
SCALE 1:10,000
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TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP1	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.6	dark brown, lightly compact, dry silty SAND with traces of clay
	0.6 - 1.8	brown, very compact, dry clayey SILT with some fine sand

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 1 - 0.9m
  Clay - 24%
  Silt - 64%
  Sand - 12%

TP2	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.8	red-brown, lightly compact, dry silty SAND with traces of clay
	0.8 - 1.7	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TP3	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	brown, compact, dry SILT AND SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 2 - 0.7m
  Clay - 12%
  Silt - 40%
  Sand - 48%

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP4	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TP5	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 3 - 0.7m
  Clay - 4%
  Silt - 39%
  Sand - 57%

TP6	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.6	grey-brown, lightly compact, dry silty SAND with traces of clay (till)
	0.6 - 1.5	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 4 - 0.5m
  Clay - 9%
  Silt - 27%
  Sand - 64%

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP7	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	grey-brown, very compact, dry silty SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

TEST PIT LOGS

Completed January 27, 2006

TEST PIT	DEPTH (m)	MATERIALS

Note: Test Pits are numbered 15 through 21, completed in conjunction with test pit programs on adjacent properties

TP15	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 5 - 0.6m
  Clay - 9%
  Silt - 33%
  Sand - 58%

TP16	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.0	brown, compact, dry silty SAND with traces of clay (till)
	1.0 - 1.5	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TP17	0 - 0.2	dark brown cultivated TOPSOIL
	0.2 - 0.8	brown, compact, dry silty SAND with traces of clay (till)
	0.8 - 1.5	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP18	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.5	red-brown, lightly compact, dry silty SAND with traces of clay
	0.5 - 1.7	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 6 - 0.3m
  Clay - 5%
  Silt - 27%
  Sand - 68%

TP19	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.7	brown, lightly compact, dry silty SAND with traces of clay
	0.7 - 1.7	grey-brown, compact, dry silty SAND with some clay, some stones (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 7 - 0.5m
  Clay - 4%
  Silt - 36%
  Sand - 60%

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP20	0 - 0.2	dark brown cultivated TOPSOIL
	0.2 - 1.65	brown, dense, dry SILT AND SAND with some clay

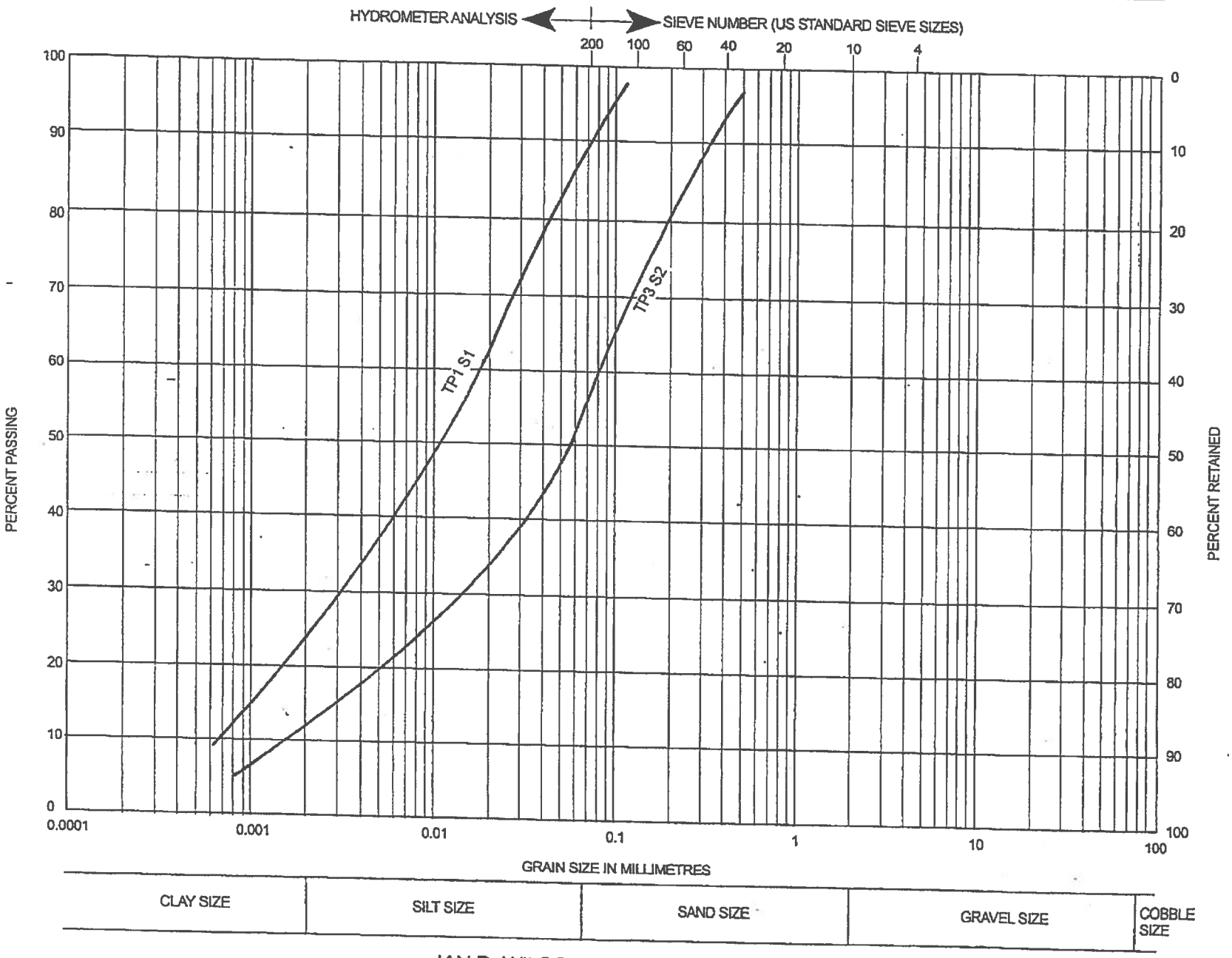
- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 8 - 0.8m
  Clay - 16%
  Silt - 42%
  Sand - 42%

TP21	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.0	brown, compact, dry silty SAND
	1.0 - 1.7	grey, compact, dry silty SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 9 - 0.6m
  Clay - 0%
  Silt - 33%
  Sand - 67%

GRAIN SIZE DISTRIBUTION CHART

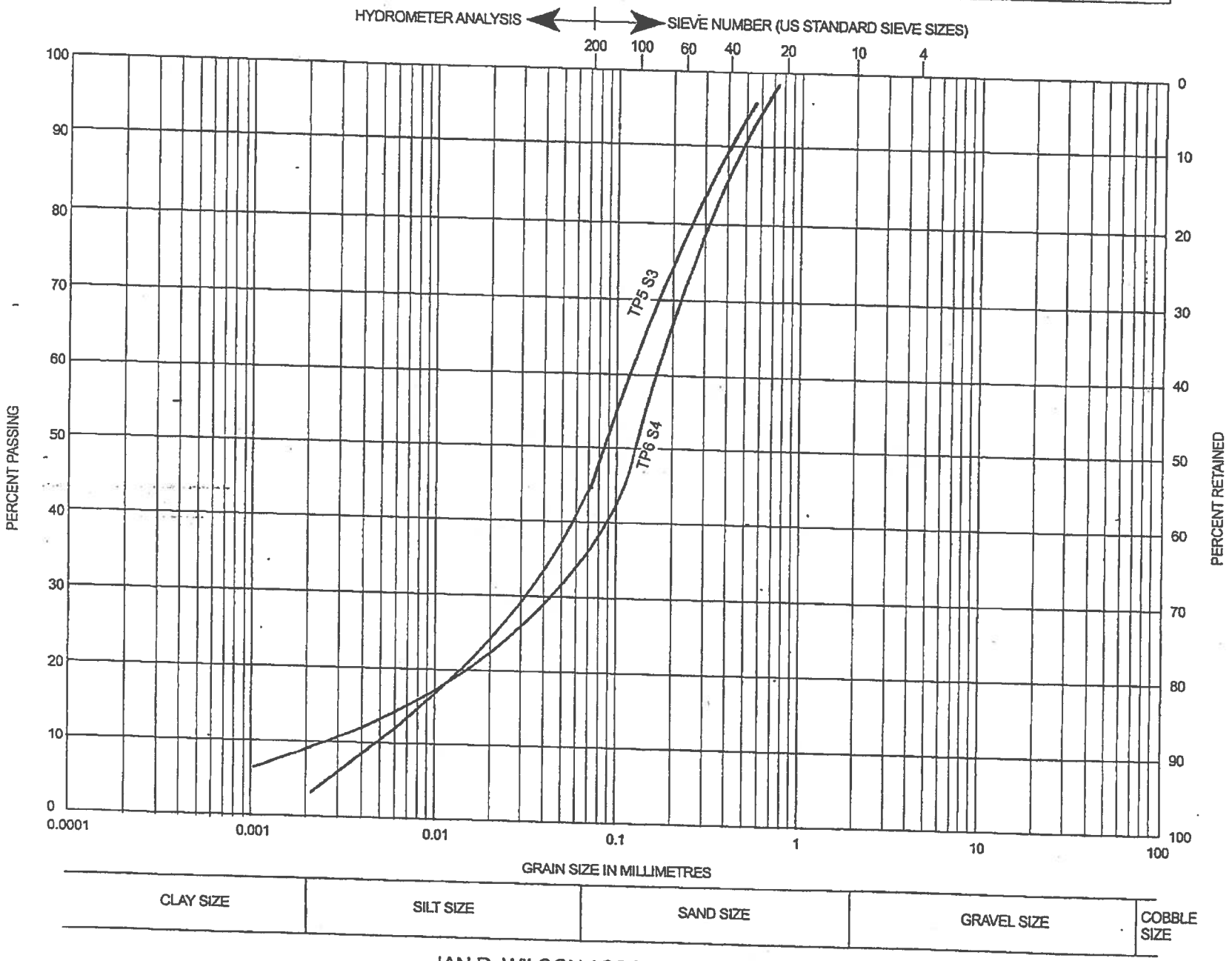
PROJECT / SAMPLE	Maple Lane Estates, Midhurst - Test Pits 1 and 3	DATE



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GRAIN SIZE DISTRIBUTION CHART

PROJECT / SAMPLE	Maple Lane Estates, Midhurst - Test Pits 5 and 6	DATE

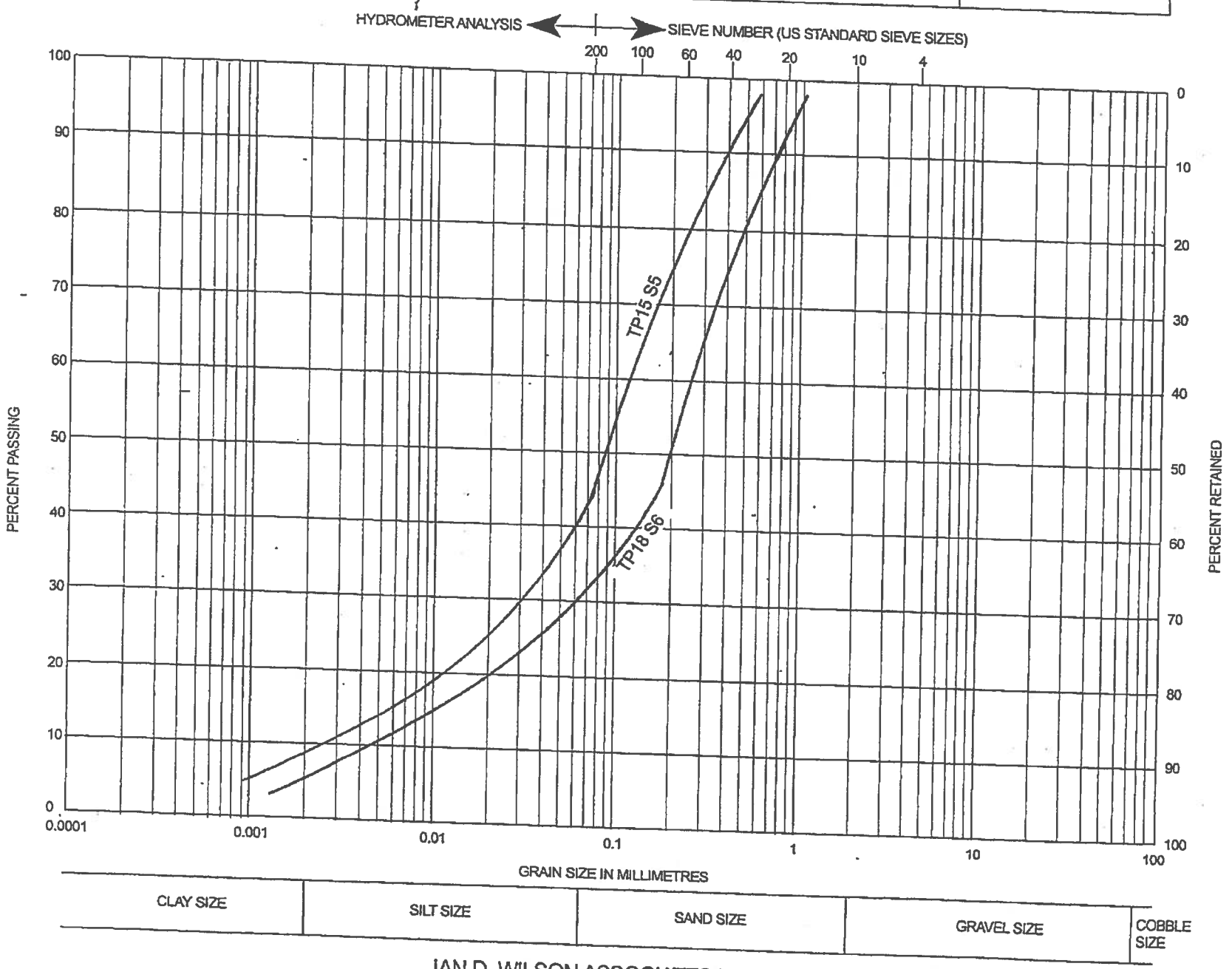


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GRAIN SIZE DISTRIBUTION CHART

PROJECT / SAMPLE: Maple Lane Estates, Midhurst - Test Pits 15 and 18

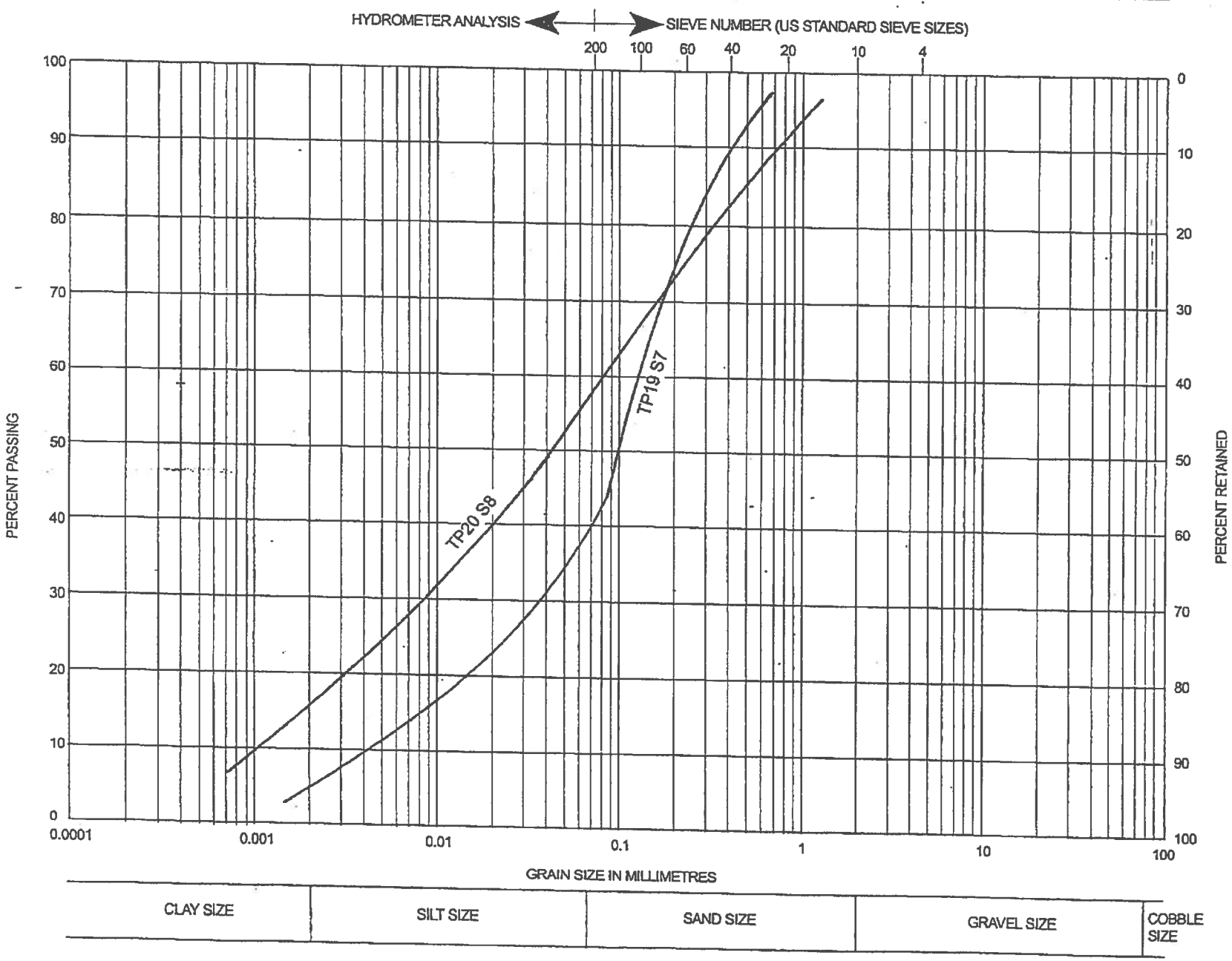
DATE:



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GRAIN SIZE DISTRIBUTION CHART

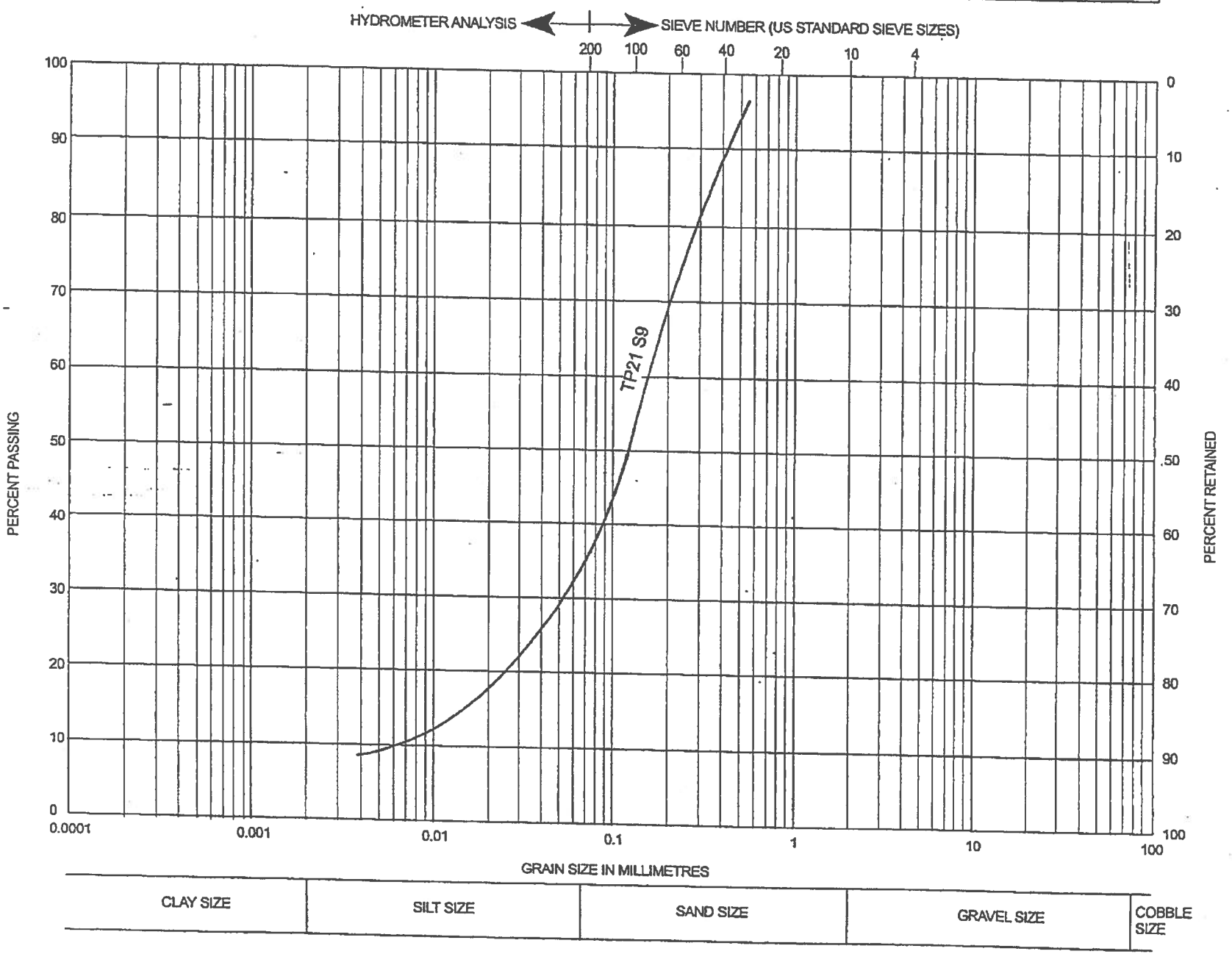
PROJECT / SAMPLE	Maple Lane Estates, Midhurst - Test Pits 19 and 20	DATE



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GRAIN SIZE DISTRIBUTION CHART

PROJECT / SAMPLE	Maple Lane Estates, Midhurst - Test Pit 21	DATE



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BARRIE WPCC ONT WATER BUDGET MEANS FOR THE PERIOD 1978 TO 1987

LAT.... 44.38 WATER HOLDING CAPACITY...150 MM HEAT INDEX... 35.04
LONG... 79.68 LOWER ZONE..... 90 MM A..... 1.055

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACCUM PCPN
31- 1	-9.2	114	10	8	0	0	0	14	132	145	330
28- 2	-7.4	47	12	35	1	1	0	44	133	146	377
31- 3	-2.3	66	31	90	6	6	0	111	78	150	449
30- 4	5.5	61	59	79	31	31	0	107	0	150	510
31- 5	12.2	75	75	0	75	75	0	11	0	138	585
30- 6	16.8	76	76	0	106	106	0	0	0	108	662
31- 7	20.5	76	76	0	133	124	-8	0	0	60	743
31- 8	19.2	97	97	0	115	104	-12	0	0	53	838
30- 9	14.8	98	98	0	76	72	-4	19	0	60	937
31-10	8.3	80	80	0	38	37	0	4	0	99	81
30-11	2.3	73	65	8	11	11	0	23	0	138	159
31-12	-3.9	84	27	16	2	2	0	32	42	147	238
AVERAGE	6.4 TOTAL	948	706	236	594	569	-24	365			

SESSION TC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER STAT FOUND FEET	LVL FEET	PUMP TEST LVL FEET	RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
CIPALITY CODE 57016 (CONTINUED...)															
			6218 4925960												BRWN MSND 0012 GREY SILT CLAY 0036 GREY CLAY 0089 BRWN CLAY MSND GRVL 0114 GREY CLAY GRVL 0121 BRWN MSND CLAY 0140 BRWN MSND CLAY GRVL 0165 BRWN MSND GRVL 0171 BRWN MSND 0203 (S 0176 20) BRWN MSND CLAY GRVL 0206
3	8	57- 4596	599870 4924752	800	11/65	3203	4	FR	20	18	40	15	1/00	ST DO	OBRICK M PROG 0020 FSND 0070 (S 0066 04)
3	10	57- 4597	601555 4924563	935	04/66	3203	5	FR	76	74	90	7	2/00	ST DO	ATKINSON G TPSL 0001 BRWN CLAY 0037 BRWN MSND 0070 FSND 0076 FSND MSND 0106 (S 0104 03) FSND 0109
3	10	57- 4598	600341 4924018	910	07/60	1510	4	FR	152	120	125	15	2/00	ST DO	CARSON E BRWN CLAY BLDR 0030 WHIT CLAY HPAN 0100 FSND 0110 BLUE CLAY 0140 CSND 0160 (S 0152 08)
3	10	57- 4599	601576 4924473	935	09/66	1510	4	FR	130	130	142	10	2/00	ST DO	RUSSEL L TPSL 0003 HPAN 0030 CSND 0170 (S 0166 04)
3	10	57- 8342	601370 4924300	925	10/71	1510	4	FR	173	138	138	10	1/30	ST DO	WRIGHT G PROG 0006 RED SAND CLAY 0120 GREY HPAN 0150 CSND MSND 0173
3	11	57- 4600	601657 4924353	935	06/66	1510	4	FR	200	140	145	10	2/00	ST DO	RUSSELL H TPSL CLAY TPSL 0002 BRWN CLAY STNS 0085 HPAN STNS 0140 FSND 0185 MSND 0200 (S 0193 07)
3	11	57- 6542	601650 4924410	935	08/69	1510	4	FR	180	135	155	10	2/00	ST DO	RUSSELL WAYNE TPSL CLAY 0002 CLAY STNS 0015 CSND 0115 MSND 0180 (S 0175 05)
3	11	57- 18864	601950 4923950	950	06/93	2514	6	FR	193	134	145	10	1/30	DO	COOK P BRWN CLAY 0019 BRWN CLAY GRVL 0153 BLUE CLAY 0193 YLLW SAND 0201 (S 0198 03)
3	12	57- 4601	601362 4922727	910	06/60	1510	4	FR	94	64	84	5	2/00	DO	NASH D RED MSND 0025 GRVL 0075 CSND 0094 (S 0090 04)
3	12	57- 4602	600050 4923990	930	06/65	1510	4	FR	150	130	138	10	2/00	ST DO	GILL D PROG 0010 FSND 0150 CSND 0170 (S 0166 04)
3	12	57- 4603	601352 4922597	910	05/66	1510	4	FR	170	130	145	5	2/00	DO	NASH D TPSL 0002 CLAY MSND STNS 0045 HPAN 0110 MSND 0170 (S 0164 04)
3	12	57- 5929	602070 4923270	950	04/70	1510	4	FR	170	165	165	10	2/00	ST DO	DOUG FERRIS BRWN CLAY TPSL 0003 GREY MSND 0120 GREY FSND 0170 GREY CSND 0130 (S 0172 04) (S 0176 04)
3	12	57- 6821	602100 4923280	950	09/69	1510	4	FR FR	145 180	150	170	4	1/00	ST DO	FRANKUM CECIL TPSL CLAY 0002 CLAY MSND 0011 CSND 0114 FSND 0145 CSND 0180 (S 0176 04)
3	12	57-	601350	950	01/75	1452	4	FR	120	153	159	5	2/00	ST DO	FRANKHURST STARLES

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ESSION UTM CSG KIND WATER STAT PUMP TEST TEST OWNER/LOG/SCREEN
TC LOT WELL EASTING ELEV DIA OF FOUND LVL LVL RATE TIME WATER DEPTHS IN FEET TO WHICH
NO NORTHING FEET DATE DRILLER INS WATER FEET FEET FEET GPM HR/MN USE FORMATIONS EXTEND

CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP TEST LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
MUNICIPALITY CODE 57016 (CONTINUED...)															
															0118 03)
CON	4 9	57- 19100	600050 4924200	850	07/83	3135	5	FR	112	76	95	10	1/00	DO	SUNDOL WOOD EST SAND CLAY DRY 0072 CLAY 0112 SAND 012 (S 0120 03)
CON	4 10	57- 4629	599833 4922904	825	09/64	1510	4	FR	45	30	42	4	8/00	DO	CAMERON A BRWN CLAY MSND 0004 HPAN 0045 FSND 005 (S 0046 04)
CON	4 10	57- 4630	599564 4923133	790	07/66	4608	30	FR	43	43		2		DO	JONES J FSND 0053
CON	4 10	57- 6051	599850 4922780	820	05/68	1510	4	FR	65	45	55	10	2/00	DO	CAMERON L TPSL MSND 0001 RED MSND STNS 0058 CSN 0065 (S 0061 04)
CON	4 10	57- 7494	599830 4922750	800	09/70	1510	4	FR	50	40	45	5	1/00	DO	POTTER BILL RED MSND 0030 GREY CSND GRVL 0050 CSN 0065 (S 0060 04)
CON	4 10	57- 10099	599900 4922579	800	06/73	1510	4	FR	60	40	40	10	2/00	DO	DUNLOP J H BRWN TPSL 0004 BRWN SAND 0070 (S 006 05)
CON	4 10	57- 10336	600540 4923600	900	08/73	3203	5	FR	122	100	130	8	1/30	DO	VANDERMUELEN A BRWN SAND CLAY STNS 0068 BRWN CLAY 012 BRWN SAND 0162 (S 0159 03)
CON	4 10	57- 11846	599900 4922600	780	10/74	4816	6	FR	66	35	54	5	2/00	DO	DELAAT R SAND GRVL 0035 SAND CMTD 0050 FSND 006 (S 0058 04)
CON	4 10	57- 13313	599840 4922710	800	07/76	1204	5	FR	55	49	65	6	1/00	DO	MCLENNAN DON BRWN SAND GRVL BLDR 0039 BRWN SAND CLA DRTY 0055 BRWN FSND 0081 (S 0078 03
CON	4 10	57- 13838	600540 4923600	900	09/76	1204	5	FR	160	117	140	6	1/00	DO	WOOD FRANK BRWN SAND CLAY 0045 BRWN SAND 0097 GRE SAND CLAY 0130 BRWN SAND 0164 (S 016 03)
CON	4 11	57- 4631	600578 4923533	905	01/52	5510	4	FR	147	121	124	46	/30	DO	PRICE W TPSL 0004 CLAY STNS 0014 MSND CLAY 004 MSND 0089 CLAY 0108 CLAY MSND 0141 MSN 0157 (S 0143 14)
CON	4 11	57- 4632	600899 4923043	940	04/56	1637	4		DRY						WOODS V TPSL 0006 GRVL 0064
CON	4 11	57- 4634	600328 4922345	800	11/61	1510	4	FR	92	68	74	15	2/00	PS	VESPRA SCHOOL BOARD GRVL MSND STNS 0013 HPAN BLDR 0045 BLU CLAY STNS 0085 HPAN STNS 0092 GRVL 009 (S 0092 06)
CON	4 11	57- 4637	600942 4922992	935	06/64	1510	4	FR	140	140	146	10	1/00	DO	CHRISTIE G BRWN CLAY 0004 GRVL HPAN 0164 CSND 016 (S 0164 04)
CON	4 11	57- 4638	600575 4923490	910	10/66	4715	4	FR	129	120	125	5	2/00	ST DO	STOER I PRDG 0008 CLAY MSND 0129 FSND 0150 (S 0147 03)
CON	4 11	57-	601053	860	12/47	2514	6	FR	29	15	32	4	2/00	DO	ADAIR W

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ESSION TC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
CIPALITY CODE 57016 (CONTINUED...)															
			4639 4922580												TPSL MSND 0001 YLLW MSND BLDR 0032 (S
	4	11	57- 600810 6061 4922460	850	12/68	1510	4	FR	65	30	50	11	1/00	CO	0029 03) FSND CLAY 0042 BRWN CLAY 0048 MIDHURST COMM HALL TPSL 0005 BRWN CLAY MSND 0040 FSND 0050 CSND 0065 (S 0061 04)
	4	11	57- 600730 7750 4923300	920	10/70	1510	4	FR	155	135	135			ST 90	COOMBES M CLAY TPSL 0002 BRWN CLAY STNS 0082 HPAN STNS 0120 RED MSND 0150 MSND 0165 (S 0159 06)
I	4	11	57- 600700 8014 4923350	915	06/71	3203	4	FR	163	138	140	6	1/30	DO	FIRTH BLCK TPSL 0001 YLLW CLAY 0010 GREY CLAY STNS 0032 GREY SAND GRVL 0041 BRWN CLAY 0053 BRWN SAND 0093 BRWN CLAY 0120 BRWN CLAY SAND 0128 BRWN SAND 0163 (S 0160 03)
I	4	11	57- 600030 8825 4922600	790	05/72	3414	6	FR	211	43	150	8	2/00	DO	NEWMAN C TPSL 0001 CLAY SAND GRVL 0070 CLAY 0150
I	4	11	57- 600370 9392 4922200	775	11/72	2514	6	FR FR	89 95	56	88	9	1/30	DO	SILT 0205 MSND 0211 (S 0207 04) THE CORKERS LTD BRWN SAND GRVL BLDR 0085 SAND GRVL 0095 (S 0089 03) (S 0092 03)
I	4	11	57- 600350 9393 4922190	775	10/72	2514	6	FR FR	98 102	60	98	4	3/30	DO	SHUTE K BRWN SAND GRVL 0002 GREY SAND 0005 BRWN SAND GRVL CLAY 0098 BRWN SAND GRVL SILT 0102
I	4	11	57- 600138 11276 4922197	775	07/74	1413	5	FR	104	64	82	5	2/00	DO	GRAVES A GRVL 0035 GREY CLAY STNS 0085 GREY SAND 0104 (S 0099 04)
I	4	11	57- 600131 11277 4922194	775	07/74	1413	5	FR	105	63	89	6	2/00	DO	GRAVES G BRWN SAND GRVL 0040 BLUE CLAY SAND 0080 BRWN SAND 0105 (S 0101 04)
N	4	11	57- 600150 12500 4922390	775	07/75	5206	5	FR		60		30		DO	DEVRIES H BRWN SAND BLDR 0030 GRVL CLAY 0104 (S 0095 03)
N	4	11	57- 600250 16745 4922250	750	07/79	2514	6	FR	96	47	95	4	1/30	DO	SHUTE J YLLW SAND 0078 YLLW SAND CLAY 0096 YLLW SAND 0101 (S 0098 03)
N	4	12	57- 600700 4633 4922367	825	01/59	1510	2	FR	40	40	44	7	3/00	DO	BERTRAM L CLAY 0040 CSND 0065
N	4	12	57- 600605 4635 4922132	785	08/62	1510	4	FR	84	54	60	35	2/00	DO	BERTRUM J MSND GRVL 0015 HPAN MSND 0084 CSND 0090 (S 0086 04)
N	4	12	57- 600498 4636 4922241	808	03/64	1510	4	FR	75	55	65	3	2/00	PS	ANGLICAN CHURCH RED MSND STNS 0010 MSND CLAY STNS 0055 HPAN 0075 GRVL 0083
N	4	12	57- 600500 4640 4921665	780	07/51	5510	4	FR	72	44	49	4	1/30	DO	PEACOCK B FSND 0005 MSND GRVL 0024 MSND 0087 (S 0068 10)
N	4	12	57- 600548	780	09/53	1637	7	FR	52	24	34	5	1/00	DO	MASON R

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UTM	CSG	KIND	WATER	STAT	PUMP	TEST	TEST		OWNER/LOG/SCREEN
ELEV	DIA	OF	FOUND	LVL	LVL	RATE	TIME	WATER	DEPTHS IN FEET TO WHICH

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SOILS SUITABILITY AND PRELIMINARY DEVELOPMENT IMPACT EVALUATION PROPOSED RESIDENTIAL DEVELOPMENT MEADOWS OF MIDHURST TOWNSHIP OF SPRINGWATER (VESPRA)

WILSON
ASSOCIATES
CONSULTING HYDROGEOLOGISTS

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Prepared For:
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Project 2006-03c
May 26, 2006
Revised December 6, 2006

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SOILS SUITABILITY AND PRELIMINARY DEVELOPMENT IMPACT EVALUATION PROPOSED RESIDENTIAL DEVELOPMENT MEADOWS OF MIDHURST TOWNSHIP OF SPRINGWATER (VESPRA)

1.0 INTRODUCTION

It is proposed to develop a 125 lot residential subdivision (107 single family homes and 18 townhouse units) on a 14.79 hectare (approximate) parcel of land located in parts of Lots 11 and 12, Concession 3, Township of Springwater (former Vespra). Figures 1 and 2 show the location of the proposed development.

It is proposed to service the subdivision with communal sub-surface sewage disposal systems with treatment, the tile beds distributed throughout the property adjacent to various walking trails/paths. The proposed development will be supplied with water through the existing Midhurst water supply system.

The site is bounded to the east by Russell Road (Road Allowance between Concessions 2 and 3). The subject lands exhibit a generally flat relief with an overall slope to the north or northwest. Two shallow swales located in the central and eastern portions of the site represent the terminuses of two valleys which extend to the northwest. The lands are mainly cleared and are in agricultural use. Lands surrounding the site are mainly in agricultural use or are undeveloped. Scattered rural residences are located to the west along Gill Road and to the east along Russell Road. No surface water bodies are located in the vicinity of the site.

A soil and shallow groundwater investigation was conducted by completing seven backhoe test pits on January 27, 2006. This report provides a description of the field investigation, soils analysis, septic system suitability, and the results of a development impact analysis applicable to development utilizing communal sewage disposal systems.

2.0 GEOLOGY AND HYDROGEOLOGY

The subject lands are situated within the Simcoe Uplands physiographic region of southern Ontario, being separated from the Simcoe Lowlands by the Algonquin Bluff which is situated nearby to the northwest. The Uplands are characterized by a series of broad, rolling till plains (which were once islands in glacial Lake Algonquin) separated by steep-sided, flat-floored valleys. The Ontario Geological Survey "Surficial Geology of Southern Ontario" describes the upper soils over the site as sandy silt to silty sand glacial till with some older alluvial deposits of clay, silt, sand and gravel. The Soil Survey of Simcoe County describes the upper soils as sandy loam belonging to the Vasey or Dundonald Soil Series.

According to area water well records, the upper overburden consists of fine-grained

deposits described as clay overlying a variable deposit consisting of sand to a gravelly clay. Where present, the granular deposits in the upper overburden appear to be dry, as indicated by a 19.5m deep well nearby to the southwest, reported as dry in gravel. Reported local wells are typically completed in an intermediate-depth granular deposit situated at a depth of about 55 to 60 metres below grade. Static water levels in these wells are very low, in the range of 40 metres below grade, consistent with the highland setting atop the Algonquin Bluff nearby to the northwest.

No local wells have fully penetrated the overburden and little local information is available regarding the lower overburden. However, according to the March 2004 document "Midhurst Secondary Plan - Settlement Capability and Servicing Option Study" prepared by Dixon Hydrogeology Limited, two deep aquifers (lower overburden), known to be capable of substantial yields in the Midhurst/Barrie corridor, may extend to the Gill Road Area north of Midhurst.

According to Ministry of the Environment Map 3135-7 "Bedrock Lithology and Topography, County of Simcoe, Southern Portion", the overburden is approximately 160 metres deep.

The bedrock beneath the site is described as limestone, dolostone and shale of the Middle Ordovician Simcoe Group of Rock.

Groundwater in viable quantities is obtained from granular formations within the overburden (i.e. sands and gravels) or from well fractured zones in the bedrock. According to local water well records, the vast majority of local wells are completed in intermediate-depth overburden granular deposits. The Midhurst Settlement Capability and Servicing Option Study completed in 2004 suggests that one or two aquifers with high yield potential may be present in the lower overburden in the vicinity of Gill Road at the north end of Midhurst. However the drilling of test wells is required to confirm that an aquifer with a yield suitable for municipal water wells is present. The bedrock is not locally utilized as a source of water due to the likelihood of obtaining low yields of aesthetically poorer water and the high cost of drilling to the bedrock. Based on the geologic setting, shallow bored or dug wells will not be viable in the vicinity of the site.

3.0 SOILS INVESTIGATION

3.1 Test Pits:

Seven test pits (numbered TP8 to TP14, completed in combination with test pit programs on adjacent properties) were excavated using backhoe equipment on January 27, 2006. The soil profile was logged in each hole and representative soil samples were collected from each identified soil horizon for subsequent classification, analysis and storage. Figure 2 shows the approximate test pit locations. The following table provides a summary of the analytical results for selected, representative soil samples.

Table 1 : Summary of Soil Analytical Data

Location/ Sample	Depth (m)	Grain-Size Distribution				"k" (cm/sec)	T-Time (min/cm)
		Clay %	Silt %	Sand %	Gravel %		
8/1	0.6	30	65	5	0	10^{-7}	>50
10/2	0.6	trace	20	80	0	$5X10^{-4}$	12 to 15
12/3	1.0	10	35	55	0	$9X10^{-6}$	30 to 35
13/4	0.5	trace	26	74	0	$1X10^{-4}$	15 to 18
14/5	0.5	12	39	49	0	$3X10^{-6}$	40 to 45

Note: The above coefficients of permeability ("k" values) and T-times (percolation rates) are estimates based on field observation, laboratory grain-size analysis, experience with similar soils and guidelines of the Ontario Building Code.

Consistent with geologic mapping, the predominant soil type on-site is a silty sand glacial till (i.e. Samples 2, 3 and 4). This soil exhibits a moderate permeability with a T-time in the range of 12 to 35 minutes per centimetre. Within the northwestern portion and the far eastern extremity of the site, a very compact to dense clayey silt/sand was encountered at surface in Test Pit 8 and in Test Pit 14. The T-time of this soil is estimated between 40min/cm and in excess of 50 minutes per centimetre.

Complete test pit logs and grain-size analysis curves are included in the appendix.

3.2 Shallow Groundwater Conditions:

No shallow groundwater or evidence of shallow groundwater (i.e. soil discolouration or mottling) was encountered in any of the seven test pits on January 27, 2006. As discussed in Section 2.0, local well records indicate that static water levels in wells are in excess of 30 metres below grade and that a nearby well completed to a depth of 19.5m below grade was dry. As such, based on the highland setting atop the nearby Algonquin Bluff and local geology, seasonally elevated watertable conditions are not anticipated. The watertable surface will likely be in excess of 20 to 30 metres below grade.

3.3 Septic System Design:

Under the Ontario Building Code, for a sewage disposal system to operate effectively, the leaching bed must be located in soil with a percolation rate (T-time) of between 1 and 50 minutes per centimetre and the base of the absorption trenches must be situated at least 0.9m above the high ground water table, bedrock or a soil with a

permeability of greater than 50 minutes per centimetre. To achieve a normal, in-ground installation, the high groundwater table, rock or soil with a permeability of greater than 50 min/cm must be situated at least 1.5 to 1.8 metres below grade.

The majority of on-site soils were identified to exhibit T-times of between 12 and 35 minutes per centimetre, except for portions of the northwest corner and eastern extremity of the site. Elevated watertable conditions are not anticipated. Therefore, apart from the dense clayey soils in the northwestern corner of the site, in-ground tile beds are considered feasible for the property.

We understand that a total of 125 lots are proposed in total for the subject 14.79ha site. The following provides a basic outline of sewage disposal constraints for the site in the context of the proposed communal sewage system. It is understood that it is proposed to install a 6m wide series of tile beds with three tile runs throughout the site, located mainly along walking trails/paths.

Based on a basic 4-bedroom design sewage flow of 2,000L/day/unit, a total design flow of 250,000 litres per day is specified under the Building Code. The basic sewage loading rate guidelines of the Ontario Building Code are:

T-time of >20 and ≤35 min/cm, loading rate = 8L/m^2/day
T-time of >35 and ≤50 min/cm, loading rate = 6L/m^2/day
T-time of >50 min/cm, loading rate = 4L/m^2/day

It is assumed that standard tile beds will be installed in sewage bed fill (sand) to minimize the required length of sewage tile. If sewage is disposed of in the medium-permeability soils present over much of the development (avoiding the lower permeability soils at the northwestern corner and eastern extremity of the site) a loading rate of 8L/m^2/day can be assumed for discussion purposes and the preliminary contact area will be about 3.1ha.

The total sewage bed area is controlled only by three factors, these being native soil T-time, number of units and design sewage flow. If standard tile beds are proposed, to reduce the size of the required tile bed areas, either the number of units have to be reduced or the design flow reduced by requiring smaller houses.

Options which might be considered by the sewage system engineer to reduce the required sewage disposal area are the use of shallow buried trenches or engineered filter beds. As the sewage will be treated in a communal system, shallow buried trenches and filter beds may be technically feasible.

For shallow buried trenches, based on the use of the formula L=Q/50 (updated Building Code Requirement), total trench length would be about 5,000m. Based on a 3-tile layout, about 1,667m of a 6m wide shallow buried trench allotment is required, for an estimated total footprint of about 1.0ha. We recommend that if this option is to be considered further, a specialist in large scale applications of shallow buried trenches be consulted to determine the feasibility of this option.

For engineered filter beds, with treated sewage, the effective area under the Code is not to exceed 100L/m^2/day. Therefore, with a design flow rate of 250,000 litres per day, the total effective area required for filter beds would be about 0.25ha. This does not include the required separation between filter bed cells (5m between pipes) or contact area. As with the shallow buried trenches, we recommend that if this option is to be considered further, a specialist in large scale applications of engineered filter beds be consulted to determine the feasibility of this option.

Site-specific test pits are strongly recommended at the sewage system approval stage to ensure that actual soils conditions at tile beds are identified for design purposes.

4.0 PRELIMINARY REASONABLE USE ASSESSMENT

The Ministry of the Environment (MOE) Reasonable Use Concept (RUC) is applicable to the assessment of impact of large sewage disposal systems (i.e. >10,000 litres per day design capacity), which would include the proposed future system on the site. MOE Guideline B-7 and Procedure B-7-1 outline details of the Ministry's RUC. The critical groundwater contaminant in the context of the RUC is nitrate. The effect of the RUC is to require the nitrate content of groundwater at the downgradient property line not to exceed 25% of the difference between background and the Ontario Drinking Water Standard (10 mg/L).

Due to very low watertable conditions, none of the test pits encountered groundwater. The watertable surface is likely situated in excess of 20 to 30m below grade. For the purposes of this preliminary evaluation, a background nitrate level of 1mg/L is assumed, given the absence of urban development nearby upgradient (east and northeast) of the site. With this assumed background nitrate content, the nitrate content of groundwater at the downgradient property boundary can be increased to about 3.25mg/L under the RUC. The final RUC evaluation will require the completion of deep boreholes to establish background water quality, confirm directions of flow of the watertable and establish the rate of groundwater flow for use as a dilutant for sewage.

To calculate the potential impact of the proposed communal sewage system on the nitrate content of groundwater at the downgradient property line, a dilution model utilizing the volume of infiltrating precipitation within the possible mixing zone (the entire property, due to the distribution of tile beds), upper groundwater flow within the possible mixing zone and on-site sewage is proposed.

To establish the infiltration rate, the percentage of the local water surplus which may infiltrate is calculated using the Rational Method approach. According to the soil evaluation, the soil profile consists mainly of a silty sand glacial till with some minor lower-permeability soils in the northwestern and eastern extremities (infiltration factor 25%), the relief is flat to rolling (infiltration factor 20%) and the cover is mainly cleared (infiltration factor 10%), all resulting in an infiltration factor of 55%. According to a Thornwaite calculation of the average annual water surplus provided by Environment Canada, the average annual water surplus in the Barrie area is 341mm (see appendix).

As such, the annual infiltration rate will be 188mm (55% of 341mm), representing 21% of average annual precipitation at the Midhurst weather station (914.2 mm). This value should be reduced by 10% to account for future impervious areas (i.e. roads, roofs, etc...) to 169mm. Accordingly, $2.5x10^7$ litres of water will join the shallow groundwater regime annually on-site.

According to the Midhurst Settlement Capability and Servicing Option Study, groundwater flow within the upper aquifer is west to southwestward in the area. Groundwater flow through the upper aquifer (identified in the Midhurst study as A-1), assuming a preliminary mixing zone of 5m depth, a perpendicular width of about 600m, a gradient of 0.02 (per the Midhurst Study) and a coefficient of permeability of $1x10^{-2}$ cm/sec (assumed, to be confirmed by borehole completion), will be approximately $1.9x10^8$ L/year. This flowthrough is assumed to contain an average of 1mg/L nitrate (to be confirmed), for a total input of $1.9x10^8$ mg of nitrate per year.

To determine the degree of treatment required to achieve a nitrate content of 3.25mg/L at the downgradient property line, the following mass balance approach is proposed:

Nitrate sources:

Sewage:	$9.1x10^7$L/year at nitrate concentration "C_s" (2000L/day/lot)
Groundwater:	$1.9x10^8$ mg/year (assumed)

Dilution Sources:

Sewage	$9.1x10^7$L/year
Infiltration:	$2.5x10^7$ L/year
Groundwater Flow:	$1.9x10^8$ L/year
Total:	$3.1x10^8$ L/year

The required degree of treatment can be determined using the mass-balance formula:

Impact = Nitrate sources ÷ Dilution sources

Therefore:

$$3.25\text{mg/L} = (9.1x10^7\text{L/year} \times C_s + 1.9x10^8\text{ mg/year}) \div 3.1x10^8\text{ L/year}$$

$$C_s = 8.98\text{mg/L}$$

Therefore, based on the preliminary assumptions outlined above, the sewage treatment system serving the proposed 125 lots will be required to reduce the nitrate content of sewage to 8.98mg/L, or lower, to meet the Ministry of the Environment's Reasonable Use Concept.

5.0 CONCLUSIONS AND RECOMMENDATIONS

1. The predominant soil type on the site is a silty sand glacial till. A small area of dense clayey silt and sand was identified in the northwestern corner and eastern extremity of the site.

2. The watertable surface was not encountered during the test pit program and, based on local geology, is likely situated at least 20 to 30 metres below grade.

3. Site-specific test pits are strongly recommended at the sewage system approval stage to ensure that soils conditions along the proposed routing of the tile bd system are confirmed for design purposes.

4. Fully in-ground sewage disposal systems are likely to be viable over much of the site. The small area of dense, low permeability soils in the northwestern corner of the site should be avoided for tile bed installation.

5. A discussion on tile bed options is outlined in Section 3.3 of this report, but based on the areas identified for sewage disposal, shallow buried trenches or filter beds may be required. A specialist in large scale applications of engineered filter beds be consulted to determine the feasibility of these options.

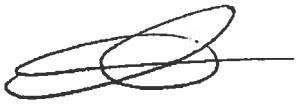
6. Under the current Ministry of the Environment Reasonable Use Concept, preliminary information suggests that sewage treatment will be required to reduce the nitrate content of sewage to 8.98mg/L or lower for the 125 proposed units. A borehole evaluation will be required prior to finalizing the Reasonable Use Assessment to confirm background nitrate levels, directions of groundwater flow and rates of groundwater flow.

7. According to the March 2004 document "Midhurst Secondary Plan - Settlement Capability and Servicing Option Study" prepared by Dixon Hydrogeology Limited, two deep aquifers (lower overburden), known to be capable of substantial yields in the Midhurst/Barrie corridor, may extend to the Gill Road Area north of Midhurst. As such a potential may exist for the completion of a high capacity municipal well in the area of Gill Road, but this must be confirmed through test drilling.

6.0 STATEMENT OF LIMITATIONS

This report was prepared solely to provide conclusions regarding the general suitability of shallow soil and groundwater conditions for sewage disposal and the density of development allowable under current Ministry of the Environment Risk Assessment Guidelines. No conclusions should be drawn from this report regarding the viability of residential development on the subject parcel of land as it relates to any other factors (e.g. water supply, drainage, slope stability, load-bearing engineering, biology, etc...).

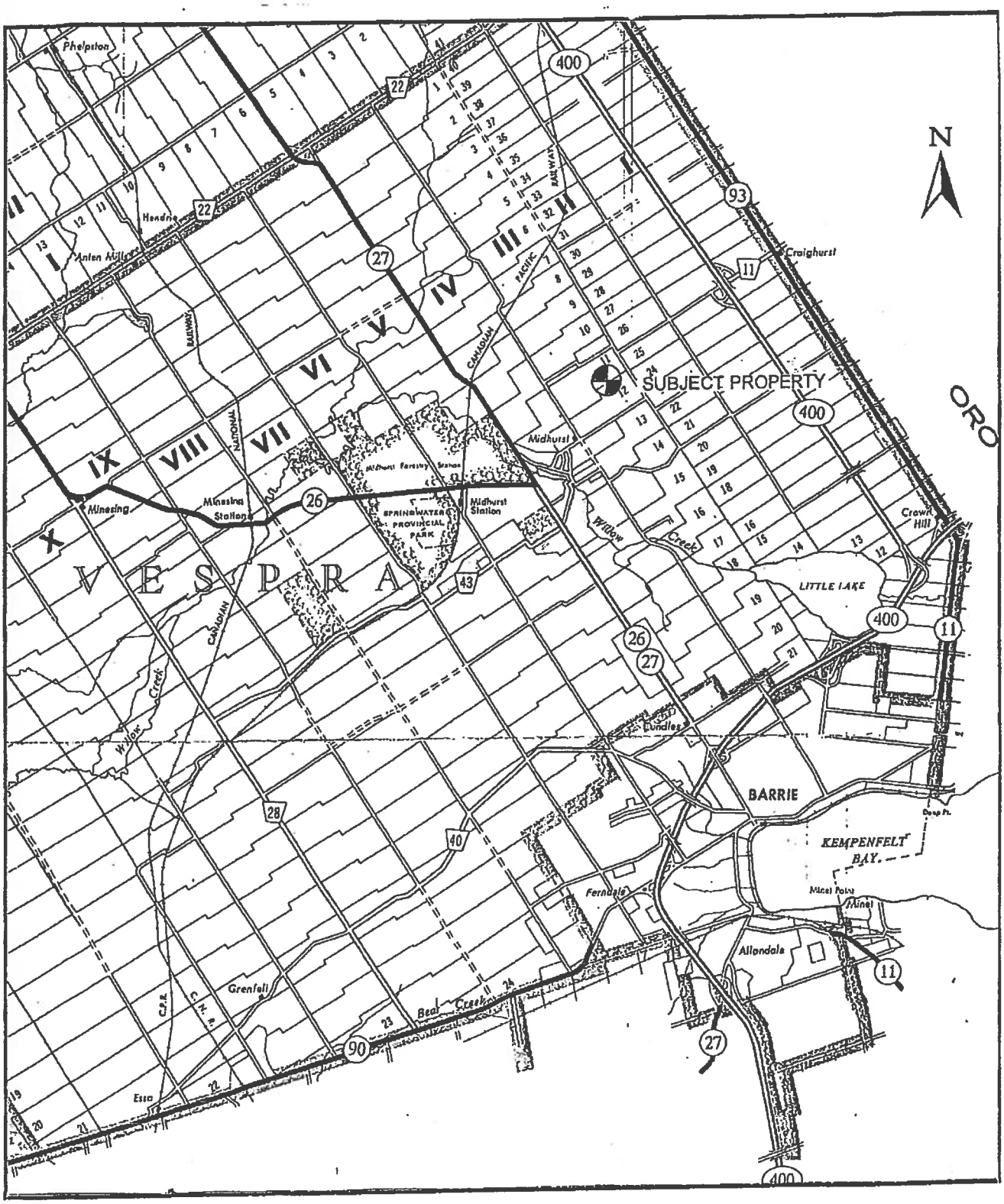
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Geoffrey Rether, P.Geo.

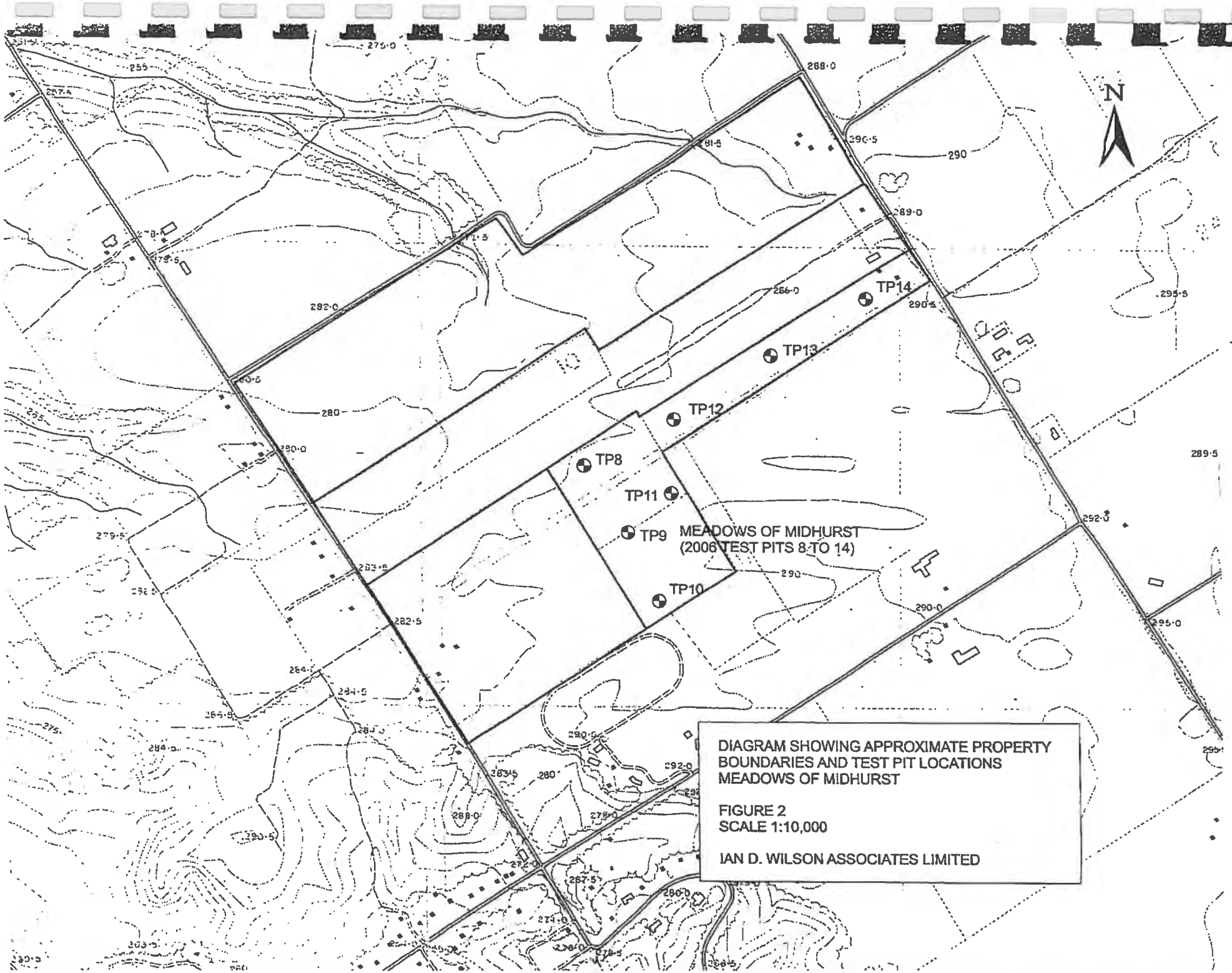
May 26, 2006
Revised December 6, 2006

FIGURES AND APPENDIX



GENERAL LOCATION OF MEADOWS OF MIDHURST PROPERTY

SCALE 1:100,000 FIGURE 1


N
TP14
TP13
TP12
TP8
TP11
TP9
TP10
MEADOWS OF MIDHURST
(2006 TEST PITS 8 TO 14)
DIAGRAM SHOWING APPROXIMATE PROPERTY BOUNDARIES AND TEST PIT LOCATIONS MEADOWS OF MIDHURST
FIGURE 2
SCALE 1:10,000
IAN D. WILSON ASSOCIATES LIMITED

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS

Note: Test Pits are numbered 8 through 14, completed in conjunction with test pit programs on adjacent properties

TP8	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.9	grey, dense, dry clayey silt with traces of fine sand
	0.9 - 1.7	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 1 - 0.6m
  Clay - 30%
  Silt - 65%
  Sand - 5%

TP9	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.0	grey-brown, compact, dry silty SAND with traces of clay (till)
	1.0 - 1.7	grey-brown, lightly compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

---

TP10	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.0	brown, compact, dry silty SAND
	1.0 - 1.7	grey-brown, loose, dry SAND

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 2 - 0.6m
  Clay - 0%
  Silt - 20%
  Sand - 80%

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP11	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

---

TP12	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.6	grey-brown, lightly compact, dry silty SAND with traces of clay (till)
	0.6 - 1.8	light brown, compact, dry silty SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 3 - 1.0m
  Clay - 10%
  Silt - 35%
  Sand - 55%

TP13	0 - 0.2	dark brown cultivated TOPSOIL
	0.2 - 0.6	red-brown, lightly compact, dry silty SAND
	0.6 - 1.5	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 4 - 0.5m
  Clay - 0%
  Silt - 26%
  Sand - 74%

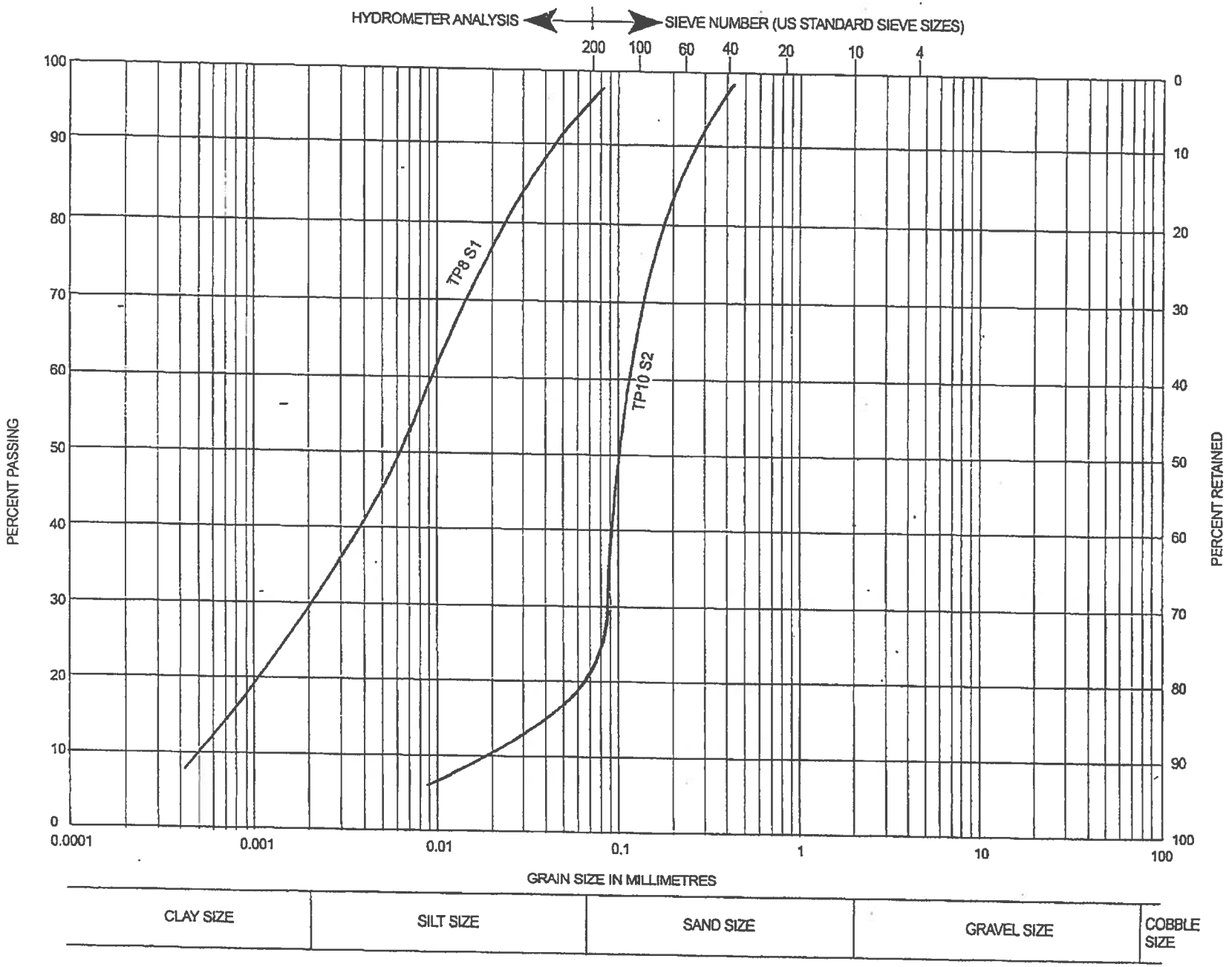
TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP14	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.9	grey-brown, very compact, dry silty SAND with some clay (till)
	0.9 - 1.5	brown, very compact, dry silty SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 5 - 0.5m
  Clay - 12%
  Silt - 39%
  Sand - 49%

GRAIN SIZE DISTRIBUTION CHART

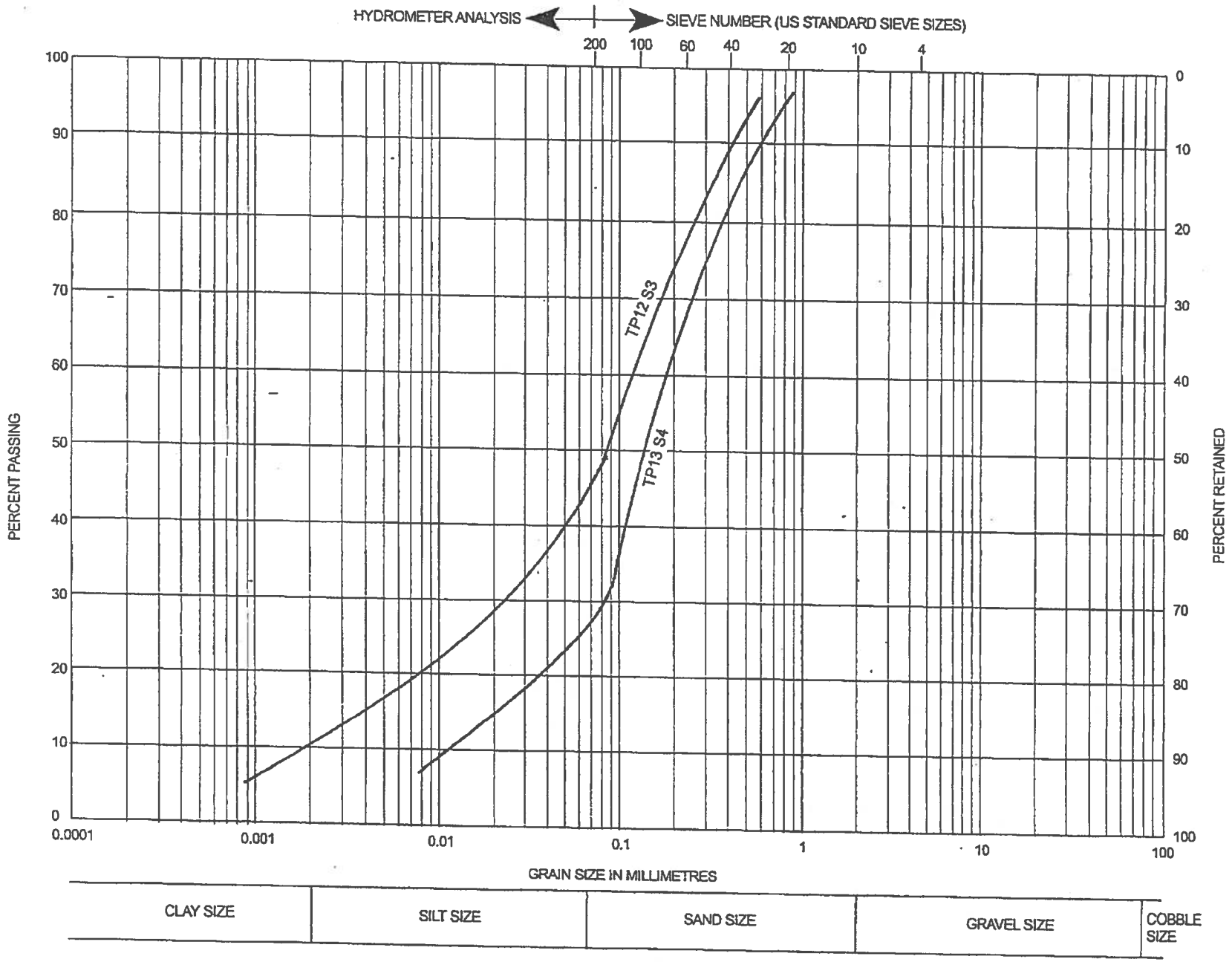
PROJECT / SAMPLE	Meadows of Midhurst - Test Pits 8 and 10	DATE



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GRAIN SIZE DISTRIBUTION CHART

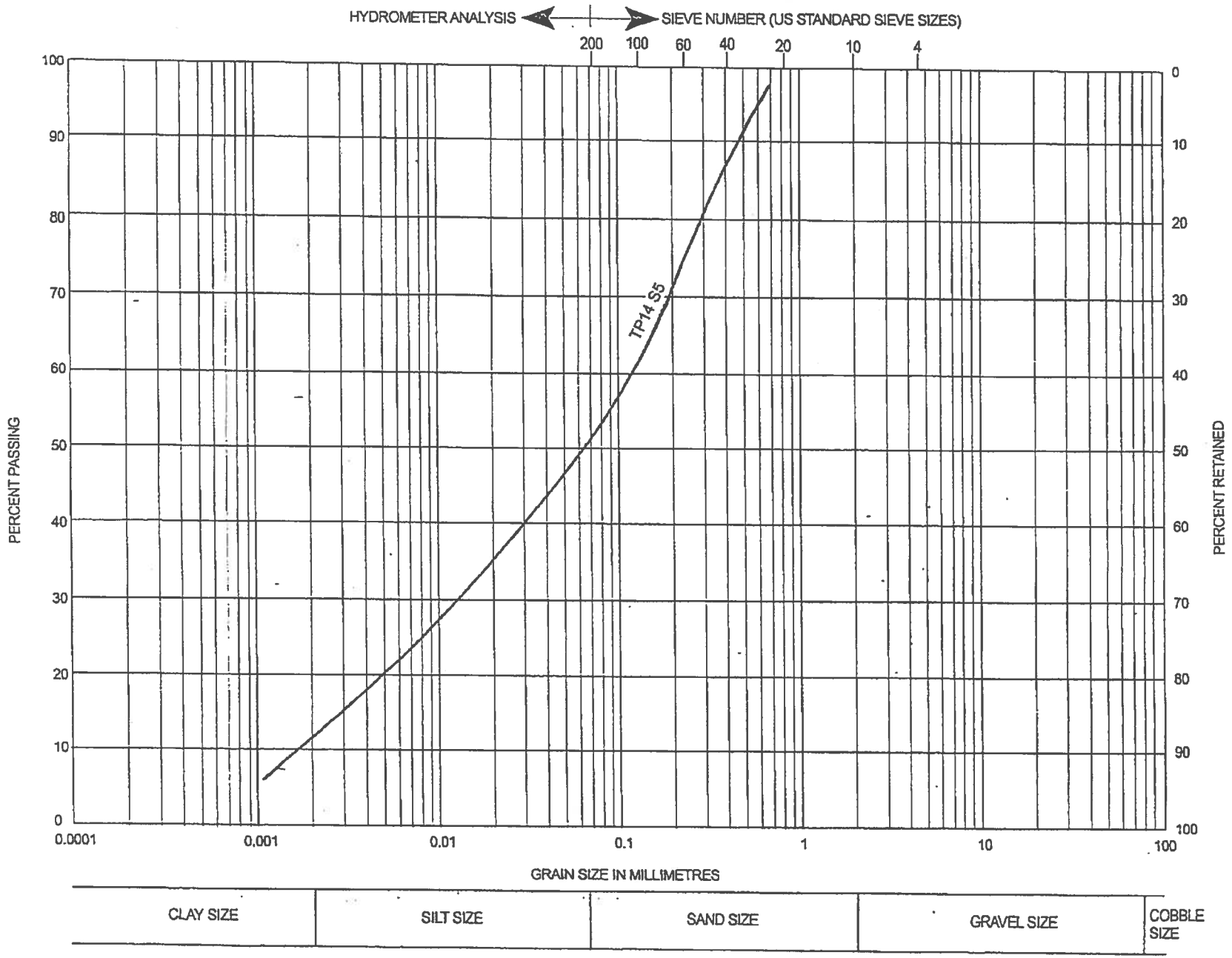
PROJECT / SAMPLE	Meadows of Midhurst - Test Pits 12 and 13	DATE



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GRAIN SIZE DISTRIBUTION CHART

PROJECT / SAMPLE	Meadows of Midhurst - Test Pit 14	DATE



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LAT.... 44.38 WATER HOLDING CAPACITY...150 MM HEAT INDEX... 35.04
LONG... 79.68 LOWER ZONE..... 90 MM A..... 1.055

DATE	TEMP (C)	PCPN	RAIN	MELT	PE	AE	DEF	SURP	SNOW	SOIL	ACCUM PCPN
31- 1	-9.2	114	10	8	0	0	0	14	132	145	330
28- 2	-7.4	47	12	35	1	1	0	44	133	146	377
31- 3	-2.3	66	31	90	6	6	0	111	78	150	449
30- 4	5.5	61	59	79	31	31	0	107	0	150	510
31- 5	12.2	75	75	0	75	75	0	11	0	138	585
30- 6	16.8	76	76	0	106	106	0	0	0	108	662
31- 7	20.5	76	76	0	133	124	-8	0	0	60	743
31- 8	19.2	97	97	0	115	104	-12	0	0	53	838
30- 9	14.8	98	98	0	76	72	-4	19	0	60	937
31-10	8.3	80	80	0	38	37	0	4	0	99	81
30-11	2.3	73	65	8	11	11	0	23	0	138	159
31-12	-3.9	84	27	16	2	2	0	32	42	147	238
AVERAGE	6.4 TOTAL	948	706	236	594	569	-24	365			

SSION C	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
IPALITY CODE 57016 (CONTINUED...)															
			6218 4925960												BRWN MSND 0012 GREY SILT CLAY 0036 GREY CLAY 0089 BRWN CLAY MSND GRVL 0114 GREY CLAY GRVL 0121 BRWN MSND CLAY 0140 BRWN MSND CLAY GRVL 0165 BRWN MSND GRVL 0171 BRWN MSND 0203 (S 0176 20) BRWN MSND
3	8	57- 4596	599870 4924752	800	11/65	3203	4	FR	20	18	40	15	1/00	ST DO	CLAY GRVL 0206 OBRICK M
3	10	57- 4597	601555 4924563	935	04/66	3203	5	FR	76	74	90	7	2/00	ST DO	PRDG 0020 FSND 0070 (S 0066 04) AIKINSON G
3	10	57- 4598	600341 4924018	910	07/60	1510	4	FR	152	120	125	15	2/00	ST DO	TPSL 0001 BRWN CLAY 0037 BRWN MSND 0070 FSND 0076 FSND MSND 0106 (S 0104 03) FSND 0109 CARSON E
3	10	57- 4599	601576 4924473	935	09/66	1510	4	FR	130	130	142	10	2/00	ST DO	BRWN CLAY BLDR 0030 WHIT CLAY HPAN 0100 FSND 0110 BLUE CLAY 0140 CSND 0160 (S 0152 08) RUSSEL L
3	10	57- 8342	601370 4924900	925	10/71	1510	4	FR	173	138	138	10	1/30	ST DO	TPSL 0003 HPAN 0030 CSND 0170 (S 0166 04) WRIGHT G
3	11	57- 4600	601657 4924353	935	06/66	1510	4	FR	200	140	145	10	2/00	ST DO	PRDG 0006 RED SAND CLAY 0120 GREY HPAN 0150 CSND MSND 0173 RUSSELL H
3	11	57- 6542	601650 4924410	935	08/69	1510	4	FR	180	135	155	10	2/00	ST DO	TPSL CLAY TPSL 0002 BRWN CLAY STNS 0085 HPAN STNS 0140 FSND 0185 MSND 0200 (S 0193 07) RUSSELL WAYNE
3	11	57- 18864	601950 4923950	950	06/93	2514	6	FR	193	134	145	10	1/30	DO	TPSL CLAY 0002 CLAY STNS 0015 CSND 0115 MSND 0180 (S 0175 05) COOK P
3	12	57- 4601	601342 4922727	910	06/60	1510	4	FR	94	64	84	5	2/00	DO	BRWN CLAY 0019 BRWN CLAY GRVL 0153 BLUE CLAY 0193 YLLW SAND 0201 (S 0198 03) NASH D
3	12	57- 4602	600050 4923320	930	06/65	1510	4	FR	150	130	139	10	2/00	ST DO	RED MSND 0025 GRVL 0075 CSND 0094 (S 0090 04) GILL D
3	12	57- 4603	601352 4922697	910	05/66	1510	4	FR	170	130	145	5	2/00	DO	PRDG 0010 FSND 0150 CSND 0170 (S 0166 04) NASH D
3	12	57- 5929	602270 4923270	950	04/70	1510	4	FR	170	165	165	10	2/00	ST DO	TPSL 0002 CLAY MSND STNS 0045 HPAN 0110 MSND 0170 (S 0161 04) DOUG FERRIS
3	12	57- 6821	602100 4923290	950	09/69	1510	4	FR FR	145 180	150	170	4	1/00	ST DO	BRWN CLAY TPSL 0003 GREY MSND 0120 GREY FSND 0170 GREY CSND 0180 (S 0172 04) (S 0176 04) FRANKUM CECIL
3	12	57-	601350	950	01/75	1452	4	FR	120	153	159	5	2/00	ST DO	TPSL CLAY 0002 CLAY MSND 0011 CSND 0114 FSND 0145 CSND 0180 (S 0176 04) FRANKHURST STABLES

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UTM CSG KIND WATER STAT PUMP TEST TEST

CONCESSION ETC	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
MUNICIPALITY CODE 57016 (CONTINUED...)															
															0118 03)
CON	4	9	57- 19100	600050 4924200	850	07/83	3135	5	FR	112	76	95	10	1/00	DO SUNDOL WOOD EST SAND CLAY DRY 0072 CLAY 0112 SAND 012 (S 0120 03)
CON	4	10	57- 4629	599833 4922904	825	09/64	1510	4	FR	45	30	42	4	8/00	DO CAMERON A BRWN CLAY MSND 0004 HPAN 0045 FSND 005 (S 0046 04)
CON	4	10	57- 4630	599564 4923133	790	07/66	4608	30	FR	43	43		2		DO JONES J FSND 0053
CON	4	10	57- 6051	599850 4922780	820	05/68	1510	4	FR	65	45	55	10	2/00	DO CAMERON L TPSL MSND 0001 RED MSND STNS 0058 CSN 0065 (S 0061 04)
CON	4	10	57- 7494	599830 4922750	800	09/70	1510	4	FR	50	40	45	5	1/00	DO POTTER BILL RED MSND 0030 GREY CSND GRVL 0050 CSN 0065 (S 0060 04)
CON	4	10	57- 10099	599900 4922579	800	06/73	1510	4	FR	60	40	40	10	2/00	DO DUNLOP J H BRWN TPSL 0004 BRWN SAND 0070 (S 006 05)
CON	4	10	57- 10336	600540 4923600	900	08/73	3203	5	FR	122	100	130	8	1/30	DO VANDERMUELEN A BRWN SAND CLAY STNS 0068 BRWN CLAY 012 BRWN SAND 0162 (S 0159 03)
CON	4	10	57- 11846	599900 4922600	780	10/74	4816	6	FR	66	35	54	5	2/00	DO DELAAT R SAND GRVL 0035 SAND CMTD 0050 FSND 006 (S 0058 04)
CON	4	10	57- 13313	599840 4922710	800	07/76	1204	5	FR	55	49	65	6	1/00	DO MCLENNAN DON BRWN SAND GRVL BLDR 0039 BRWN SAND CLA DRTY 0055 BRWN FSND 0081 (S 0078 03
CON	4	10	57- 13838	600540 4923600	900	09/76	1204	5	FR	160	117	140	6	1/00	DO WOOD FRANK BRWN SAND CLAY 0045 BRWN SAND 0097 GRE SAND CLAY 0130 BRWN SAND 0164 (S 016 03)
CON	4	11	57- 4631	600578 4923533	905	01/52	5510	4	FR	147	121	124	46	/30	DO PRICE W TPSL 0004 CLAY STNS 0014 MSND CLAY 004 MSND 0089 CLAY 0108 CLAY MSND 0141 MSN 0157 (S 0143 14)
CON	4	11	57- 4632	600899 4923043	940	04/56	1637	4		DRY					WOODS V TPSL 0006 GRVL 0064
CON	4	11	57- 4634	600328 4922345	800	11/61	1510	4	FR	92	68	74	15	2/00	PS VESPRA SCHOOL BOARD GRVL MSND STNS 0013 HPAN BLDR 0045 BLU CLAY STNS 0085 HPAN STNS 0092 GRVL 009 (S 0092 06)
CON	4	11	57- 4637	600942 4922992	935	06/64	1510	4	FR	140	140	146	10	1/00	DO CHRISTIE G BRWN CLAY 0004 GRVL HPAN 0164 CSND 016 (S 0164 04)
CON	4	11	57- 4638	600575 4923490	910	10/66	4715	4	FR	129	120	125	5	2/00	ST DO STOER I PROD 0008 CLAY MSND 0129 FSND 0150 (S 0147 03)
CON	4	11	57-	601053	860	12/47	2514	6	FR	29	15	32	4	2/00	DO ADAIR W

- CONTINUED

SION	LOT	WELL NO	UTM EASTING NORTHING	ELEV FEET	DATE	DRILLER	CSG DIA INS	KIND OF WATER	WATER FOUND FEET	STAT LVL FEET	PUMP LVL FEET	TEST RATE GPM	TEST TIME HR/MN	WATER USE	OWNER/LOG/SCREEN DEPTHS IN FEET TO WHICH FORMATIONS EXTEND
CPALITY CODE 57016 (CONTINUED...)															
			4639 4922580												TPSL MSND 0001 YLLW MSND BLDR 0032 (S 0029 03) FSND CLAY 0042 BRWN CLAY 0048
4	11	57- 6061	600810 4922460	850	12/68	1510	4	FR	65	30	50	11	1/00	CO	MIDHURST COMM HALL TPSL 0005 BRWN CLAY MSND 0040 FSND 0050 CSND 0065 (S 0061 04)
4	11	57- 7750	600730 4923300	920	10/70	1510	4	FR	155	135	135			ST DO	COOMBES M CLAY TPSL 0002 BRWN CLAY STNS 0082 HPAN STNS 0120 RED MSND 0150 MSND 0165 (S 0159 06)
4	11	57- 8014	600700 4923350	915	06/71	3203	4	FR	163	138	140	6	1/30	DO	FIRTH BLCK TPSL 0001 YLLW CLAY 0010 GREY CLAY STNS 0032 GREY SAND GRVL 0041 BRWN CLAY 0053 BRWN SAND 0093 BRWN CLAY 0120 BRWN CLAY SAND 0128 BRWN SAND 0163 (S 0160 03)
4	11	57- 8825	600030 4922600	790	05/72	3414	6	FR	211	43	150	8	2/00	DO	NEWMAN C TPSL 0001 CLAY SAND GRVL 0070 CLAY 0150 SILT 0205 MSND 0211 (S 0207 04)
4	11	57- 9392	600370 4922200	775	11/72	2514	6	FR FR	89 95	56	88	9	1/30	DO	THE CORKERS LTD BRWN SAND GRVL BLDR 0085 SAND GRVL 0095 (S 0089 03) (S 0092 03)
4	11	57- 9393	600350 4922190	775	10/72	2514	6	FR FR	98 102	60	98	4	3/30	DO	SHUTE K BRWN SAND GRVL 0002 GREY SAND 0005 BRWN SAND GRVL CLAY 0098 BRWN SAND GRVL SILT 0102
4	11	57- 11276	600138 4922197	775	07/74	1413	5	FR	104	64	82	5	2/00	DO	GRAVES A GRVL 0035 GREY CLAY STNS 0085 GREY SAND 0104 (S 0099 04)
4	11	57- 11277	600131 4922194	775	07/74	1413	5	FR	105	63	80	6	2/00	DO	GRAVES C BRWN SAND GRVL 0040 BLUE CLAY SAND 0080 BRWN SAND 0105 (S 0101 04)
4	11	57- 12500	600150 4922300	775	07/75	5206	5	FR		60		30		DO	DEVRIES H BRWN SAND BLDR 0030 GRVL CLAY 0104 (S 0095 03)
4	11	57- 16745	600250 4922250	750	07/79	2514	6	FR	96	47	95	4	1/30	DO	SHUTE J YLLW SAND 0078 YLLW SAND CLAY 0096 YLLW SAND 0101 (S 0098 03)
4	12	57- 4633	600700 4922362	825	01/59	1510	2	FR	40	40	44	7	3/00	DO	BERTRAM L CLAY 0040 CSND 0065
4	12	57- 4635	600605 4922132	785	08/62	1510	4	FR	84	54	60	35	2/00	DO	BERTRUM J MSND GRVL 0015 HPAN MSND 0084 CSND 0090 (S 0086 04)
4	12	57- 4636	600498 4922241	808	03/64	1510	4	FR	75	55	65	3	2/00	PS	ANGLICAN CHURCH RED MSND STNS 0010 MSND CLAY STNS 0055 HPAN 0075 GRVL 0083
4	12	57- 4640	600500 4921665	780	07/51	5510	4	FR	72	44	49	4	1/30	DO	PEACOCK B FSND 0005 MSND GRVL 0024 MSND 0082 (S 0068 10)
4	12	57-	600348	780	09/53	1677	2	FR	52	24	34	5	1/00	DO	MASON R

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CONSOLIDATED HYDROGEOLOGIC EVALUATION
PROPOSED RESIDENTIAL DEVELOPMENT
MIDHURST ROSE ALLIANCE
TOWNSHIP OF SPRINGWATER (VESPRA)

1.0 INTRODUCTION

It is proposed to develop a residential subdivision on a 157.6 hectare parcel of land located in parts of Lots 11 and 12, Concession 3, and part of Lot 11, Concession 4, Township of Springwater (former Vespra). Figures 1 and 2 show the location of the proposed development.

It is proposed to service the subdivision with communal sub-surface treated sewage disposal systems, with the tile beds distributed throughout the property adjacent to various roadways, walking trails and paths. The subdivision will be supplied with water through an on-site communal water well system currently under development.

The majority of the site (152.5ha, referred to as the main parcel) is mainly bounded the block formed by Gill Road to the west, Doran Road to the south, Russell Road to the east and Craig Road to the north. A small portion of the development (5.11ha) extends to the west of Gill Road (referred to as the west parcel), to the south of the Road Allowance between Lots 10 and 11 (Craig Road).

The main parcel exhibits a generally flat relief which is interrupted by two northwest-trending, moderately incised, dry valleys in the far north-central and north-eastern portions of the site. The overall slope of the main parcel is towards the two valleys or to the north or northwest. The west parcel exhibits a hilly relief dominated by three northwest-trending, deeply incised, dry valleys. The main parcel is mostly cleared and is typically in active agricultural use, except for small forested areas in the north-central and northeastern portions of the site. The west parcel is mainly reforested. Lands surrounding the site are mainly in agricultural use or are undeveloped. Scattered rural residences are located along Gill Road and along Russell Road.

Although local National Topographic Series and Ontario Base Maps indicate that streams are situated in the base of some of the on-site valleys, the valleys have been observed to be dry on all site visits. Based on downgradient observation from Gill Road and extrapolation of the watertable surface (See Section 3.4.2), permanent streams are indicated to rise in the valleys near Gill Road approximately 1km to the northwest of the site.

Several general soil and shallow groundwater investigations were conducted over most parts of the site through the completion of thirty eight backhoe test pits during December 2004 and January 2006. Four deep test holes were drilled to the watertable surface during January, February and March 2008 to obtain information regarding the receiving aquifer. Eleven site-specific exploratory boreholes were completed in March 2008 to obtain subsurface information along proposed communal tile bed corridors. This

report provides a summary and consolidation of the various field investigations and soils analyses, details of communal sewage system disposal constraints, and the results of a development impact analysis following the guidelines of the Ministry of the Environment Reasonable Use Concept (RUC) as applicable to development utilizing communal sewage disposal systems.

2.0 GEOLOGY AND HYDROGEOLOGY

All subject lands are situated within the Simcoe Uplands physiographic region of southern Ontario, being separated from the Simcoe Lowlands by the Algonquin Bluff which is situated nearby to the north and northwest. The Uplands are characterized by a series of broad, rolling till plains (which were once islands in glacial Lake Algonquin) separated by steep-sided, flat-floored valleys. The Ontario Geological Survey "Surficial Geology of Southern Ontario" describes the upper soils over the site as sandy silt to silty sand glacial till with some older alluvial deposits of clay, silt, sand and gravel. The Soil Survey of Simcoe County describes the upper soils as primarily sandy loam belonging to the Vasey or Dundonald Soil Series, with some Tioga Soil Series loamy sand within the west parcel.

According to area water well records, the upper overburden consists of fine-grained deposits described as clay overlying a variable deposit consisting of sand to a gravelly clay. Where present, the granular deposits in the upper overburden appear to be dry, as indicated by a 19.5m deep well nearby to the southwest, reported as dry in gravel. Reported local wells are typically completed in an intermediate-depth granular deposit situated at a depth of about 55 to 60 metres below grade. Static water levels in these wells are very low, in the range of 40 metres below grade, consistent with the highland setting atop the Algonquin Bluff nearby to the northwest.

No local wells have fully penetrated the overburden and little local information is available regarding the lower overburden. However, according to the March 2004 document "Midhurst Secondary Plan - Settlement Capability and Servicing Option Study" prepared by Dixon Hydrogeology Limited, two deep aquifers (lower overburden), known to be capable of substantial yields in the Midhurst/Barrie corridor, may extend to the Gill Road Area north of Midhurst.

According to Ministry of the Environment Map 3135-7 "Bedrock Lithology and Topography, County of Simcoe, Southern Portion", the overburden is approximately 160 metres deep.

The bedrock beneath the site is described as limestone, dolostone and shale of the Middle Ordovician Simcoe Group of Rock.

Groundwater in viable quantities is obtained from granular formations within the overburden (i.e. sands and gravels) or from well fractured zones in the bedrock. According to local water well records, the vast majority of local wells are completed in an upper aquifer situated within intermediate-depth overburden granular deposits. The

Midhurst Settlement Capability and Servicing Option Study completed in 2004 suggests that one or two aquifers with high yield potential may be present in the lower overburden in the vicinity of Gill Road at the north end of Midhurst. These deep aquifers, identified as aquifers A3 and A4, are the target aquifers for the development's water supply, and good potential for the presence of the upper deep aquifer has been identified in a test hole at the northeastern corner of the site (see Section 6.0). The bedrock is not locally utilized as a source of water due to the likelihood of obtaining low yields of aesthetically poorer water and the high cost of drilling to the bedrock. Based on the geologic setting, shallow bored or dug wells will not be viable in the vicinity of the site.

3.0 SUBSURFACE INVESTIGATIONS

3.1 Test Pits:

Thirty eight test pits (numbered TP1 to TP21, TPN1 to TPN14 and TPW1 to W3) were excavated using backhoe equipment on December 8, 2004 and January 27, 2006. The soil profile was logged in each hole and representative soil samples were collected from each identified soil horizon for subsequent classification, analysis and storage. Figure 2 shows the approximate test pit locations. The following table provides a summary of the analytical results for selected, representative soil samples.

Table 1 : Summary of Test Pit Soil Analytical Data

Location/ Sample	Depth (m)	Grain-Size Distribution			"K" (cm/sec)	T-Time (min/cm)
		Clay %	Silt %	Sand %		
1/1	0.9	24	64	12	10^{-7}	>50
3/2	0.7	12	40	48	$3X10^{-6}$	40 to 45
5/3	0.7	4	39	57	$3X10^{-5}$	25 to 30
6/4	0.5	9	27	64	$8X10^{-6}$	35 to 40
8/5	0.6	30	65	5	10^{-7}	>50
10/6	0.6	trace	20	80	$5X10^{-4}$	12 to 15
12/7	1.0	10	35	55	$9X10^{-6}$	30 to 35
13/8	0.5	trace	26	74	$1X10^{-4}$	15 to 18
14/9	0.5	12	39	49	$3X10^{-6}$	40 to 45
15/10	0.6	9	33	58	$1X10^{-5}$	30 to 35
18/11	0.3	5	27	68	$3X10^{-5}$	25 to 30
19/12	0.5	4	36	60	$2X10^{-5}$	25 to 30

20/13	0.8	16	42	42	10^{-7}	>50
21/14	0.6	traces	33	67	$5X10^{-5}$	25 to 30
N1/15	1.3	0	8	92	$6X10^{-3}$	8 to 10
N4/16	1.0	3	29	68	$5X10^{-5}$	25 to 30
N5/17	0.6	3	18	79	$3X10^{-4}$	12 to 15
N7/18	1.0	12	40	48	$4X10^{-6}$	40 to 45
N8/19	0.6	10	48	42	$5X10^{-6}$	40 to 45
N9/20	0.5	3	37	60	$4X10^{-5}$	25 to 30
N13/21	1.1	8	31	61	$1X10^{-5}$	20 to 25
N14/22	0.5	22	52	26	10^{-7}	>50
W1/23	0.5	5	30	65	$3X10^{-5}$	30 to 35
W2/24	0.7	4	29	67	$5X10^{-5}$	25 to 30
W3/25	1.1	8	34	58	$1X10^{-5}$	30 to 35

Note: The above coefficients of permeability ("k" values) and T-times (percolation rates) are estimates based on field observation, laboratory grain-size analysis, experience with similar soils and guidelines of the Ontario Building Code.

Consistent with geologic mapping, the predominant soil type on-site is a silty sand glacial till. This soil exhibits a moderate permeability with a T-time in the range of 25 to 40 minutes per centimetre. A discontinuous, very compact to dense clayey silt was encountered mostly in test pits located in the northwestern portions of the site (TP1, TP3, TP8, TP20, TPN11, TPN12, TPN13 and TPN14), but was also found in a small area at the extreme eastern end of the site (TP14). The T-time of this soil is estimated to range between 40 minutes per centimetre to in excess of 50 minutes per centimetre in the vicinity due to high density and clay content.

3.2 Test Pit Shallow Groundwater Conditions:

No shallow groundwater or evidence of shallow groundwater (i.e. soil discolouration or mottling) was encountered in any of the thirty eight test pits, including Test Pit N10 which was located at the base of the north-central valley on the site. As discussed in Section 2.0, local well records indicate that static water levels in wells are in excess of 30 metres below grade and that a nearby well completed to a depth of 19.5m below grade was dry. As such, based on the highland setting atop the nearby Algonquin Bluff and local geology, seasonally elevated watertable conditions are not anticipated. The watertable surface will likely be in excess of 20 to 30 metres below grade.

It was noted on December 8, 2004 that in the vicinity of Test Pits N11 through N14, where the upper soils consist of lower-permeability materials, perched surface water was present. This condition is caused by the relatively low permeability of soils in this area is likely temporary following significant precipitation or snow melt.

3.3 Borehole Evaluation:

On March 20 and 21, 2008, eleven intermediate-depth (9.1m) exploratory boreholes (BH1 through BH11) were completed at regular intervals along the proposed subsurface sewage disposal corridors using a power auger machine equipped with hollow-stem, continuous flight augers operated by Canadian Soil Drilling. Soil samples were observed continuously using drilling cuttings and at 1.5m intervals using a standard split-spoon sampling apparatus over a drive length of 0.6m. Figure 3 shows the approximate borehole locations. As the boreholes, including the borehole for Monitoring Well 4 (see below), were completed to provide information in support of tile bed design, all samples from the 1.5m and 3.0m depth interval (6.0m depth at BH2) were subjected to grain-size analysis. The following table provides a summary of the borehole soil sample analytical results:

Table 2 : Summary of Borehole Soil Analytical Data

Location/ Sample	Depth (m)	Grain-Size Distribution			"k" (cm/sec)
		Clay %	Silt %	Sand %	
BH1/S26	1.5	8	29	63	$5x10^{-5}$
BH1/S27	3.0	7	31	62	$8x10^{-5}$
BH2/S28	1.5	23	47	30	$1x10^{-6}$
BH2/S29	6.0	0	8	82 (10% gravel)	$6x10^{-3}$
BH3/S30	1.5	6	30	64	$8x10^{-5}$
BH3/S31	3.0	35	58	7	10^{-7}
BH4/S32	1.5	14	36	50	$7x10^{-6}$
BH4/S33	3.0	6	35	59	$6x10^{-5}$
BH5/S34	1.5	9	44	47	$5x10^{-6}$
BH5/S35	3.0	12	28	60	$3x10^{-5}$
BH6/S36	1.5	13	32	55	$1x10^{-5}$
BH6/S37	3.0	0	3	97	$3x10^{-3}$
BH7/S38	1.5	0	16	84	$2x10^{-3}$

BH7/S39	3.0	2	38	60	$1x10^{-4}$
BH8/S40	1.5	16	41	43	$3x10^{-6}$
BH8/S41	3.0	24	42	34	$1x10^{-6}$
BH9/S42	1.5	23	49	28	$1x10^{-6}$
BH9/S43	3.0	0	8	92	$6x10^{-3}$
BH10/S44	1.5	9	32	59	$4x10^{-5}$
BH10/S45	3.0	32	56	12	10^{-7}
BH11/S46	1.5	7	57	36	$1x10^{-5}$
BH11/S47	3.0	0	51	49	$2x10^{-5}$
MW4/S48	1.5	0	3	97	$1x10^{-2}$
MW4/S49	3.0	6	31	63	$6x10^{-5}$

Note: The above coefficients of permeability ("k" values) are estimates based on field observation, laboratory grain-size analysis, experience with similar soils and guidelines of the Ontario Building Code.

The soil profiles encountered at the twelve boreholes were generally consistent with the test pit programs. The majority of boreholes encountered an upper silty sand till of varying consistency overlying a sand till at depth. Three areas of the site (the northwest corner, the southwest corner and the eastern/southeastern periphery) exhibited differing soil profiles:

- The upper clayey soils known to be present throughout the northwestern corner of the site were encountered at BH2, but were underlain at a relatively shallow depth (i.e. less than 2m) by the sand till. The upper clayey silt soils are indicated to be present within an area extending approximately 550m to the south, southeast and east from the intersection of Gill Road and Craig Road.

- The upper clayey silt soils were also encountered at the eastern and southeastern periphery of the site at BH8 (to 4.3m) and BH9 (to 1.5m), but were also underlain by the sand till. The driller's log for nearby MW2 also indicates a "brown clay" from grade to 3.1m, underlain by a "sand and gravel" (likely sand till).

- Moving westward from the eastern periphery of the site, at BH10 the clayey silt soil was found at depth, between 2.1 and 4.0m, but was underlain by sand till. At BH6, the clayey silt soil was found at depth (5.5m to the base of the borehole).

- At the southwestern corner of the site, BH3 encountered the clayey silt soil from 1.8m to 8.2m. The drillers log for nearby MW1 also noted a "grey clay" from 1.5m to 7.6m, indicating that this underlying clayey silt is likely contiguous within about 200 to 250m of the southwestern corner of the site. At both locations, the clayey silt was underlain by sand till.

Borehole logs and grain size curves are included in the appendix.

3.4 Watertable Evaluation:

3.4.1 Monitoring Wells:

In conjunction with the on-going deep aquifer test well drilling program (see Section 6.0), three small diameter monitoring wells (MW1, MW2 and MW3) were installed to below the watertable surface during January, February and March 2008 by Allan Wright Water Wells Inc. The monitors were completed as 3.6cm-diameter Schedule 40 PVC wells with 3m lengths of #10 slot PVC well screen (1.5m length on MW2) to depths of 44.8m (MW1 and MW3) and 48.2m below grade (MW2).

In conjunction with the above borehole investigation, a 28.8m deep monitoring well (MW4) was installed to a deep perched groundwater zone using a power auger machine equipped with hollow-stem, continuous flight augers operated by Canadian Soil Drilling. The well was equipped with a 5.1cm-diameter Schedule 40 PVC casing and a 3m length of #10 slot PVC well screen. Due to the limitations of drilling with hollow-stem augers, MW4 could not be installed beyond the perched groundwater zone and into the regional watertable.

An existing 15cm-diameter domestic well (currently out-of-service) is located on-site (MW5), approximately 160m north of MW1, and information from this well is incorporated into portions of this assessment.

Water well records, which contain well construction details and the geologic logs for wells MW1, MW2, MW3 and MW5, are included in the appendix. Well construction details and a visual log for MW4 is included in the appendix. The locations of the monitoring wells are shown on Figure 3.

3.4.2 Water Level Observations:

Water levels were observed in MW's 1 to 5 on March 24, 2008. Ground and casing elevation data were provided by C.T. Strongman Surveying Ltd. The following provides a summary of the water level information:

Well	Ground Elevation (m asl)	Water Level (m below grade)	Water Level Elevation (m asl)
MW1	285.23	39.71	245.52
MW2	289.01	40.00	249.01
MW3	287.05	39.30	247.75
MW4	282.43	23.68	258.75
MW5	283.10	37.58	245.52

As described in Section 3.2.1, MW4 was completed in an isolated zone of deep perched groundwater, as the water level in MW4 is about 10 to 13m higher than in the other monitors. The remaining four monitors are completed in the regional watertable.

Figure 3 shows the watertable surface equipotential lines and the inferred direction of groundwater flow in the upper aquifer, as interpreted from the March 24, 2008 water levels observed in MW1, MW2, MW3 and MW5. Groundwater in the upper aquifer is indicated to flow generally west-northwestward with a shallow gradient of approximately $3.5x10^{-3}$. This interpreted direction of flow is consistent with local drainage patterns, which leads toward the Matheson Creek system.

3.4.3 Borehole Water Levels:

No groundwater was located within 9.1m of ground surface at all borehole locations, except at BH3 and BH6. Because of the underlying, relatively permeable sand till, the upper soils are typically well drained, and perched shallow watertable conditions are not present throughout most of the site.

However, small zones of isolated perched groundwater were identified at BH3 and at BH6, these being the boreholes where the clayey silt soils of significant thickness were found at depth. Shallow standpipes were set in BH3 and BH6 upon completion for subsequent water level observation. Water levels were observed in these two standpipes on March 24, 2008. Although shallow groundwater was encountered in BH3 above 1.5m during drilling, the standpipe was observed to be dry to a depth of 2.8m below grade, this despite the bentonite sealing of the borehole below the standpipe. The water level in BH6 was 2.07m below grade.

3.5 Groundwater Quality:

On March 24, 2008, samples of water were collected from MW1, MW2, MW3 and MW4 for background nitrate content analysis. The samples were collected using a Waterra inertial pump with a Hydrolift drive. Prior to sample collection, the wells were developed using the Waterra pump by pumping each well for approximately 60 minutes each at a rate of 3 to 4 litres per minute. MW2 and MW4 were incapable of a sustained yield of

3L/min, and were pumped dry three times and allowed to recover prior to sample collection. The standpipe set in BH6 was also sampled using the same procedures. The samples were collected in laboratory-supplied bottles, stored in an ice-packed cooler and submitted to Maxxam Analytics Inc. under chain of custody for nitrate content analysis. The following summarizes the analytical results:

Monitoring Well	Nitrate Content (mg/L as N)
MW1 (watertable)	4.4
MW2 (watertable)	<0.1
MW3 (watertable)	0.4
MW4 (deep perched groundwater)	11.0
BH6 (shallow perched groundwater)	4.0

Based on the inferred west-northwestward direction of groundwater flow in the upper aquifer, MW2 and MW3 are located at the upgradient end of the site, while MW1 is located near the downgradient end of the site. MW1, MW2 and MW3 all obtain water from the regional watertable aquifer. Being set in isolated perched groundwater zones, MW4 and BH6 will derive all water from direct on-site infiltration.

The nitrate content of the water from the five sampled boreholes is reflective of active agricultural practices on the site, in particular the application of agricultural fertilizers, with samples from the upgradient monitors containing little to no nitrate, and the downgradient sample containing 4.4mg/L nitrate. The shallow perched sample (BH6) contained 4.0mg/L nitrate, while the deep perched sample (MW4) contained 11mg/L nitrate. Given that the nitrate content of groundwater in the upper aquifer entering the site contains essentially no nitrate, with the withdrawal of agricultural practices on the site, the agriculturally-derived nitrate content of perched groundwaters and the upper aquifer will decline over time to low levels consistent with background levels.

A copy of the laboratory report is included in the appendix.

3.6 On-Site Stratigraphic Summary:

As described above, the test pit and borehole investigations indicated that at most locations, the upper soil profile consists of silty sand till overlying a sand till. Some clayey silt soils were found near surface in the northwestern and southeastern extremities of the site, but were also indicated to be underlain by the sand till. Of note in the context of sewage system function is the clayey silt soils encountered at depth at BH3, BH6 and MW1, where the base of the clayey silt soil is likely beyond the reasonable reach of excavation equipment.

Figures 4 and 5 are schematic cross-sections from southwest to northeast and northwest to southeast, each showing the geologic profile from grade to the upper portions of the watertable aquifer (approximately 50m total depth).

The cross-sections indicate that, with the above noted exceptions, the finer-grained upper soils are typically restricted to within the upper one or two metres of the soil

profile. The underlying sand till was indicated by the deeper monitoring well logs to be present down to an elevation of about 245m asl in the western half of the site, rising to above 270m asl in the eastern and southeastern portions of the site. The sand till is underlain by sands associated with the regional upper aquifer. A deep discontinuous sand/clay lens complex was identified in the eastern half of the site (i.e. at MW2 and MW3) at an elevation range of 245 to 250m asl, and likely supports the localized deep perched watertable at MW4.

As indicated in Section 3.4.2, the regional watertable slopes generally west-northwestward with a shallow gradient of approximately $3.5x10^{-3}$, from a high of about 245m asl in the east down to a low of approximately 245m asl in the west. The regional aquifer is considered the ultimate receiving aquifer of all on-site sewage disposal.

4.0 SEWAGE DISPOSAL CONSTRAINTS

It is proposed to service the subdivision with communal sub-surface treated sewage disposal systems, with a cluster of tile beds surrounding the centrally-located sewage treatment plant (STP), with the balance of the tile beds distributed in a linear manner throughout the property adjacent to various roadways, walking trails and paths. It is understood that the linear tile beds (those not clustered around the STP) will be approximately 6m in width.

The regional watertable surface represents the ultimate receiving aquifer, and is situated beneath the entire development proposal at depth of more than 35m below grade. Although some sewage mounding will occur on the watertable surface, based on the sand deposits which form the upper aquifer, and the substantial unsaturated zone above the aquifer, any watertable mounding will be inconsequential to the operation of the tile beds.

Of primary concern to the operation of the tile beds is potential sewage mounding atop the native upper soils beneath the tile beds. In the interest of making the most efficient use of the areas tentatively allotted for sewage disposal, it is recommended that the underlying sand till be utilized as the target formation for the contact areas beneath the tile beds. The sand till offers the highest average permeability of the soils identified to be within reasonable reach of ground surface, and was found to be present within about 2m to 2.4m of ground surface in all areas except at BH3/MW1, BH6, BH8 and BH10.

To maximize the acceptable rate of sewage disposal per unit area beneath the tile beds, it is recommended that the upper silty sand till and upper clayey silt soils be removed to a depth of at least 2m beneath the tile bed corridors (so that the underlying sand till is exposed) and replaced with a clean sand fill with a coefficient of permeability in the range of 10^{-2}cm/sec (T-time 5 to 7 minutes per centimetre).

At BH3/MW1 and at BH6, the clayey silt soils were found at depth, and extended to 9m and beyond. Actual and potential perched watertable conditions were identified at these locations, this due to the presence of the low permeability underlying soils. Furthermore,

at BH8 the clayey silt soil extended to a depth of 4.3m. It is recommended that these locations not be utilized for tile bed disposal, as the potential for adverse sewage mounding atop the low permeability soil and perched watertable will be relatively high. Site specific boreholes are recommended to accurately determine the extent of the clayey silt soils beyond the above borehole locations, so that the installation of tile beds above clayey silt soil is avoided.

The following strip basin formula provides the sewage mounding potential atop the sand till beneath the linear tile bed corridors, assuming the above recommendation to use 2m of sand fill is followed.

$$H_{max} = W \times ((q/k_1) \times (q/k_2 - 1))^{0.5}$$

Where: H_{max} = maximum mound height
W = basin width
q = sewage infiltration rate (m/day)
k_1 = conductivity of upper soil (sand fill)
k_2 = conductivity of lower soil (underlying sand till)

Assuming a basin width of 6m, a sand fill conductivity of 1×10^{-2}cm/sec and a worst-case underlying sand till permeability of 2×10^{-5}cm/sec (as the linear basins traverse a variety of sand till conditions), the following mound heights are indicated above the base of the imported sand.

Application Rate	Mound Height
75 L/m²/day	1.02m
60 L/m²/day	0.79m
50 L/m²/day	0.63m
40 L/m²/day	0.47m

While mounding potential at application rates up to 75 L/m²/day appear viable, it should be noted that soils surrounding the linear sand fill will consist of native silty sand till and/or clayey silt soils. Because of the relatively lower permeability of these surrounding soils, and the resulting relative inability of the sewage mound to disperse laterally beyond the tile bed corridor, to conservatively maintain clearance between the tiles and the top of the sewage mound, it is recommended that the sewage application rate not exceed 50 L/m²/day. This recommendation assumes that there will be at least 1.5m of imported sand fill between the bases of the tile beds and the exposed sand till, and that the sewage will be subject to tertiary treatment prior to subsurface disposal.

A cluster of tile beds is also proposed in a generally square-shaped area surrounding the STP. According to the most recent concept plan, the tile bed cluster is situated within an area of dimensions approximately 245m x 225m. The above linear basin calculation assumed the worst-case sand till permeability, as the linear corridors will traverse a variety of sand till conditions. Several test pits and boreholes are located in the vicinity of the central tile bed cluster, these being test pits 7, 8, 19, 19, 20, N7 and

N9, as well as Boreholes 2, 4 and 5. Soil analyses and soil profiles in the vicinity of the tile bed cluster suggest that at depths beyond 2.1 to 2.4m below grade, the bulk permeability of the underlying sand till is approximately an order of magnitude higher (averaging $1x10^{-4}$cm/sec) than the worst-case permeability assumed for the above linear basin analysis. Assuming a conservative local sand till permeability of $8x10^{-5}$ cm/sec, and a loading rate of 50L/m^2/day (or 5cm/day), the "q/k_2" value in the above mounding equation will be less than 1. As such, the mounding equation will indicate essentially no potential for mounding of treated sewage atop the sand till beneath the tile bed cluster, this based on the known soils data from test pits and boreholes in the close vicinity of the tile bed cluster.

Qualitatively, the underlying sand till in the vicinity of the STP exhibits a typical interpreted "T-time" in the range of 30 to 35 minutes per centimetre. A treated sewage loading rate of 5cm/day in the tile bed cluster is well within the interpreted "T-time" for this soil type.

Accordingly, subject to the proper extraction of the upper silts and clays, thereby exposing the more permeable underlying sand till, the cluster of tile beds surrounding the STP, as well as the linear tile basins throughout the site are viable using a maximum loading rate of 50L/m^2/day. The full replacement of the upper silts/clays with clean sand fill beneath all of the tile beds to a depth of 2.1 to 2.4m is essential. Alternate dosing of beds, if an available option, is an appropriate conservative operational measure.

All tile bed excavations must be supervised by a qualified person to ensure that the sand till deposit, or a contiguous deposit of better permeability is exposed by the excavation.

5.0 REASONABLE USE ASSESSMENT

The Ministry of the Environment (MOE) Reasonable Use Concept (RUC) is applicable to the assessment of impact of large sewage disposal systems (i.e. >10,000 litres per day design capacity), which would include the proposed communal system on the site. MOE Guideline B-7 and Procedure B-7-1 outline details of the Ministry's RUC. The critical groundwater contaminant in the context of the RUC is nitrate. The effect of the RUC is to require the nitrate content of groundwater at the downgradient property line not to exceed 25% of the difference between background and the Ontario Drinking Water Standard (10 mg/L).

As described in Section 3.5, the background nitrate content of the receiving aquifer entering the site is <0.1mg/L to 0.4mg/L. On-site agricultural practices, which will cease upon development of the lands, has increased the on-site nitrate levels to slightly in excess of 4mg/L. With the low identified background nitrate content of groundwater entering the site (0.4mg/L), the nitrate content of groundwater at the downgradient property boundary can be increased to 2.8mg/L under the RUC.

To calculate the potential impact of the proposed communal sewage system on the

nitrate content of groundwater at the downgradient property line, a dilution model utilizing the volume of infiltrating precipitation within the possible mixing zone downgradient of communal tile bed corridors, plus the volume of sewage is proposed. Recent opinion from the Ministry of the Environment has indicated that groundwater flow within the receiving aquifer cannot be included in the RUC dilution model, and guidance in the November 2007 draft MOE "Design Guidelines for Sewage Works" supports this opinion.

Section 22 of the November 2007 draft Design Guidelines for Sewage Works suggests the use of a standard infiltration rate of 250mm/year for dilution purposes, which recognizes the ability of finer-grained soils to provide attenuative mechanisms not available in high permeability sand deposits. Based on the indicated freely-draining soils throughout most of the property and the relatively flat relief of much of the site, with a regional water surplus of approximately 341mm/year (see appendix), such an infiltration rate is warranted.

As described in Section 3.4.2, groundwater flow in the receiving aquifer is west-northwestward. Based on the most recent site plans, two general sewage disposal corridors are proposed, with the corridors situated southwest to northeast, one spanning the central portion of the site and the other spamming the northwestern half of the site. It is recommended that the current site plan be consulted for accurate locations of the proposed tile bed corridors. Based on a west-northwestward direction of groundwater flow, approximately 51ha of on-site lands are available for dilution directly downgradient of all on-site tile beds. Accordingly, 1.28×10^8 litres of water will join the receiving aquifer on-site downgradient of the tile beds.

It is understood from the project engineer (Totten Sims Hubicki Associates) that the design sewage flow for the STP serving the "neighbourhood" is approximately 2,376m^3/day.

To determine the degree of treatment required to achieve a nitrate content of 2.8mg/L at the downgradient property line, the following mass balance approach is proposed:

Nitrate sources:

Sewage:	8.67×10^8L/year at nitrate concentration "C_s"

Dilution Sources:

Sewage	8.67×10^8L/year
Infiltration:	1.28×10^8 L/year
Total:	9.95×10^8 L/year

The required degree of treatment can be determined using the mass-balance formula:

Impact = Nitrate sources ÷ Dilution sources

Therefore:

$$2.8mg/L = (8.67x10^8 L/year \times C_s) \div 9.95x10^8 L/year$$

$$C_s = 3.21mg/L$$

Therefore, based on the assumptions outlined above, the sewage treatment system serving the proposed development will be required to reduce the nitrate content of sewage to 3.21mg/L or lower to meet the requirements Ministry of the Environment's Reasonable Use Concept.

It should be noted that groundwater flow within the receiving aquifer will be substantial, based on the indicated depth and extent of the upper aquifer. However, as noted above, recent opinion from the Ministry of the Environment has indicated that this dilution source is no longer permitted for use as part of RUC calculations. The actual impact of sewage at the downgradient property line will be less than calculated.

As described above, the closest surface water body to the site is estimated to be approximately 1km to the northwest. This distance is more than sufficient to provide adequate attenuative mechanisms in the subsurface so that adverse impacts to surface waters (phosphorous in particular) do not occur in the long term.

6.0 STATUS OF WATER SUPPLY DEVELOPMENT

The development of an on-site water supply is currently underway. Three deep test holes (at the locations of MW1, MW2 and MW3) were completed to the known base elevation of target aquifers A3 or A4 during January, February and March 2008 by Allan Wright Water Wells Inc. Copies of the water well records are included in the appendix.

Test Hole 1, located at MW1, was completed to a depth of 146.4m (elevation 139m asl), and encountered probable aquifer A3 at a depth of about 101m (elevation 184m asl). However, the A3 formation was determined to be excessively silty at TH1, with the only possible viable formation being about 6.1m thick, an insufficient section to support a high-yield municipal well.

Test Hole 2, located at MW2, was completed to a depth of 158m (elevation 131m asl), and encountered probable aquifer A3 at a depth of 103.6m (elevation 185.4m asl). Aquifer A3 was identified to be approximately 31m thick at Test Hole 2, but was again mainly somewhat silty, with the most viable portions of the formation (i.e. coarser than medium sands) identified in two separate horizons, each only about 5 to 6 metres thick. Of interest at TH2 was the indicated thickness of aquifer A2, which is the upper aquifer most commonly utilized by local domestic wells. The most viable portion of aquifer A2 was found to extend over a length of about 41metres, from a depth of 48.8m (elevation 240m asl) to a depth of 89.9m (elevation 199m asl). Aquifer A2 is not the preferred source, as it may introduce a risk of off-site interference potential, and the downgradient upper portion of aquifer A2 is the probable eventual receiving aquifer for on-site sewage.

As such, TH2 was not completed as a test well at this time.

Test Hole 3, located at MW3, was completed to a depth of 131m (elevation 156.5m), and encountered probable aquifer A3 at a depth of 100.6m (elevation 187m). The most viable portion of the aquifer was found to be approximately 20m thick, and was selected for the development of a large-diameter test well. The construction of the test well is currently under way, and has been specified with a large-diameter 15.2m long Johnson Screens Hi-Flow 304 Stainless well screen with a transmitting capacity of approximately 48L/sec. Aquifer A3 is well known to be capable of such yields to the north and south, however formal testing is required to confirm actual long-term safe yields.

Depending on the outcome of the test well, an additional well(s) will be required for the development to either supplement the supply and/or to provide backup/alternate sources. Subject to the results of testing, additional development of aquifer A3 may be viable in the northern portion of the site. Alternatively, development of the lower portion of Aquifer A2 may be possible at TH2. Aquifer A2 may be a viable source at TH2 as it is a relatively remote location, with the closest off-site wells being approximately 200 to 300m distant. TH2 is also located about 550m upgradient of the closest proposed on-site tile bed corridor, thereby minimizing the possibility that the well's capture zone might extend to the on-site tile beds. Based on the identified formation at TH2, a well screen similar to that specified at the test well at TH3 appears viable (i.e. >40L/sec transmitting capacity). However, aquifer A2 is not as well known for high yield wells in the area, and a test well would be required to confirm long-term yield potential at the TH2 location.

7.0 CONCLUSIONS AND RECOMMENDATIONS

1. The predominant upper soil type on the site is a silty sand glacial till. Small areas of surficial, dense clayey silt were identified within the northwest, southwest and southeastern extremities of the main site.

2. The regional watertable surface was identified to be in excess of 37m below grade, and is inferred to flow in a west-northwestward direction. The regional watertable surface is considered as the receiving aquifer for sewage disposal purposes.

3. The nitrate content of groundwater in the receiving aquifer entering the site is low, at between <0.1 to 0.4mg/L.

4. Fully in-ground sewage tile beds are likely to be viable over much of the site. It is recommended that to achieve the most efficiency of the tile bed areas, the underlying sand till be exposed beneath the tile bed corridors, and the excavations backfilled with imported sand. In most areas, this should be possible within 2m to 2.4m of land surface, but slightly greater in some areas. However, two small areas identified in Section 4.0 of this report should be avoided for tile bed installation due to deep clayey silt deposits, and additional boreholes are recommended to accurately delineate the local areal extent of these low

permeability deposits.

5. Sewage mounding potential atop the watertable surface will be inconsequential, based on the depth to the regional watertable and the sand deposit of the upper aquifer.

6. Due to sewage mounding potential atop the exposed sand till, the treated sewage application rate beneath the all tile beds should not exceed 50L/m^2/day.

7. Under the current Ministry of the Environment Reasonable Use Concept, a tertiary sewage treatment facility will be required to reduce the nitrate content of sewage to 3.21mg/L or lower for the indicated design sewage flow of 2,376m^3/day.

8. The construction of a large-diameter well to be completed in deep Aquifer A3, and equipped with a large-diameter well screen with a transmitting capability of approximately 48L/sec., is currently underway. Aquifer A3 is well known to be capable of such yields, however formal testing of the test well, once completed, is required to confirm long-term safe yield. A second test drilling site, located at the southeast corner of the site has also indicated high yield potential.

8.0 STATEMENT OF LIMITATIONS

This report was prepared solely to provide conclusions regarding the general suitability of soil and groundwater conditions for sewage disposal and the density of development allowable under current Ministry of the Environment Reasonable Use Concept, and the current status of water supply development. No conclusions should be drawn from this report regarding the viability of residential development on the subject parcel of land as it relates to any other factors (e.g. demonstrated water supply, drainage, slope stability, load-bearing engineering, biology, etc...).

IAN D. WILSON ASSOCIATES LIMITED

draft

Geoffrey Rether, P.Geo.

June 18, 2008

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP1	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.6	dark brown, lightly compact, dry silty SAND with traces of clay
	0.6 - 1.8	brown, very compact, dry clayey SILT with some fine sand

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 1 - 0.9m
  Clay - 24%
  Silt - 64%
  Sand - 12%

TP2	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.8	red-brown, lightly compact, dry silty SAND with traces of clay
	0.8 - 1.7	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TP3	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	brown, compact, dry SILT AND SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 2 - 0.7m
  Clay - 12%
  Silt - 40%
  Sand - 48%

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP4	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TP5	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 3 - 0.7m
  Clay - 4%
  Silt - 39%
  Sand - 57%

TP6	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.6	grey-brown, lightly compact, dry silty SAND with traces of clay (till)
	0.6 - 1.5	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 4 - 0.5m
  Clay - 9%
  Silt - 27%
  Sand - 64%

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP7	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	grey-brown, very compact, dry silty SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TP8	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.9	grey, dense, dry clayey silt with traces of fine sand
	0.9 - 1.7	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 1 - 0.6m
  Clay - 30%
  Silt - 65%
  Sand - 5%

TP9	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.0	grey-brown, compact, dry silty SAND with traces of clay (till)
	1.0 - 1.7	grey-brown, lightly compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP10	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.0	brown, compact, dry silty SAND
	1.0 - 1.7	grey-brown, loose, dry SAND

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 2 - 0.6m
  Clay - 0%
  Silt - 20%
  Sand - 80%

TP11	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TP12	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.6	grey-brown, lightly compact, dry silty SAND with traces of clay (till)
	0.6 - 1.8	light brown, compact, dry silty SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 3 - 1.0m
  Clay - 10%
  Silt - 35%
  Sand - 55%

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP13	0 - 0.2	dark brown cultivated TOPSOIL
	0.2 - 0.6	red-brown, lightly compact, dry silty SAND
	0.6 - 1.5	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 4 - 0.5m
  Clay - 0%
  Silt - 26%
  Sand - 74%

TP14	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.9	grey-brown, very compact, dry silty SAND with some clay (till)
	0.9 - 1.5	brown, very compact, dry silty SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 5 - 0.6m
  Clay - 12%
  Silt - 39%
  Sand - 49%

TP15	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 5 - 0.6m
  Clay - 9%
  Silt - 33%
  Sand - 58%

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP16	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.0	brown, compact, dry silty SAND with traces of clay (till)
	1.0 - 1.5	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TP17	0 - 0.2	dark brown cultivated TOPSOIL
	0.2 - 0.8	brown, compact, dry silty SAND with traces of clay (till)
	0.8 - 1.5	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TP18	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.5	red-brown, lightly compact, dry silty SAND with traces of clay
	0.5 - 1.7	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 6 - 0.3m
  Clay - 5%
  Silt - 27%
  Sand - 68%

TEST PIT LOGS **Completed January 27, 2006**

TEST PIT	DEPTH (m)	MATERIALS
TP19	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.7	brown, lightly compact, dry silty SAND with traces of clay
	0.7 - 1.7	grey-brown, compact, dry silty SAND with some clay, some stones (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 7 - 0.5m
  Clay - 4%
  Silt - 36%
  Sand - 60%

TP20	0 - 0.2	dark brown cultivated TOPSOIL
	0.2 - 1.65	brown, dense, dry SILT AND SAND with some clay

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 8 - 0.8m
  Clay - 16%
  Silt - 42%
  Sand - 42%

TP21	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.0	brown, compact, dry silty SAND
	1.0 - 1.7	grey, compact, dry silty SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 9 - 0.6m
  Clay - 0%
  Silt - 3 Sand - 67%

TEST PIT LOGS **Completed December 8, 2004**

TEST PIT	DEPTH (m)	MATERIALS
TPN1	0 - 0.2	dark brown cultivated TOPSOIL
	0.2 - 1.1	dark brown to grey-brown, lightly compact, dry silty SAND with traces of clay
	1.1 - 1.8	light brown to grey-brown, loose, dry SAND with traces of silt

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 1 - 1.3m
  Clay - 0%
  Silt - 8%
  Sand - 92%

TPN2	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.2	brown, very compact, dry SILT AND SAND with some clay
	1.2 - 1.9	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TPN3	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.8	grey-brown, compact, dry silty SAND with traces of clay (till)
	1.8 - 2.0	light grey, compact to very compact, dry SILT with traces of clay

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

TEST PIT LOGS **Completed December 8, 2004**

TEST PIT	DEPTH (m)	MATERIALS
TPN4	0 - 0.2	dark brown cultivated TOPSOIL
	0.2 - 1.7	grey-brown, compact, dry silty SAND with traces of clay (till)
	1.7 - 2.0	red-brown, loose, dry SAND

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 2 - 1.0m
  Clay - 3%
  Silt - 29%
  Sand - 68%

TPN5	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.9	dark grey-brown, lightly compact, dry stony, silty SAND with traces of clay (till)
	0.9 - 2.0	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 3 - 0.6m
  Clay - 3%
  Silt - 18%
  Sand - 79%

TPN6	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.9	grey-brown, compact, dry silty SAND with traces of clay (till)
	0.9 - 2.0	light grey, very compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

TEST PIT LOGS **Completed December 8, 2004**

TEST PIT	DEPTH (m)	MATERIALS
TPN7	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.7	grey-brown, very compact to dense, dry SILT and SAND with some clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions (perched surface water in vicinity)
- Sample 4 - 1.0m
  Clay - 12%
  Silt - 40%
  Sand - 48%

TPN8	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.2	dark red-brown, very compact, dry SILT and SAND with some clay (till)
	1.2 - 2.2	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 5 - 0.6m
  Clay - 10%
  Silt - 48%
  Sand - 42%

TEST PIT LOGS **Completed December 8, 2004**

TEST PIT	DEPTH (m)	MATERIALS
TPN9	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.7	red-brown, compact, dry silty fine SAND with traces of clay
	0.7 - 2.3	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 6 - 0.5m
  Clay - 3%
  Silt - 37%
  Sand - 60%

TPN10	0 - 0.1	dark brown TOPSOIL
	0.1 - 1.2	brown, compact, dry SILT
	1.2 - 2.7	red-brown, compact, dry silty fine SAND with traces of clay

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

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TPN11	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.3	red-brown, compact to very compact, dry sandy, clayey SILT
	1.3 - 2.3	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions

TEST PIT LOGS **Completed December 8, 2004**

TEST PIT	DEPTH (m)	MATERIALS
TPN12	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 1.5	red-brown, very compact to dense, dry sandy, clayey SILT
	1.5 - 2.1	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions (perched surface water in vicinity)

TPN13	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.7	red-brown, compact to very compact, dry sandy, clayey SILT
	0.7 - 1.5	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions (perched surface water in vicinity)
- Sample 7 - 1.1m
  Clay - 8%
  Silt - 31%
  Sand - 61%

TPN14	0 - 0.3	dark brown cultivated TOPSOIL
	0.3 - 0.9	red-brown, compact to very compact, dry sandy, clayey SILT
	0.9 - 1.5	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 7 - 0.5m
  Clay - 22%
  Silt - 52%
  Sand - 26%

TEST PIT LOGS **Completed December 8, 2004**

TEST PIT	DEPTH (m)	MATERIALS
TPW1	0 - 0.2	dark brown TOPSOIL
	0.2 - 0.9	dark brown to red-brown, loose, dry silty fine SAND with traces of clay
	0.9 - 1.8	grey-brown, dense, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 1 - 0.5m
  Clay - 5%
  Silt - 30%
  Sand - 65%

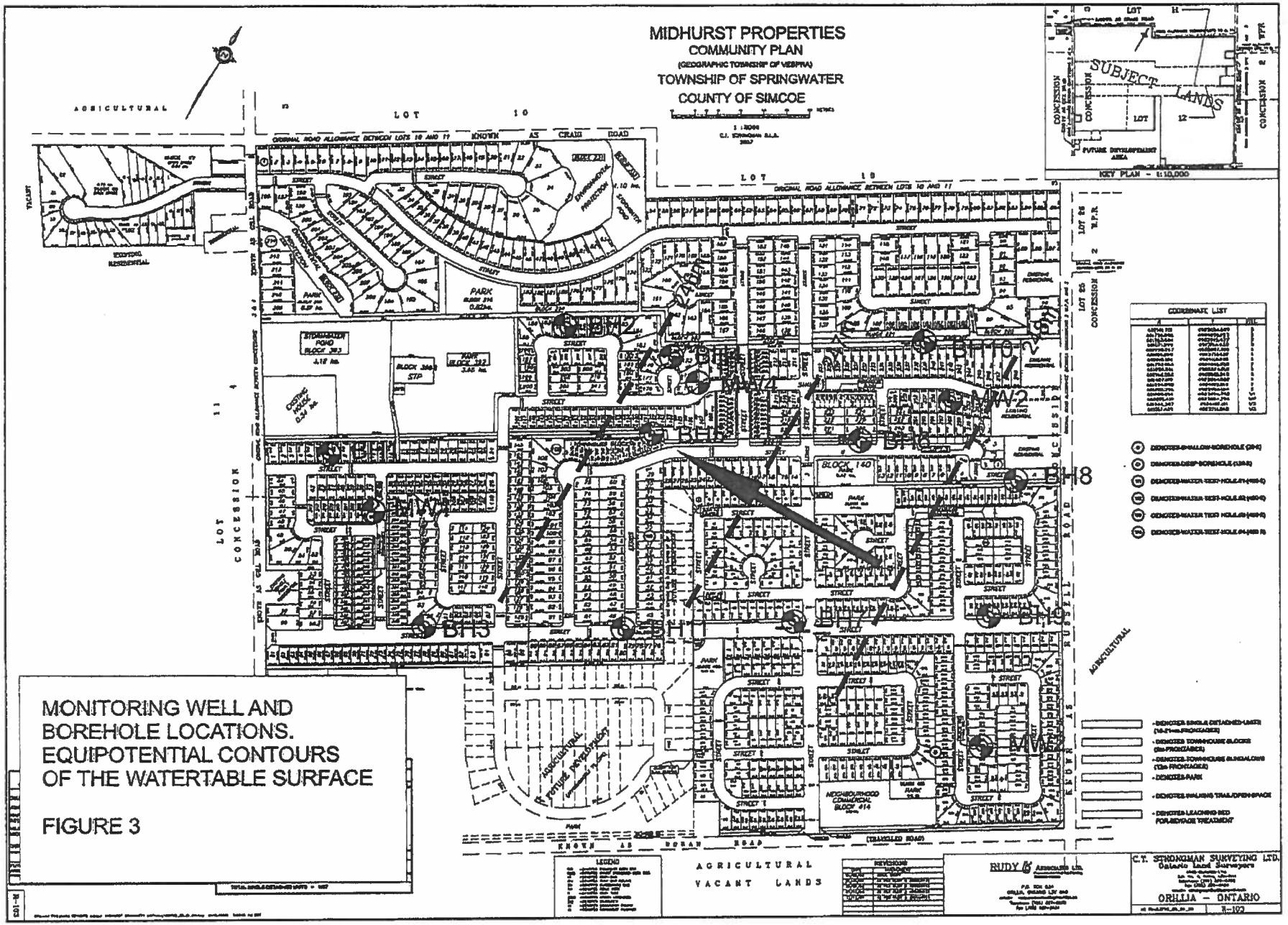
TPW2	0 - 0.3	dark brown TOPSOIL
	0.3 - 1.0	brown, compact, dry silty SAND with traces of clay (till)
	1.0 - 1.7	grey-brown, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 2 - 0.7m
  Clay - 4%
  Silt - 29%
  Sand - 58%

TEST PIT LOGS **Completed December 8, 2004**

TEST PIT	DEPTH (m)	MATERIALS
TPW3	0 - 0.2	dark brown TOPSOIL
	0.2 - 0.9	grey-brown, compact, dry silty SAND with traces of clay (till)
	0.9 - 1.7	grey, compact, dry silty SAND with traces of clay (till)

- Test Pit stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 3 - 1.1m
  Clay - 8%
  Silt - 34%
  Sand - 58%


MIDHURST PROPERTIES
COMMUNITY PLAN
(GEOGRAPHIC TOWNSHIP OF VESPRA)
TOWNSHIP OF SPRINGWATER
COUNTY OF SIMCOE
SUBJECT LANDS
KEY PLAN - 1:10,000
MONITORING WELL AND BOREHOLE LOCATIONS. EQUIPOTENTIAL CONTOURS OF THE WATERTABLE SURFACE
FIGURE 3
BH1
BH2
BH3
BH4
BH5
BH6
BH7
BH8
BH9
BH10
BH11
MW1
MW2
MW3
MW4
MW5
AGRICULTURAL
VACANT LANDS
RUDY & ASSOCIATES LTD.
C.T. STRONGMAN SURVEYING LTD.
Ontario Land Surveyors
ORILLIA - ONTARIO

VISUAL BOREHOLE LOGS **Completed March 20 and 21, 2008**

BOREHOLE	DEPTH (m)	MATERIALS
BH3	0 - 0.3	dark brown cultivated TOPSOIL
(March 20)	0.3 - 1.8	brown, soft, damp silty SAND TILL with traces of clay
	1.8 - 8.2	brown, soft, dry clayey SILT with traces of sand
	8.2 - 9.6	grey-brown, lightly compact, dry silty SAND TILL with traces of clay

- Borehole stable and wet upon completion
- 5.1cm-diameter PVC monitor installed, with a 1.5m length of #10 slot screen set from 0.9 to 2.4m, Bentonite plug installed below the pipe.
- Perched groundwater noted above clayey silt above 2.4m.
- Sample 30 - 1.5m
  Clay - 6%
  Silt - 30%
  Sand - 64%
- Sample 31 - 3.0m
  Clay - 35%
  Silt - 58%
  Sand - 7%

BH4	0 - 0.3	dark brown cultivated TOPSOIL
(March 20)	0.3 - 1.8	brown, compact, dry SILT AND SAND with some clay
	1.8 - 3.1	grey-brown, lightly compact, dry silty SAND TILL with traces of clay

- Borehole stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 32 - 1.5m
  Clay - 14% Silt - 36%
  Sand - 50%
- Sample 33 - 3.0m
  Clay - 6%
  Silt - 35%
  Sand - 59%

VISUAL BOREHOLE LOGS **Completed March 20 and 21, 2008**

BOREHOLE	DEPTH (m)	MATERIALS
BH5	0 - 0.3	dark brown cultivated TOPSOIL
(March 20)	0.3 - 2.4	brown, compact, dry SILT and SAND with traces of clay
	2.4 - 9.6	grey, compact, dry silty SAND till with some clay

- Borehole stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 34 - 1.5m
  Clay - 9%
  Silt - 44%
  Sand - 47%
- Sample 35 - 3.0m
  Clay - 12%
  Silt - 28%
  Sand - 60%

BH6	0 - 0.3	dark brown cultivated TOPSOIL
(March 21)	0.3 - 2.3	brown, compact, dry to wet silty SAND TILL with some clay
	2.3 - 5.5	brown, loose, wet SAND with traces of silt
	5.5 - 8.4	brown, compact, dry clayey SILT with traces of sand
	8.4	boulder refusal

- Borehole unstable and wet upon completion
- 5.1cm-diameter PVC monitor installed, with a 1.5m length of #10 slot screen set from 2.4 to 4.0m, Bentonite plug installed below the pipe.
- Perched groundwater noted above clayey silt above 5.5m.
- Sample 36 - 1.5m
  Clay - 13%
  Silt - 32%
  Sand - 55%
- Sample 37 - 3.0m
  Clay - 0%
  Silt - 3%
  Sand - 97%

VISUAL BOREHOLE LOGS **Completed March 20 and 21, 2008**

BOREHOLE DEPTH (m) MATERIALS

BH7	0 - 0.3	dark brown cultivated TOPSOIL
(March 21)	0.3 - 2.1	red-brown, loose, dry fine SAND with some silt
	2.1 - 9.6	grey, compact, dry silty SAND till with traces of clay

- Borehole stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 38 - 1.5m
  Clay - 0%
  Silt - 16%
  Sand - 84%
- Sample 39 - 3.0m
  Clay - 2%
  Silt - 38%
  Sand - 60%

BH8	0 - 0.3	dark brown cultivated TOPSOIL
(March 21)	0.3 - 4.3	brown, soft, dry SILT AND SAND with some clay
	4.3 - 8.5	grey, compact, dry sandy SILT till with some clay
	8.5 - 9.6	light brown, compact, dry silty SAND till with traces of clay

- Borehole stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 40 - 1.5m
  Clay - 16%
  Silt - 41%
  Sand - 43%
- Sample 41 - 3.0m
  Clay - 24%
  Silt - 42%
  Sand - 34%

VISUAL BOREHOLE LOGS **Completed March 20 and 21, 2008**

BOREHOLE DEPTH (m) MATERIALS

BH9	0 - 0.3	dark brown cultivated TOPSOIL
(March 21)	0.3 - 1.5	brown, compact, dry SILT with some sand and clay
	1.5 - 4.8	brown, lightly compact, dry SAND TILL with some silt
	4.8 - 9.6	grey, compact, dry silty SAND till with traces of clay

- Borehole stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 42 - 1.5m
  Clay - 23%
  Silt - 49%
  Sand - 28%
- Sample 43 - 3.0m
  Clay - 0%
  Silt - 8%
  Sand - 92%

BH10	0 - 0.3	dark brown cultivated TOPSOIL
(March 21)	0.3 - 2.1	brown, compact, dry silty SAND with traces of clay
	2.1 - 4.0	brown, lightly compact, clayey SILT with some fine sand
	4.0 - 6.4	grey, compact, dry silty SAND till with traces of clay
	6.4 - 9.6	brown, loose, dry SAND TILL with some silt

- Borehole stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 44 - 1.5m
  Clay - 9%
  Silt - 32%
  Sand - 59%
- Sample 45 - 3.0m
  Clay - 32%
  Silt - 56%
  Sand - 12%

VISUAL BOREHOLE LOGS **Completed March 20 and 21, 2008**

BOREHOLE	DEPTH (m)	MATERIALS
BH11	0 - 0.3	dark brown cultivated TOPSOIL
(March 21)	0.3 - 0.8	brown, soft, dry silty fine SAND
	0.8 - 2.1	brown, loose, dry sandy SILT with traces of clay
	2.1 - 5.2	brown, loose, dry SILT AND SAND
	5.2 - 7.6	grey, compact, dry silty SAND till with traces of clay
	7.6	rock refusal

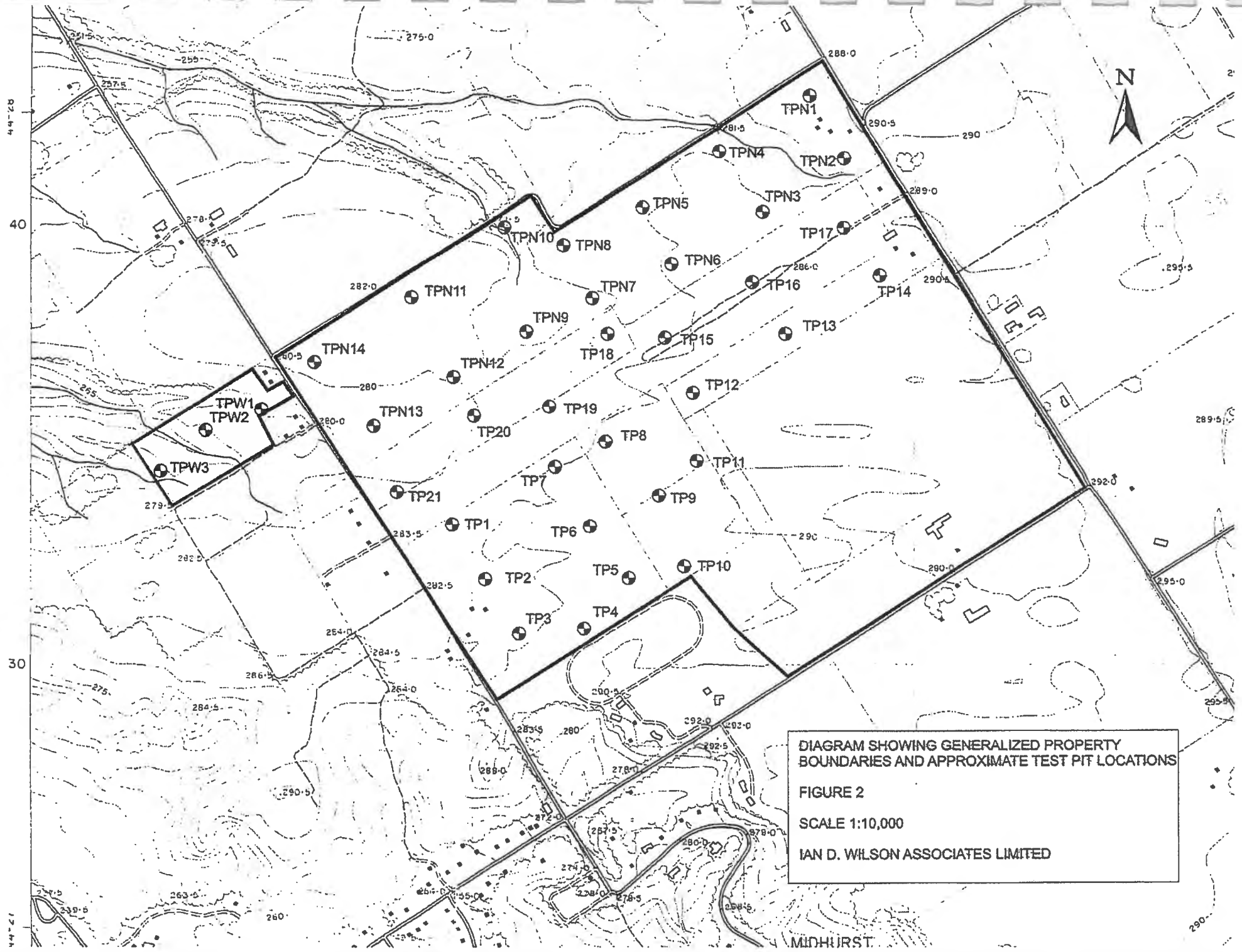
- Borehole stable and dry upon completion
- No evidence of emergent groundwater or seasonally elevated watertable conditions
- Sample 46 - 1.5m
  Clay - 7%
  Silt - 57%
  Sand - 36%
- Sample 47 - 3.0m
  Clay - 0%
  Silt - 51%
  Sand - 49%

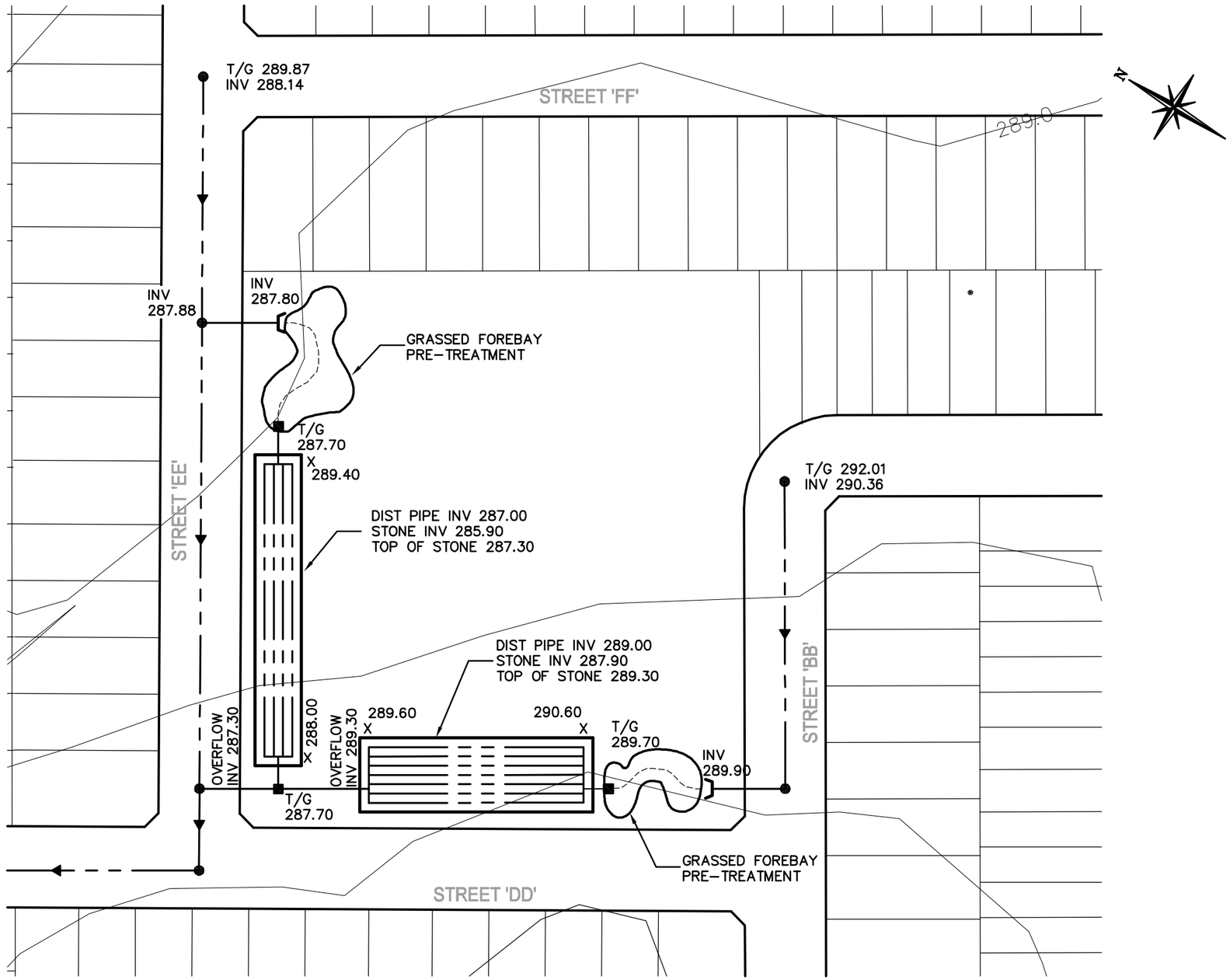
VISUAL BOREHOLE LOGS **Completed March 5, 20 and 21, 2008**

BOREHOLE	DEPTH (m)	MATERIALS
MW4	0 - 0.3	dark brown cultivated TOPSOIL
(March 5)	0.3 - 3.2	light brown, compact, dry SAND TILL with traces of silt
	3.2 - 22.9	grey, compact, dry silty SAND TILL with traces of clay
	22.9 - 28.7	brown, loose, wet SAND with some silt

- Borehole mainly stable and dry, base unstable and wet upon completion
- 5.1cm-diameter PVC monitor installed, with a 3.0m length of #10 slot screen set from 25.7 to 28.7m.
- Water level March 24, 2008 - 23.71m below grade.
- Sample 48 - 1.5m
  Clay - 0%
  Silt - 3%
  Sand - 97%
- Sample 49 - 3.0m
  Clay - 6%
  Silt - 31%
  Sand - 63%

For MW1, MW2 and MW3 - See water well records prepared by Allan Wright Water Wells


TPN1
TPN2
TPN3
TPN4
TPN5
TPN6
TPN7
TPN8
TPN9
TPN10
TPN11
TPN12
TPN13
TPN14
TP1
TP2
TP3
TP4
TP5
TP6
TP7
TP8
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TP16
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TP18
TP19
TP20
TP21
TPW1
TPW2
TPW3
N
40
30
MIDHURST
DIAGRAM SHOWING GENERALIZED PROPERTY BOUNDARIES AND APPROXIMATE TEST PIT LOCATIONS
FIGURE 2
SCALE 1:10,000
IAN D. WILSON ASSOCIATES LIMITED



20 0m 20 40 60 80

SCALE: 1:1000

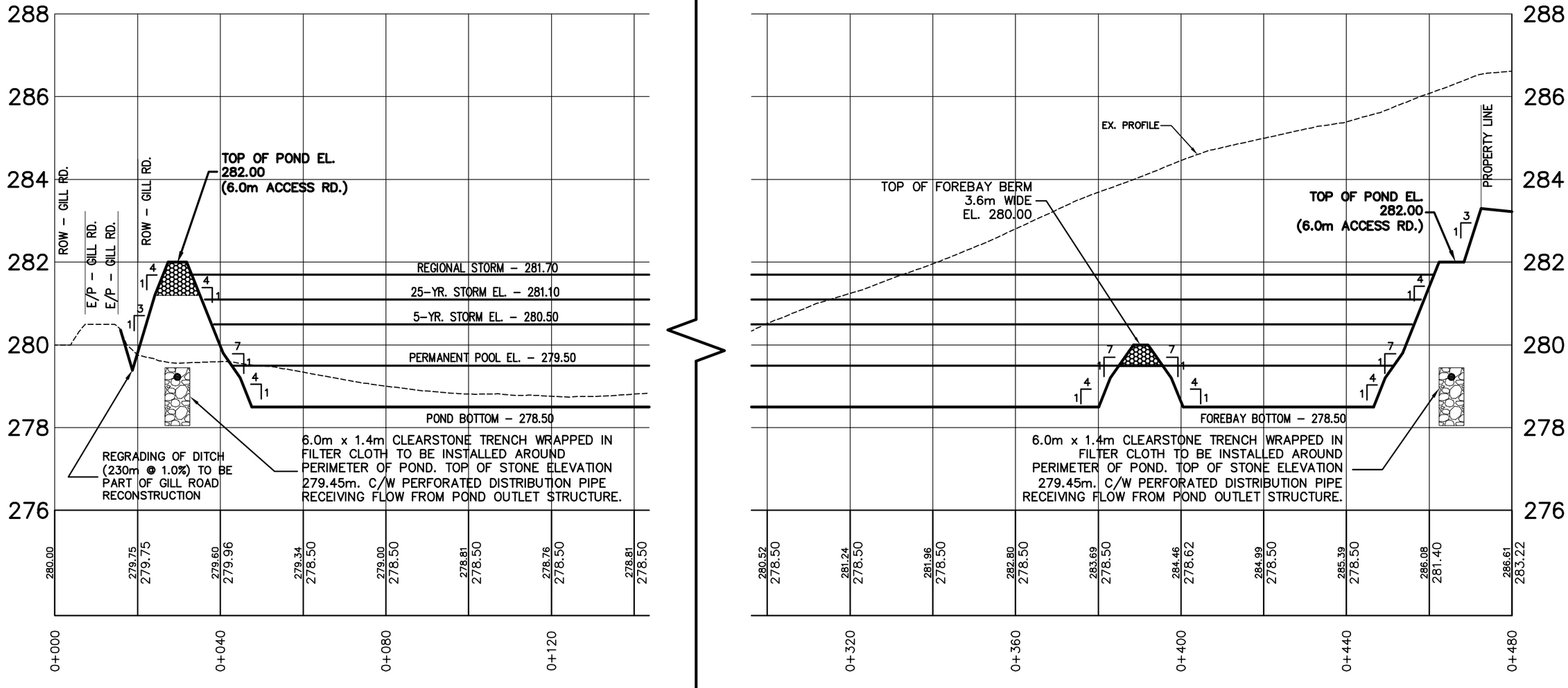
Project
MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing
PARK BLOCK INFILTRATION
CONCEPTUAL DESIGN

CROZIER & ASSOCIATES
Consulting Engineers
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	L.W.	Design By	K.W.	Project	845-3675
Scale	1:1000	Date	06/24/2014	Check By	C.F.C.	Drawing	FIG C-1

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\3675 FSR.dwg, FIG C-1, 8/1/2014 10:12:51 AM, lwaters



NOTE:
POND DESIGN PER MNT
CONSULTING GROUP.

Project
MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing
POND BLOCK INFILTRATION
CONCEPTUAL DESIGN

CROZIER & ASSOCIATES Consulting Engineers
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
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Drawn By	L.W.	Design By	K.W.	Project	845-3675
Scale	H 1:1000 V 1:100	Date	06/24/2014	Check By	C.F.C.	Drawing	FIG C-2

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APPENDIX D

Ainley Comment Response Memo

CROZIER & ASSOCIATES
Consulting Engineers

The HarbourEdge Building
40 Huron Street, Suite 301
Collingwood, ON L9Y 4R3

T.705-446-3510
F.705-446-3520
cfcrozier.ca

MEMO

DATE August 1, 2014 **FILE NO.** 845-3675
RE Midhurst Master Drainage Plan Review Comments

TO Richard D. Sloan **CC**
FROM Kaitlin Wilmshurst

Dear Mr. Sloan,

Please accept this letter as a formal response to Ainley & Associates' June 30th 2014 comment letter regarding Crozier & Associates' May 27th, 2014 submission to support the Midhurst Heights Draft Plans. A meeting was held June 20th 2014 with representatives from the NVCA, the Township of Springwater, SCS Consulting, Ainley, C.F. Crozier & Associates, and MNT Consulting to discuss the main issues raised during the review of the May 27th submission. Based on the feedback received in this meeting, a second package of information was submitted on June 26th 2014, which addressed the majority of the comments provided in Ainley's June 30th comment letter. We have prepared this memo to summarize our responses to Ainley comments with reference to the consolidated material in the OMB Summary Document. Comment numbers below are listed as in the original Ainley letter, followed by responses.

Comment 1.0
Acknowledged

Comment 2.1
It was confirmed through site walks with NVCA staff and Azimuth Environmental Consultants that the vegetation communities at the existing west and north outlets can be characterized as "upland forest" and are insensitive to reductions in contributing flows and volumes. It is further noted that the EXT4 and EXT5 catchment areas contribute significant runoff to these outlets only in large storm events (greater than 25 year SCS event). Given the infrequent contributions from these external catchments, it is not anticipated that diversion of runoff associated with these catchments from the Matheson Creek system will have an impact on the day-to-day ecological function of the downstream flow routes.

For the purposes of Phase 1 assessment, the June 26th, 2014 submission and OMB Summary Document include conservative modeling of the post-development interim conditions where EXT3, EXT4, and EXT5 contribute to the Midhurst Heights SWM pond. The SWM pond and outlet pipe have been sized to account for this scenario for the purposes of demonstrating flexibility of the Draft Plans. Conveyance within the proposed subdivision will be addressed at the detailed design stage.

Comment 2.2
Acknowledged. Alternative outlets for the external drainage areas will be considered in Phase 2: the Master Drainage Plan. For the purposes of Phase 1, the ability of the pond and Gill Road outlet to accept flows from the external lands south of Doran Road in the interim condition has been assessed.

Comment 2.3
Crozier's June 26th submission and the OMB Summary Document account for flows from the future John's development and appropriate external lands in the sizing of the pond and Gill Road outlet pipe. Preliminary design of conveyance of runoff from EXT1 and EXT2 has also been included, to confirm that the proposal to route EXT1 flows around the proposed development is feasible. Conveyance through the proposed development will be further addressed at the detailed design stage.

Comments 2.4 & 2.5
To be addressed by SCS Consulting Group.

Comment 3.0
A stormwater best management practices evaluation was completed for the Midhurst Heights site as part of the May 27th submission. Several LIDs practices were determined to be feasible. Analysis of their performance was submitted as part of Crozier's May 27th and June 26th submissions and is included in the Summary Document, including allowances for reduced function (ie. safety factors).

Comment 3.1
A suitable location for a centralized SWM Pond to service the John's, Frankcom and Midhurst Heights lands was identified through the June 26th submission and in the Summary Document.

Comment 3.2
The SWM strategy for the Midhurst Heights Development has been updated in the June 26th submission and Summary Document to account for all contributing external areas. The existing and proposed land uses have been considered in the analysis, as have interim conditions.

Comment 4.0
Acknowledged. We further note that the updated modeling and SWM pond design reflects 72 hour extended detention to exceed the stated 48 hour ED objective. The SWM pond has been demonstrated to meet water quality and extended detention objectives in the absence of LIDs.

Comment 5.0
Acknowledged. Further investigation related to the feasibility of LIDs, performance, and maintenance will be conducted in Phase 2.

Comment 6.0
End-of-pipe and conveyance requirements have been assessed with respect to all developments within the Secondary Plan Area and external rural areas that may contribute in future to site SWM facilities. With regard to the Midhurst Heights Development, a SWM pond block has been identified which will serve the subject lands and other future development lands (Frankcom, John's) with expansion capability in the future as required. In our opinion, the location of the Midhurst Heights Development pond is suitably located. Some uncontrolled areas around the periphery of the site and within the external lands (for example, the existing church property on the Frankcom lands) have been identified and accounted for in the analysis. We note that other areas slated

for future development along Gill Road are nominal and will be addressed through the cumulative impact assessment in Phase 2.

Comment 6.1
GEO Morphix Ltd. has completed an assessment of the impacts of the stormwater outfall on the geomorphology of the receiving watercourse. Azimuth Environmental Consulting has also completed an assessment of the ecological impacts of the proposed outlet. Both reports support the suitability of the Gill Road outfall to the Matheson Creek tributary. These reports have been submitted as an Appendix in the OMB Summary Document.

Comment 6.2
See Comment 2.1

Comment 6.3
Conveyance routes for EXT1 and EXT2 have been assessed in the June 26th and OMB Summary Documents to confirm the assumption that runoff from EXT1 can feasibly be bypassed around the development. To be conservative, bypassing of flows from the lands south of Doran Road has not been I included in the Phase 1 analysis, to provide a conservative pond block sizing. The potential to bypass these lands will be explored in Phase 2.

Comment 6.4
Acknowledged.

Comment 6.5
External drainage area EXT1 is not part of the Midhurst Secondary Plan area, and will therefore not be developed in the foreseeable future. Assessment of proposed flows to the North and Gill Road outlets in the case of development of the John's lands was included in the June 26th submission and is captured in the OMB Summary Document.

Comment 6.6
To be addressed by SCS Consulting.

Comment 7.1
Given the implementation of LIDs on the site, and the proposed 3km long outlet pipe to the Gill Road outlet, thermal impacts will be mitigated by the proposed design.

Comment 7.2
See Comment 7.1.

Comment 7.3
Acknowledged. The naturalization and shading of the stormwater facilities will be further addressed at the detailed design stage.

Comment 7.4
See comment 6.1

Comments 8.0 through 8.8
To be addressed by SCS Consulting Group on behalf of the Midhurst Landowner Group.

Comment 9.0
The developers have agreed that the Draft Plans may be altered based on the results of Phase 2 analysis. Assessment of potential plan adjustments or mechanisms is premature until the nature of any Phase 2 issues are known. At that time, plans may be adjusted as required to meet environmental targets.

Comments 10.0 through 10.2
To be addressed in Phase 2 of the MDP.

Comment 10.3
To be addressed by SCS Consulting Group on behalf of the Midhurst Landowners.

Comment 11.1
a) Azimuth Environmental Consulting will submit a review of the historic policies and decisions with respect to natural heritage and environmental features in the Midhurst Heights development.
b) Park areas and the designated SWM Block area are provided to meet SWM objectives.
c) Right-of-way LIDs have conservatively not been accounted for in the Phase 1 analysis. Further investigation of their appropriateness for implementation on the Midhurst Heights site will be undertaken in Phase 2.
d) To be addressed through detailed design.

Comment 11.2
Acknowledged. To be addressed in Phase 2.

Comment 11.3
Azimuth Environmental Consulting will be addressing species at risk as part of a report on natural heritage features.

We trust that these responses are sufficient to confirm that Ainley & Associates' concerns have been addressed, and are reflected in the Summary Document.

Sincerely,

C.F.CROZIER & ASSOCIATES INC.



Kaitlin Wilmshurst, E.I.T.

KW /af

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\Memos\2014 07 30 Ainley Comment Response.docx

APPENDIX E

Geomorphology and Ecology Studies

GEO Morphix Ltd.
348 Bronte Street South, Unit 2
Milton, Ontario L9T 5B6
T 416.920.0926
e balance@geomorphix.com

Glenn Switzer
NVCA
8195 8th Line
Utopia, ON
L0M 1T0

Attention: Glenn Switzer

Re: Opinion Regarding Stormwater Management and Instream Erosion, Midhurst Rose Alliance.

Introduction

GEO Morphix Ltd. was retained by Alliance Homes to review preliminary storm water management plans associated with the Midhurst Rose Alliance in the context of instream erosion and impact to river processes.

It is our understanding that the NVCA have directed the proponent to propose alternative outlets for the development due to concerns with regards to erosion and impact to watercourse function of the two existing receiving watercourses. At present, an alternative outlet is proposed to run north along Gill Road to be released to a larger tributary of Matheson Creek. This outlet is approximately 2 km upstream of the confluence of the current tributaries that drain the development area. The increase in flow volume and peaks between the confluence and proposed outlet, if unmitigated, could impact stream function and exacerbate rates of erosion along this length of the watercourse.

To address these concerns a preliminary assessment was completed that included review of the background materials related to the conceptual stormwater management plan, subwatershed and development. This was supplemented with a preliminary geomorphological assessment that included both a desktop assessment and initial observations collected from the potential receiving watercourses.

From this assessment an opinion is provided on the feasibility of the plan to address instream erosion. Along with this opinion is a proposed process for later phases of planning and design of the development to assure that the stormwater management plan can mitigate potential negative impacts to instream channel function and erosion.

Background Review

Stormwater Management Approach

As part of the background review, parts of the following documents were reviewed:

- Consolidated Hydrogeological Evaluation for the proposed residential development of Midhurst Rose Alliance, Township of Springwater (Vespra) (2008);
- Soils Suitability and Preliminary Development Impact Evaluation for the proposed residential development of Maple Lane Estates, Township of Springwater (Vespra) (2006);
- Soils Suitability and Preliminary Development Impact Evaluation for the proposed residential development of Meadows of Midhurst, Township of Springwater (Vespra) (2006).

- Hydrographs for 25mm event, 2 year Chicago, 2 year SCS, 5 year Chicago and 5 year SCS storms for pre- and post- development conditions provided by C.F. Crozier & Associates Inc (Crozier).

- Willow Creek Subwatershed Study (NVCA, 2001).

- Midhurst Heights Development NVCA Comment Response Letter (C.F. Crozier & Associates, May 27, 2014)

It is our understanding that the current preliminary stormwater management plan proposes to address instream erosion and maintenance of flows to receiving watercourses with the following approach.

- SWMF and LIDs to address post-development flows from the Midhurst Heights development area (approximately 97ha) and additional 11.6ha of external development land that will likely in future contribute to the proposed pond;
- Providing maintenance flows to two of the original receiving tributaries of Matheson Creek;
- A significant portion of the remaining flow would be retained and infiltrated onsite (this plan currently suggests that through synthetic event based modelling that the 4 hour 25 mm event through a significant portion of the 2 year event can be maintained onsite);
- Remaining stormwater release would be sent north along Gill Road to be released to a tributary to Matheson Creek (the flows would have their peak flows shaved through onsite retention with a post-development Chicago event peaks at the 25 mm event, 2-year, 5-year of 0.00 cms, 0.037 cms and 0.12 cms, respectively); and
- A monitoring and adaptive management plan to address unanticipated changes.

Watershed

The development falls within the Willow Creek Subwatershed and the Midhurst Secondary Plan Area. The development consists of 97 hectares with a combined site and external drainage area of 2.5 sq. km at the existing site outlets (neglecting areas of trapped drainage which do not contribute in small storm events). It currently drains into two small tributaries of Matheson Creek. Matheson Creek provides coldwater habitat and substantial discharge to the Nottawasaga River system. The upstream section of these tributaries lie within an area of drumlinized till plain and drain into kame moraine and sand plain at the confluence of the main stem of Matheson Creek. The tributary area for the Gill Rd outlet (identified as subcatchment 715 in the Willow Creek Subwatershed Plan) consists of 20.5 sq. km. The 5-year expected discharge is 6.9 m^3/s (MacLaren Plansearch, 1988). This is not expected to change post-development. The tributary area for Matheson Creek downstream of the tributaries draining the the Midhurst Rose Alliance lands (outlet of subcatchment 716) is 74.4 sq. km with a 5-year expected discharge of 27.3 m^3/s at the outlet (MacLaren Plansearch, 1988).

Reach Delineation

To facilitate discussion preliminary reach delineation has been completed (this would need to be refined at later stages of study). Reach delineation is a prerequisite of a geomorphological assessment. As it provides a logical length of channel for which the meander belt width can be considered to be consistent. Reaches divide watercourses into homogeneous channel segments. These segments have similar inputs and outputs and controls. Indicators for reach breaks include: changes in channel and valley planform; local variation physiography; variation in land cover (land use or vegetation); new inputs from confluences or valley wall contacts; changes in soil types and surficial geology; abrupt changes in slope; and local human modifications . Reaches are delineated

first in desktop assessment and then field verified (a reach map is provided in **Appendix A**). Not all reaches mapped were assessed in the field study due to their unimportance to the development project.

Three major areas of the watershed and their tributaries were delineated based on physiography, surficial geology and topography. The northernmost branch (containing primarily MTN1, MTN2 and MTN3) was delineated due to the Sand Plain physiography and overlying foreshore-basinal deposits. The topography is low-lying relative to the other areas discussed. The middle area containing the main branches of MTS2, MTS3 and MTS4 was delineated because the upstream section is in a drumlinized till plain leading away from the development and the downstream section ends in sand plain. The southernmost branch, containing the tributaries to MTS2, is the highest in terms of topography out of each branch and has a similar geological composition to the middle branch, although it passes through a large area of alluvial deposits. Maps of local surficial geology and physiography and reaches are provided in **Appendix B**.

Field observations

Field observations were collected on June 12th and June 13th 2014. These observations are preliminary in nature and a more thorough geomorphological work plan would be developed to support the storm water management plan. These include:

- Reach characteristics in the proximity of road crossings using a modified Downs' model (1995) and a modified River Styles classification system (Brierley and Fryirs, 2005);
- Measurements of bankfull and wetted width and depth;
- Detailed cross-sections including measurements of velocity at 10 cm intervals, where applicable;
- Observations of sediment transport including video of active bed load transport and sample collection over a period of time using sediment traps on the bed, where applicable;
- Photographic record of field visits and equipment set-up;
- Samples of bed and bank materials (analysis still to be completed); and
- Measurements of dissolved oxygen, conductivity and water temperature, where applicable.

Downs' model of channel evolution is a method used to evaluate the magnitude and potential for channel instability. Downs' model uses physical indicators of systematic adjustment including channel, bank and bar morphology and stability to classify the type of channel evolution. By classifying channels using this model, we can infer the nature of fluvial and hillslope processes that are working to change the system. (Simon and Downs, 1995; Downs, 1995).

Brierley's River Styles framework characterizes rivers based on dominant processes and channel type. Classifying dominant processes and channel type provides information and understanding of the active processes, relative stability, dominant sediment transport mechanisms and the energy in a system. This framework also indicates the type and degree of sinuosity, the gradient, confinement and the number of channels that are present in equilibrium conditions. This information provides insight about geomorphic structure, function and evolutionary trajectory of a river system. (Brierley and Fryirs, 2005).

Over 2 days, the following reaches were visited as part of the field study:

- MTN3 downstream of the culvert, in proximity to the crossing at Gill Rd
- MTN4 upstream of the culvert in proximity to the crossing at Gill Rd
- MTN3-c downstream of the culvert in proximity to the crossing at Gill Rd

- MTN3-c upstream of the culvert in proximity to the crossing at Gill Rd
- Confluence connecting MTN3 and MTN3-c downstream of Gill Rd
- MTN3-b upstream of the culvert at Gill Rd at the confluence with MTN3-c
- MTS3 upstream and downstream at the crossings both at Gill Rd and at McGowan Rd
- MTN2-3 in proximity to the crossing at Gill Rd
- MTN2-4 in proximity to the crossing at Gill Rd
- MTS4 downstream of Russell Rd
- MTS3-d upstream of Craig Rd
- MTS2-2 upstream of the culvert at the CN rail crossing

MTN3 downstream of the culvert was visited both on June 12th and June 13th. This reach is characterized as a mixed-load dominated, meandering channel. The dominant bed material was sand throughout the entire length of observed reach. There was evidence of limited active bed load transport on June 12th and 13th. June 12th appeared to be close to the entrainment threshold with only limited entrainment and transport. On both days a detailed cross-section of the creek was measured at 10 cm intervals. These cross-sections included measurements of wetted and bankfull depth and velocity measurements taken with a drifters (wiffle ball) and Global Water current meter. Using these measurements, it was possible to calculate discharge on each day. Averages of these measurements are provided below in **Table 1** and **Table 2.** Averages for the surface drifters were corrected with a correction factor of 68% following standard practices for the water depth on the day. It should be noted that there was very limited transport along reach MTN4 and no transport on MTN3 on June 12th and limited transport on June 13th along MTN3 and MTN4. This indicates that the discharge values on the day are near threshold.

MTN4 upstream of the culvert was visited both on June 12th and June 13th as well. This reach is very similar to MTN3 immediately downstream of the culvert. Averages of bankfull, wetted and discharge measurements are provided below in **Table 1** and **Table 2.**

MTN3-c downstream of the road crossing was visited on both days, while MTN3-c upstream was visited only on June 13th. These reaches were characterized as suspended-load dominanted meandering channels. The bed materials were primarily sand, although larger gravels were observed in the riffles. This reach was partially confined. Qualitatively, there was no and/or limited transport on June 12th and limited on June 13th. There is a confluence downstream of Gill Rd connecting MTN3 and MTN3-c. Averages of bankfull, wetted and discharge measurements are provided below in **Table 1** and **Table 2.**

All other reaches that were visited showed no sign of a defined channel and were heavily encroached with vegetation. The only exception to this was MTS3 upstream and downstream of Gill Rd, where some channel definition was observed, however there was no water. Upstream of Gill Rd, the bankfull estimates were 2.8 m in width and 0.1 m in depth. Downstream of Gill Rd the culvert was elevated resulting in a depression from the falling flow downstream of the culvert. There was no water on the day, however the hole was measured at 3.8 m wide, 0.8 m deep and 5.0 m long. No obvious channel definition existed beyond this point.

A photo record is provided in **Appendix C** which contains the locations of detailed cross section observations.

Table 1. Observations taken on June 12th 2014

Site	Bankfull Width of XS (m)	Wetted Width of XS (m)	Average Bankfull Depth (m)	Average Wetted Depth (m)	Average Velocity (m/s)	Calculated Discharge (m^3/s)
MTN3 D/S culvert	3.5	3.3	0.78	0.35	0.24	0.26
MTN4 U/S culvert	3.3	2.4	0.64	0.37	0.31	0.29
MTN3-c D/S culvert	3.0	2.0	0.50*	0.20*	N/A	N/A

* indicates that measurement was estimated.
** note that velocities were calculated at surface. A correction factor of 68% is applied to account for channel average.

Table 2. Observations taken on June 13th 2014

Site	Bankfull Width of XS (m)	Wetted Width of XS (m)	Average Bankfull depth (m)	Average Wetted Depth (m)	Average Velocity (m/s)	Calculated Discharge (m^3/s)
MTN3 D/S culvert	4.55	2.9	0.77	0.30	0.40	0.33
MTN4 U/S culvert	2.7	2.1	0.68	0.40	0.26	0.25
MTN3-c D/S culvert	3.0	2.0	0.32	0.11	0.12	0.03
MTN3-c U/S culvert	2.25	1.6	0.22	0.13	0.19	0.04

Stormwater Management Strategy

Substantial onsite LIDs are currently proposed to provide substantial onsite detention and infiltration. Additional tools or opportunities that can be evaluated through later design and planning phases include open or perforated pipe as conveyance of flows along Gill Road to further increase infiltration and detention of flow, multiple release points distributing flows to several tributaries along Gill Road to distribute the additional volume and mitigate peaks.

From an erosion perspective, much of the impact to stream process is associated with increases in flow volume and peak of high frequency, low magnitude storm events. This has been shown by numerous studies (Villard and Parish, 2003; Villard and Ness, 2006, CVC, 2012). These events

occur often enough that over a long period of time, they have the greatest impact on channel morphology. This is of even greater significance in streams with low erosion thresholds, such as the sand-based environments examined. During larger magnitude, lower frequency events, minor increases in peak flow or volume are mitigated by energy dissipation within the floodplain. The current conceptual plan aims to address these frequent events through onsite detention and infiltration.

At present, there are two scenarios proposed by Crozier regarding onsite control and pond controlled retention. These event based models in both cases provide reduced peak and volume compared to pre-development conditions to the present day receiving watercourses. Based on onsite detention through LIDs, the 25 mm event and a substantial portion of the 2 year and 5 year returns are maintained onsite. The release south along Gill Road has a peak of 0.10 m^3/s and 0.33 m^3/s for the 2 year and 5 year SCS return respectively. The Chicago return event peaks at 0.04 m^3/s and 0.11 m^3/s for the 2 year and 5 year event respectively. See **Table 3** below for the preliminary assessment of the erosion threshold based on an average of the discharge measurements recorded for the main tributary at Gill Rd. Note that flows on the day of data collection were slightly above the threshold for entrainment for this particular tributary.

Table 3. Event based returns and release rates.

	Reference return events (cms)		*Release rate as a proportion of Reference Return Events(%)*	
	SCS Return	**Chicago Return**	**SCS Return**	**Chicago Return**
25 mm	N/A	0.00	N/A	0.1
2 year	0.10	0.04	44.2	17.7
5 year	0.33	0.11	146.0	48.7

It is our understanding that there is still substantial infiltration capacity, opportunities to peel-off flows to the original receiving watercourses, longer detention times and peak shaving and alternative conveyance along Gill Road (to allow for further infiltration). It should also be noted that synthetic storms are generally conservative in nature. Given these factors, there is still capacity for further mitigation and as such impacts to instream erosion can very likely be mitigated/addressed.

Suggested Approach Moving Forward

To assure that the finalized SWM plan provides a site appropriate solution, the following strategy is suggested:

SWM/LID measures assist in mitigating potential impacts to natural heritage features in multiple ways, including provision of groundwater recharge, instream erosion mitigation, and benefits to water quality. The SWM/LID strategy is recommended with a number of measures that will contribute to erosion mitigation. Outlined below is a summary of the suggested erosion mitigation analyses and strategy.

- All stream reaches receiving flow should be field assessed using a standard field assessment protocols including identification of sensitive reaches, mapping wall contacts and areas of active erosion. Further detailed field characterization should be computed for sensitive reaches using standard protocols such as those allowed by TRCA/CVC (CVC,

2012; TRCA, 2012). The sensitive reaches function as indicators in the system and provided conservative erosion thresholds for the identification of stormwater management targets.

- Develop a continuous surface water model to assess different SWM strategies. Different extended detention strategies in combination with onsite retention should be assessed.

- The results of the model should be used as input for erosion analyses based upon time of exceedance, number of exceedances, cumulative effective stream power, and erosion index approach. This will allow evaluation of erosion potential based upon number, total time, effective force and total effective stream power. These measures are a good surrogate for transport rates. This will allow development of an optimized combination of LID measures and extended detention storage for the greatest reduction in erosion potential.

- End-of-pipe facilities reduce peak flows by detaining the stormwater and releasing it slowly over time. LID measures function to reduce runoff volumes by increasing infiltration and evapotranspiration and to provide extended detention and reduction of peak flows. The proposed LID strategy in combination with the end-of-pipe SWM facilities will therefore mitigate in-stream erosion potential, especially during low magnitude high frequency events.

- Monitoring of instream erosion should form part of the proposed adaptive management approach and overall SWM strategy. It is suggested that this program establish a watercourse monitoring program that includes, but may not be limited to fluvial geomorphological and fisheries monitoring. The fluvial geomorphology component of the program should address potential adjustment in channel geometry, rates of change with regards to channel adjustment and instream sediment characteristics.

- It is our understanding that the Client is open to an adaptive management approach. This provides a mechanism to adapt designs should future monitoring indicate the occurrence of unacceptable erosion impacts.

Overall, the preliminary comprehensive approach detailed provides a practical strategy to move forward in mitigating against stream erosion.

I trust this letter meets you current requirements. If you have any question please contact the undersigned.

Respectfully submitted,



Paul Villard Ph.D., P.Geo., CAN-CISEC
Director, Geomorphologist
CC: Alex Troop, Alliance Homes Ltd. & Chris Crozier, C.F. Crozier & Associates Inc.

References

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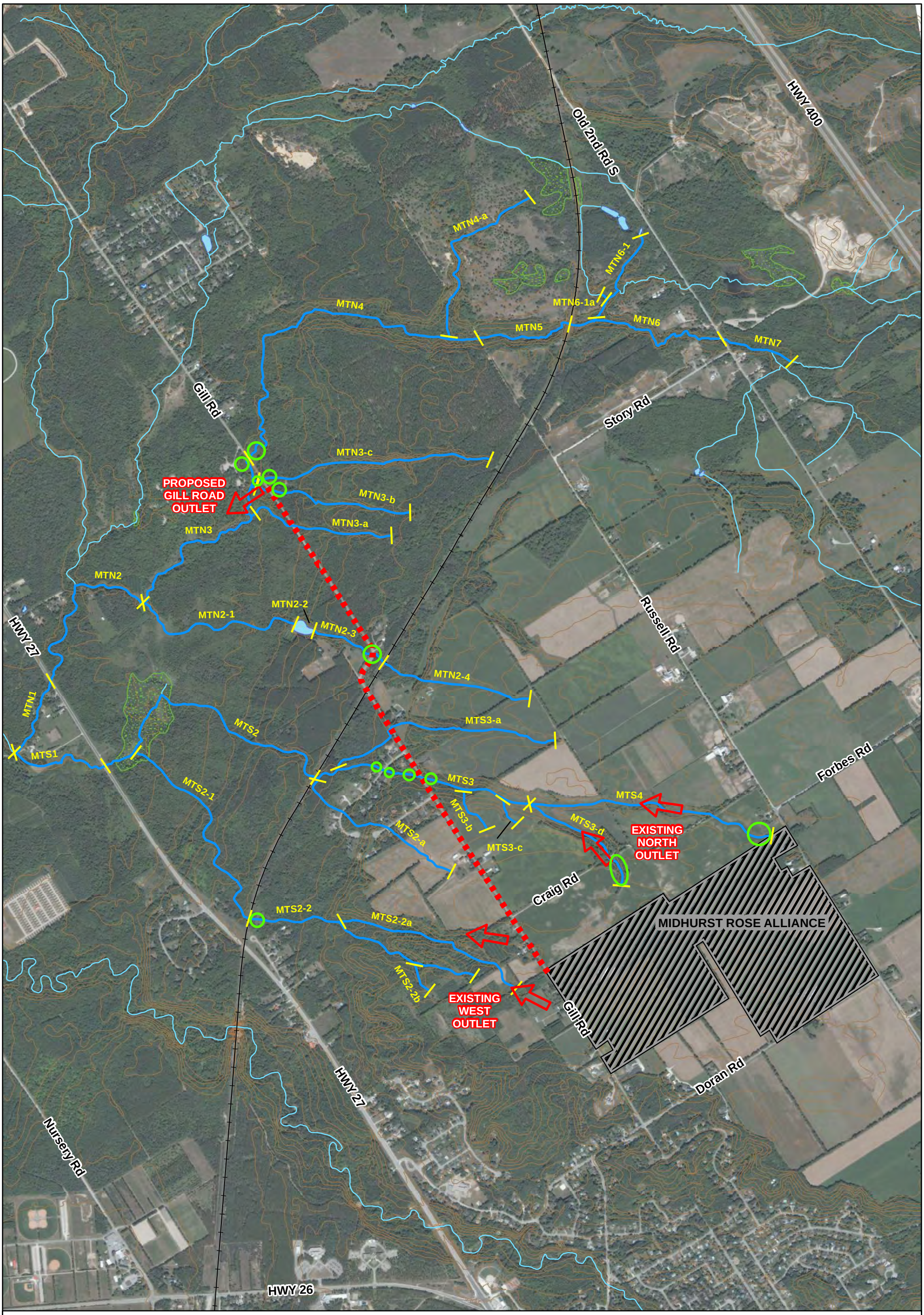
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Appendix A



LEGEND

- Field sites visited
- MTN2 — Reach break and label
- 5 m Contour
- Watercourse
- Waterbody
- Wetland
- Proposed pipe and open ditch flow route

Reach Delineation

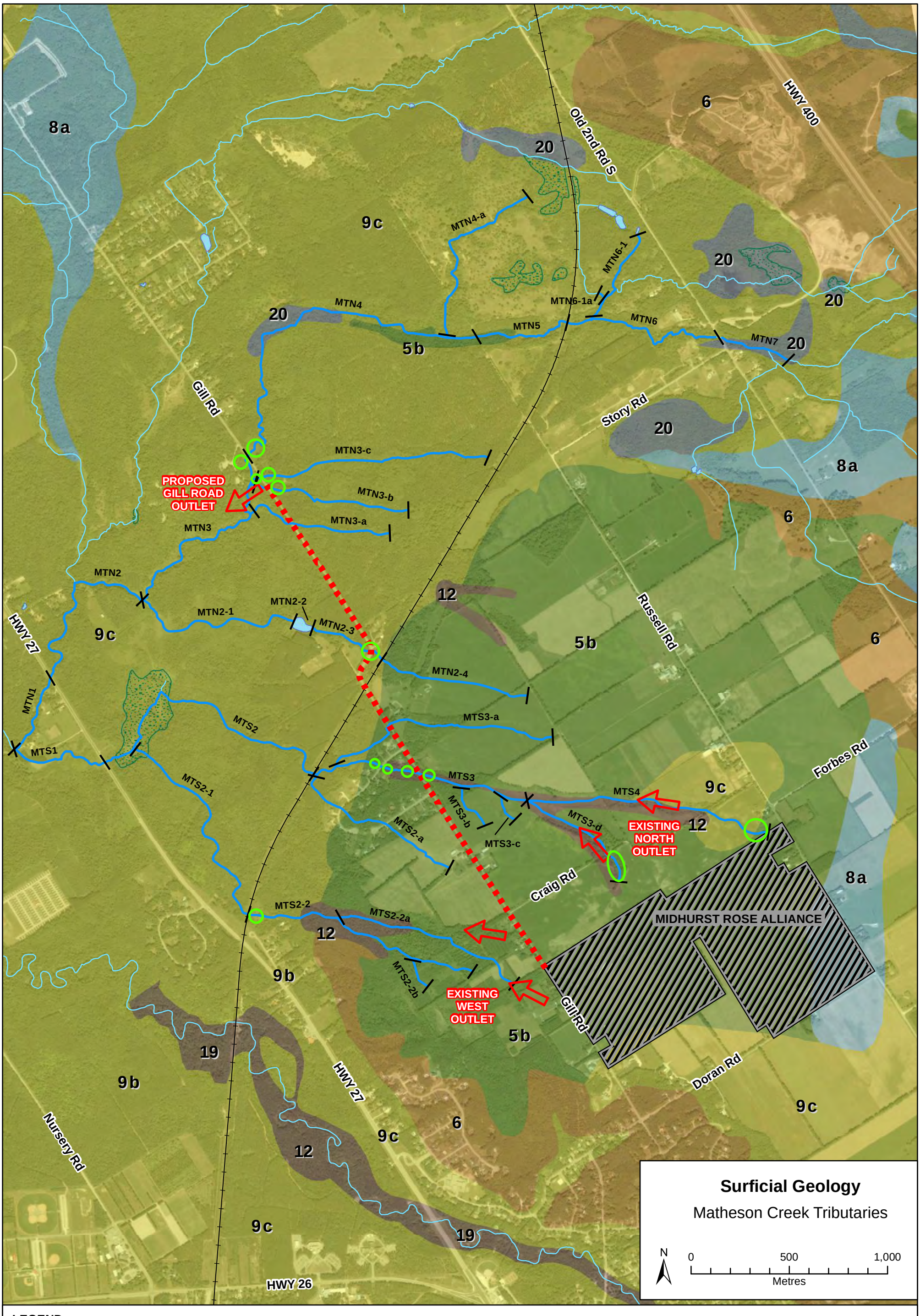
Matheson Creek Tributaries

N

0 500 1,000

Metres

Imagery: Google Earth Pro, 2006. Field sites visited, and Reach break and label: GEO Morphix Ltd., 2014. 5 m Contour: MNR, 2003.
Proposed pipe and open ditch flow route, Proposed and existing outlets, and Midhurst Rose Alliance: C.F. Crozier & Associates Inc., 2014.
Watercourse: County of Simcoe, 2014, and C.F. Crozier & Associates Inc., 2014. Waterbody and Wetland: County of Simcoe, 2014.



LEGEND

- Field sites visited
- MTN2 — Reach break and label
- Watercourse
- Waterbody
- Wetland
- Proposed pipe and open ditch flow route

Surficial Geology

- 5b — Stone-poor, carbonate-derived silty to sandy till
- 6 — Ice-contact stratified deposits
- 8a — Massive-well laminated
- 9b — Littoral-foreshore deposits
- 9c — Foreshore-basinal deposits
- 12 — Older alluvial deposits
- 19 — Modern alluvial deposits
- 20 — Organic deposits

Imagery: Google Earth Pro, 2006. Field sites visited, and Reach break and label: GEO Morphix Ltd., 2014. Surficial geology: Ontario Geological Survey, 2010.
Proposed pipe and open ditch flow route, Proposed and existing outlets, and Midhurst Rose Alliance: C.F. Crozier & Associates Inc., 2014.
Watercourse: County of Simcoe, 2014, and C.F. Crozier & Associates Inc., 2014. Waterbody and Wetland: County of Simcoe, 2014.

Appendix B

Photo 1	
	MTN3 Looking upstream from right bank Note location of cross-section and bedload observations relative to Gill Rd
Photo 2	
	MTN3 Looking upstream from right bank Note location of cross section and additional equipment

Photo 3	
	MTN3 Looking downstream from Gill road Note location of cross-section observations and bedload sampler
Photo 4	
	MTN4 Looking upstream from centre of channel Note location of cross-section observations

Photo 5	
	MTN3 Looking upstream from right bank Note location of cross-section observations
Photo 6	
	MTN3 Looking upstream from right bank Note location of cross-section observations, bedload sampler and bedload video cameras

Photo 7	
	MTN3-c Looking across channel from left bank D/S of culvert Note location of cross-section
Photo 8	
	Confluence of **MTN3 and MTN3-c**

Photo 9	
	MTN3-c Looking upstream from centre of channel Note location of cross-section obervations
Photo 10	
	Confluence of **MTN3-c** and **MTN3-b** Note dimensions of MT3N-b

Photo 11	
	Channel cross-section of **MTS3** upstream of Gill Road. Note extreme vegetation encroachment and limited channel definition.
Photo 12	
	Channel cross-section of **MTS3** upstream of McGowan Place. Note extreme vegetation encroachment and limited channel definition.

Appendix C

GEO | MORPHIX

Detailed Cross-section **PN:** 14026

Date:	June 12, 2014	**Stream/Reach:**	MTN4
Weather:	30°C, cloudy	**Location:**	U/S culvert @ Guill Rd
Field Staff:	PV/ER	**Watershed/Subwatershed:**	Willow Creek

Data collected: Velocity ☐ Bed Load ☐ Bed Sample ☑ Surface Velocity ☑ Suspended Load ☑ Bank Sample ☐ **UTM:**

XS #	Distance (m)	BF Depth (m)	Wetted Depth (m)	Velocity (m/s)	BL	SL	Notes
2	0.0	0.05	0.0				
	0.1	0.06	0.0				
	0.2	0.07	0.0				
	0.3	0.06	0.0				
	0.4	0.70	0.21				
	0.5	0.73	0.25				
	0.6	0.80	0.32				
	0.7	0.80	0.34				
	0.8	0.83	0.38				
	0.9	0.85	0.40				
	1.0	0.84	0.39	0.38			
	1.1	0.81	0.38				
	1.2	0.81	0.38	0.49			
	1.3	0.77	0.35				
	1.4	0.77	0.35	0.39			
	1.5	0.78	0.36				
	1.6	0.85	0.43				
	1.7	0.87	0.45	0.57			
	1.8	0.87	0.46				
	1.9	0.89	0.47				
	2.0	0.86	0.45	0.51			
	2.1	0.85	0.44	0.49			
	2.2	0.82	0.41				
	2.3	0.82	0.39	0.45			
	2.4	0.84	0.40				

Notes: velocity measurements taken w wiffle ball.

GEO | MORPHIX

Detailed Cross-section **PN:** PN14026

Date:	June 12, 2014	**Stream/Reach:**	MTN4
Weather:	30°C, cloudy	**Location:**	D/S culvert @ Gill Rd
Field Staff:	PV/ER	**Watershed/Subwatershed:**	Willow Creek

Data collected: Velocity ☐ Bed Load ☐ Bed Sample ☑ Surface Velocity ☑ Suspended Load ☐ Bank Sample ☐ **UTM:**

XS #	Distance (m)	BF Depth (m)	Wetted Depth (m)	Velocity (m/s)	BL	SL	Notes
2	2.5	0.82	0.40				
	2.6	0.75	0.32				
	2.7	0.74	0.30				
	2.8	0.75	0.20				
	2.9	0.27	0				
	3.0	0.28	↓				
	3.1	0.24					
	3.2	0.25					
	3.3	0.23					

Notes:

GEO | MORPHIX

Detailed Cross-section **PN:** 140126

Date:	June 12, 2014	**Stream/Reach:**	MTN 3
Weather:	30°C, cloudy	**Location:**	D/S Culvert @ Gill Rd
Field Staff:	PV/ER	**Watershed/Subwatershed:**	Willow Creek

Data collected: Velocity ☑ Bed Load ☐ Bed Sample ☑ Surface Velocity ☑ Suspended Load ☑ Bank Sample ☑ **UTM:**

XS #	Distance (m)	BF Depth (m)	Wetted Depth (m)	Velocity (m/s)	BL	SL	Notes
1	0.0	0.0	0.0				
	0.1	0.0	0.0				
	0.2	0.0	0.0				
WE	0.3	0.60	0.17				
	0.4	0.62	0.20				
	0.5	0.65	0.24				
	0.6	0.68	0.27				
	0.7	0.69	0.28				
	0.8	0.69	0.28				
	0.9	0.73	0.33	0.30			
	1.0	0.78	0.38				
	1.1	0.79	0.38	0.39			
	1.2	0.79	0.38				
	1.3	0.80	0.40	0.42			
	1.4	0.80	0.40				
	1.5	0.83	0.43				
	1.6	0.86	0.45	0.55			
	1.7	0.89	0.49				
	1.8	0.86	0.45				
	1.9	0.84	0.43	0.37			
	2.0	0.84	0.42				
	2.1	0.86	0.43				
	2.2	0.85	0.42				
	2.3	0.82	0.38	0.42			
	2.4	0.80	0.37				

Notes:

velocity measured in wiffle ball

GEO | MORPHIX

Detailed Cross-section **PN:** PN14026

Date:	June 12, 2014	**Stream/Reach:**	MTN3
Weather:	30°C, cloudy	**Location:**	D/S culvert @ Gill Rd
Field Staff:	PV/ER	**Watershed/Subwatershed:**	Willow Creek

Data collected: Velocity ☐ Bed Load ☐ Bed Sample ☐ Surface Velocity ☐ Suspended Load ☐ Bank Sample ☐ **UTM:**

XS #	Distance (m)	BF Depth (m)	Wetted Depth (m)	Velocity (m/s)	BL	SL	Notes
1	2.5	0.80	0.35	0.32			
|	2.6	0.81	0.37	0.30			
|	2.7	0.83	0.38				
|	2.8	0.85	0.38	0.17			
|	2.9	0.82	0.34				
|	3.0	0.81	0.32				
|	3.1	0.80	0.31				
|	3.2	0.71	0.22				
↓ WE	3.3	0.69	0.18				

Notes:

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Detailed Cross-section **PN:**

Date:	June 13, 2014	**Stream/Reach:**	MTN3-c
Weather:	30°C, cloudy	**Location:**	U/S culvert @ Gill Rd
Field Staff:	PV/ER	**Watershed/Subwatershed:**	Willow Creek

Data collected: Velocity ☑ Bed Load ☑ Bed Sample ☐ Surface Velocity ☐ Suspended Load ☐ Bank Sample ☐ **UTM:**

XS #	Distance (m)	BF Depth (m)	Wetted Depth (m)	Velocity (m/s)	BL	SL	Notes
4	0.4	0.120	0.020	Ø			too shallow
	0.5	0.120	0.020	Ø			to measure
	0.6	0.130	0.050	Ø			velocity
	0.7	0.150	0.080	Ø			*
	0.8	0.150	0.090	0.2			
	0.9	0.190	0.120	0.3			Bed load
	1.0	0.200	0.130	0.3			sample
	1.1	0.220	0.150	0.2			taken
	1.2	0.230	0.160	0.2			mid-channel
	1.3	0.240	0.160	0.2			
	1.4	0.230	0.150	0.2			
	1.5	0.290	0.180	0.2			
	1.6	0.290	0.185	0.2			
	1.7	0.320	0.200	0.2			
	1.8	0.320	0.190	0.1			
	1.9	0.300	0.170	0.1			
	2.0	0.270	0.120	0.0			

Notes:

* Bed load sampler left for 30 minutes

GEO | MORPHIX

Cross-section Details

PN: 14026

Date:	June 13, 2014	**Stream/Reach:**	MTN3-c
Weather:	30°C, cloudy	**Location:**	D/S culvert @ Gill Rd
Field Staff:	LD/ER	**Watershed/Subwatershed:**	Willow Creek

Data collected: Velocity ☑ Bed Load ☐ Bed Sample ☐ Surface Velocity ☐ Suspended Load ☐ Bank Sample ☐

XS #	Distance (m)	BF Depth (m)	Wetted Depth (m)	Velocity (m/s)	BL	SL	Notes
3 WE	0.1	0.393	0.060	0.1			
	0.2	0.420	0.110	0.0			
	0.3	0.420	0.130	0.0			
	0.4	0.425	0.155	0.0			
	0.5	0.415	0.160	0.1			
	0.6	0.410	0.170	0.2			
	0.7	0.385	0.160	0.3			
	0.8	0.350	0.150	0.4			
	0.9	0.340	0.140	0.4			
	1.0	0.320	0.130	0.2			
	1.1	0.315	0.110	0.0			
	1.2	0.280	0.100	0.1			
	1.3	0.280	0.120	0.2			
	1.4	0.270	0.110	0.1			
	1.5	0.255	0.000	0.0			
	1.6	0.215	0.070	0.0			
	1.7	0.185	0.040	0.0			
	1.8	0.155	0.020	Ø			too shallow to measure $\vec{v}$ ↓
	1.9	0	0.000	Ø			
	2.0	0	0.000	Ø			
WE	2.1	0	0.000	Ø			

Notes: undercut of 22cm in right bank

GEO | MORPHIX

Cross-section Details

PN: 14026

Date:	June 13, 2014	**Stream/Reach:**	HTN4
Weather:	30°C, cloudy	**Location:**	U/S Culver @ Gill Rd
Field Staff:	LD/ER	**Watershed/Subwatershed:**	Willow Creek

Data collected: Velocity ☑ Bed Load ☑ Bed Sample ☐
Surface Velocity ☐ Suspended Load ☐ Bank Sample ☐

XS #	Distance (m)	BF Depth (m)	Wetted Depth (m)	20% D Velocity (m/s)	Velocity ~~BF~~ 80% D	SL	Notes
2	0.2	0.545	0.170	0.0	0.0		
	0.3	0.540	0.200	0.0	0.0		
	0.4	0.638	0.301	0.1	0.2		
	0.5	0.723	0.402	0.2	0.3		
	0.6	0.708	0.400	0.2	0.3		
	0.7	0.704	0.401	0.3	0.3		
	0.8	0.710	0.425	0.4	0.4		
	0.9	0.710	0.450	0.3	0.3		One bed load sample taken mid-channel
	1.0	0.715	0.445	0.3	0.3		
	1.1	0.715	0.455	0.4	0.3		
	1.2	0.725	0.470	0.4	0.3		
	1.3	0.735	0.480	0.4	0.4		
	1.4	0.735	0.490	0.4	0.2		
	1.5	0.725	0.470	0.4	0.4		
	1.6	0.710	0.460	0.4	0.2		
	1.7	0.688	0.440	0.4	0.3		
	1.8	0.685	0.410	0.4	0.3		
	1.9	0.640	0.390	0.4	0.3		
	2.0	0.670	0.420	0.3	0.2		
	2.1	0.680	0.425	0.2	0.1		
	2.2	0.660	0.395	0.3	0.0		
	2.3	0.610	0.340	0.1	0.0		

Notes:
Heli-smith sampler used for 37 minutes
Home-made sed trap ~~used~~ left for

GEO | MORPHIX

Cross-section Details

PN: 14026

Date:	June 13, 2014	**Stream/Reach:**	MTN3
Weather:	30°C, cloudy	**Location:**	D/S Culvert @ Gill Rd
Field Staff:	LD | ER	**Watershed/Subwatershed:**	Willow Creek

Data collected: Velocity ☑ Bed Load ☑ Bed Sample ☐ Surface Velocity ☐ Suspended Load ☐ Bank Sample ☐

XS #	Distance (m)	BF Depth (m)	Wetted Depth (m)	(20%) Velocity (m/s)	Velocity 80% (m/s)	SL	Notes
1	1.4	0.660	0.180	0.0	0.1		
	1.5	0.670	0.210	0.1	0.1		
	1.6	0.720	0.260	0.2	0.2		
	1.7	0.740	0.290	0.4	0.3		
	1.8	0.770	0.220	0.4	0.4		
	1.9	0.700	0.310	0.4	0.3		
	2.0	0.750	0.280	0.5	0.3		
	2.1	0.700	0.260	0.4	0.3		
	2.2	0.720	0.260	0.5	0.5		one bed
	2.3	0.780	0.330	0.5	0.4		load sample
	2.4	0.750	0.330	0.6	0.6		taken mid
	2.5	0.750	0.330	0.6	0.5		channel
	2.6	0.750	0.330	0.6	0.5		
	2.7	0.780	0.350	0.6	0.5		
	2.8	0.800	0.370	0.5	0.4		
	2.9	0.850	0.420	0.6	0.5		
	3.0	0.820	0.390	0.6	0.5		
	3.1	0.840	0.390	0.6	0.4		
	3.2	0.820	0.370	0.4	0.4		
	3.3	0.810	0.370	0.5	0.3		
	3.4	0.810	0.340	0.4	0.2		
	3.5	0.800	0.320	0.3	0.1		
	3.6	0.800	0.320	0.4	0.3		
	3.7	0.800	0.310	0.3	0.3		
	3.8	0.800	0.300	0.4	0.3		

Notes:

BL sample taken w Helley-Smith sampler. 8cm in diameter, left for 45 minutes

GEO | MORPHIX

Cross-section Details

PN: 14026

Date:	June 13, 2013	**Stream/Reach:**	MTN3
Weather:	30°C, cloudy	**Location:**	D/S Culvert + @ Gill Rd
Field Staff:	LD/ER	**Watershed/Subwatershed:**	Willow Creek

Data collected: Velocity ☐ Bed Load ☐ Bed Sample ☐
Surface Velocity ☐ Suspended Load ☐ Bank Sample ☐

XS #	Distance (m)	BF Depth (m)	Wetted Depth (m)	Velocity	BL	SL	Notes
1	3.9	0.800	0.240	0.3	0.3		
↓	4.0	0.790	0.270	0.3	0.2		
↓	4.1	0.720	0.170	0.2	0.1		

Notes:

AZIMUTH ENVIRONMENTAL CONSULTING, INC.
Environmental Assessments & Approvals

June 16, 2014 AEC 14-142

Nottawasga Valley Conservation Authority
8195 8th Line
Utopia, ON
L0M 1T0

Attention: Dave Featherstone, Manager, Watershed Monitoring Program

Re: **Thermal impacts of proposed stormwater management outlets**
Midhurst Heights Development, Township of Springwater

Dear Mr. Featherstone:

Azimuth Environmental Consulting Inc. (Azimuth) has been retained by Midhurst Rose Alliance (MRA) to assist in obtaining Draft Plan approval for the Midhurst Heights Development in The Township of Springwater. It is our understanding that the Nottawasga Valley Conservation Authority (NVCA) has provided initial comments on the original Draft Plan Submission, and has requested a preliminary assessment of the thermal impacts to Matheson Creek, a coldwater tributary of Willow Creek, as a result of stormwater discharge.

The current site plan includes an 'L-shaped' stormwater management (SWM) pond located at the west corner of the property, which will collect the majority of surface flow. The SWM pond will outlet into the ditch in the Gill Road right-of-way (ROW), and will include both piped and open sections until it reaches the legal outlet at a Tributary of Matheson Creek. The degree of piping and location of the ditch (i.e. east or west ROW) will be determined during detail design.

Crozier has completed hydrologic modeling for the post-development scenario; it was determined that the Gill Road SWM pond outlet will receive virtually no flow or volume in the <25mm storm event. This size of storm accounts for approximately 90% of all rainfall events. Furthermore, it was determined that during larger storm events, the first 12,900 m^3 will be subject to 48 hour extended detention by orifice control in the SWM pond.

The hydrologic modeling has determined that Matheson Creek will receive storm flows in less than 10% of all rainfall events. It is reasonable to expect that during storm events with greater than 25mm of precipitation, there will be general thermal impacts throughout the entire watershed. During storm events and for several hours after, Matheson Creek will be subjected to inflow of surface run-off from surrounding agricultural fields and roadways, which will have a warming effect at the watershed scale. During these larger storm events, the volume of flow from the Midhurst Heights SWM pond is not expected to be large enough to significantly impact thermal regimes beyond that experienced elsewhere throughout the watershed.

Water temperatures were assessed today, June 13, 2014 at 2:00-2:30 pm. Ambient air temperature was 25.0 °C. Water temperatures in the ditch upstream and downstream of the confluence with the forest feature were 23.7 and 20.6 °C, respectively. Water temperature in the forest feature was 16.1°C. A GPS location for the forest feature was not determined, due to a high degree of cloud cover, resulting in poor satellite reception. It is important to note that Midhurst received 12.7 mm of rain 24 hour prior to the temperature assessment.

Further investigations and mitigation measures regarding thermal impacts will be addressed in an adaptive management plan, which will be completed during detail design. Additionally, the bottom draw outlet on the SWM pond, lot level controls and low impact design elements and their ability to reduce thermal impacts, will be discussed in more detail in the adaptive management plan.

It is expected that this letter adequately addresses the concerns of NVCA. Should there be anything you wish to discuss in more detail, please do not hesitate to contact me directly.

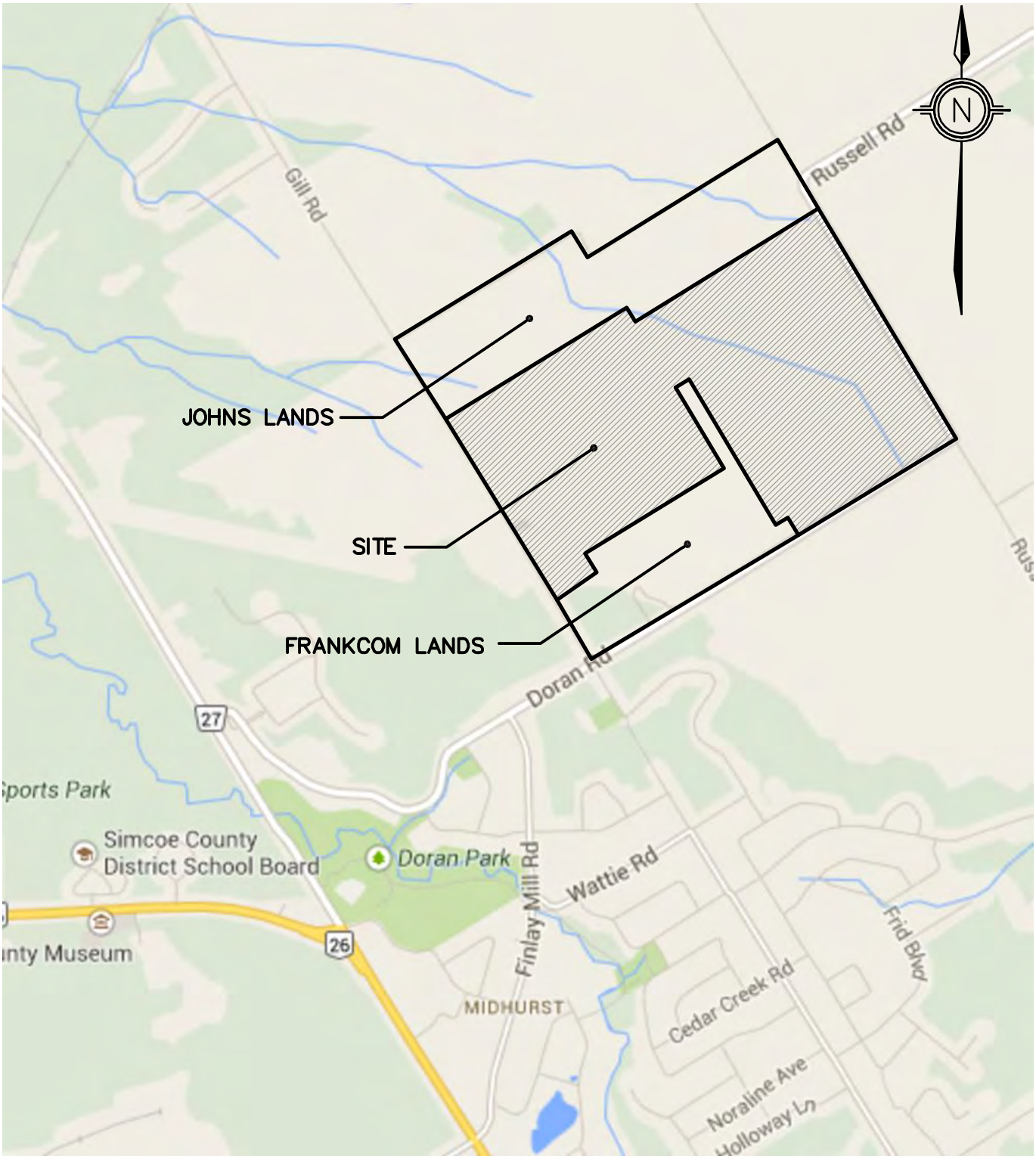
Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.



Kate Ellis, B.Sc.
Aquatic Ecologist
KLE:

LIST OF FIGURES

Figure 1: Site Location Plan
Figure 2: Draft Plan
Figure 3: Water Servicing Plan
Figure 4: Sanitary Servicing Plan
Figure 5A: Drainage Context Plan
Figure 5B: Pre-development Drainage Plan
Figure 6: Storm Servicing and Grading Plan
Figure 7: Stormwater Management Facility Plan
Figure 8: Post-development Drainage Plan
Figure 9: External Flows Conveyance Plan
Figure 10: Preliminary Plan and Profile Gill Road



Legend

= SUBJECT LANDS

Project

MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing

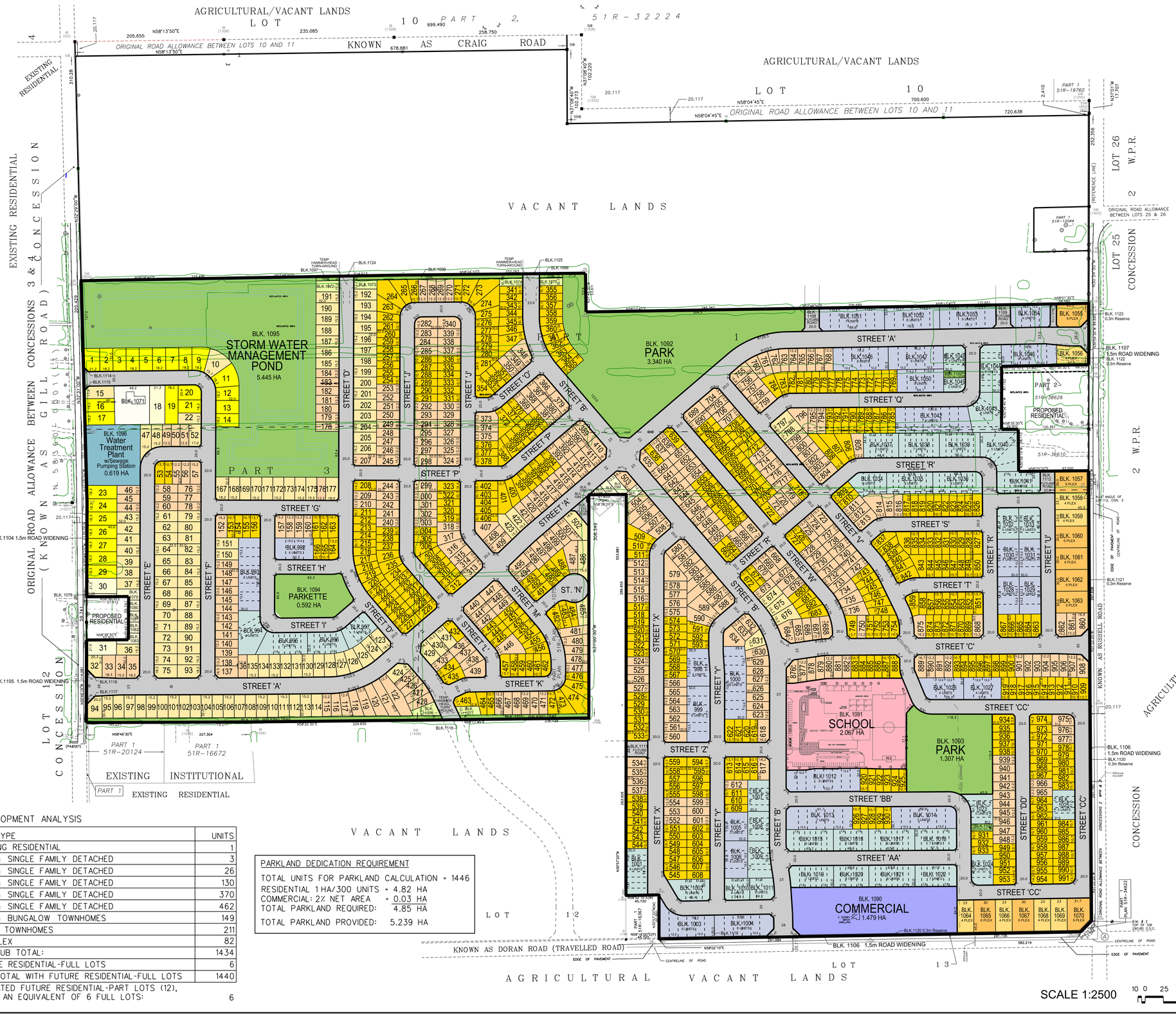
SITE LOCATION

CROZIER & ASSOCIATES Consulting Engineers
The HarbourEdge Building,
40 Huron Street, Suite 301,
Collingwood, ON L9Y 4R3
705 446 3510 T
705 446 3520 F
www.cfcrozier.ca
info@cfcrozier.ca

Drawn By	Design By	Project
L.W.	L.W.	845-3675

Scale	Date	Check By	Drawing
N.T.S.	06/24/2014	K.W.	FIG 1

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\3675 FSR.dwg, FIG 1, 8/1/2014 10:04:51 AM, lwaters



DEVELOPMENT ANALYSIS

UNIT TYPE	UNITS
EXISTING RESIDENTIAL	1
21.3 m SINGLE FAMILY DETACHED	3
18.2 m SINGLE FAMILY DETACHED	26
15.2 m SINGLE FAMILY DETACHED	130
12.2 m SINGLE FAMILY DETACHED	370
10.7 m SINGLE FAMILY DETACHED	462
12.2 m BUNGALOW TOWNHOMES	149
7.6 m TOWNHOMES	211
4/6 PLEX	82
UNIT SUB TOTAL:	1434
FUTURE RESIDENTIAL-FULL LOTS	6
UNIT TOTAL WITH FUTURE RESIDENTIAL-FULL LOTS	1440
ESTIMATED FUTURE RESIDENTIAL-PART LOTS (12), EQUAL AN EQUIVALENT OF 6 FULL LOTS:	6

PARKLAND DEDICATION REQUIREMENT

TOTAL UNITS FOR PARKLAND CALCULATION = 1446
RESIDENTIAL 1 HA/300 UNITS = 4.82 HA
COMMERCIAL: 2% NET AREA = 0.03 HA
TOTAL PARKLAND REQUIRED: 4.85 HA
TOTAL PARKLAND PROVIDED: 5.239 HA

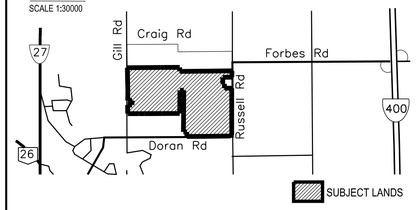
MIDHURST HEIGHTS DEVELOPMENT

DRAFT PLAN OF SUBDIVISION

OF PART LOT 11, CONCESSION 3
AND PART OF LOT 12, CONCESSION 3
(GEOGRAPHIC TOWNSHIP OF VESPRA)
TOWNSHIP OF SPRINGWATER
COUNTY OF SIMCOE

WESTON CONSULTING
planning + urban design

KEY PLAN
SCALE 1:30000



OWNER'S CERTIFICATE:

I authorize Weston Consulting Group Inc. to prepare and submit this plan for draft approval.

SEE ORIGINAL SUBMISSION Date:

ALEX TROOP, PRESIDENT
MIDHURST ROSE ALLIANCE INC.
MIDHURST ROSE ALLIANCE COONEY INC.
MIDHURST ROSE ALLIANCE O'BRIEN INC.
ALLIANCE HOMES LTD.
6048 HIGHWAY 9, UNIT 7
SCHOMBERG, ONTARIO
L0G 1T0
TEL. 905-761-7086 FAX. 905-761-7201

SURVEYOR'S CERTIFICATE:

I hereby certify that the boundaries of the lands being subdivided and their correct relationship to the adjacent lands are accurately and correctly shown on this plan.

SEE ORIGINAL SUBMISSION Date:

C. T. STRONGMAN SURVEYING LTD.
ONTARIO LAND SURVEYORS
4145 BURNSIDE LINE
R.R. No. 4, ORILLIA, ONTARIO
L3V 6H4
TEL. 705-329-0765 FAX. 705-329-0424

ADDITIONAL INFORMATION:

[Section 51(17) of the Planning Act, R.S.O. 1990, c. P. 13], as amended to May 26, 2014.
a), b), e), f), g), & j) - on plan.
c) - on key plan
d) - see statistics
h) - municipal water and sewage services
i) - sandy loam
k) - all services to be made available by developer
l) - nil

DEVELOPMENT STATISTICS:

Residential - Single Family Detached [Lots 1-991]:	41.265 ha
Residential-Bungalow Townhomes (12.2m) [Blks. 992,993,998-1000,1003-1006, 1012-1014,1026-1031,1042,1045-1047,1050-1054]:	6.045 ha
Residential-Townhomes (7.6m) [Blks. 994-997,1001,1002,1007-1011, 1015-1025,1032-1041,1043,1044,1048,1049]:	5.789 ha
Residential - 4&6 Plex [Blks 1055-1070]:	1.941 ha
Existing Residential Lot [Blk. 1071]:	0.261 ha
Future Residential-Full Lots [Blks. 1072-1077]:	0.246 ha
Future Residential-Part Lots [Blks. 1078-1089]:	0.277 ha
Commercial [Blk. 1090]:	1.479 ha
School [Blk. 1091]:	2.067 ha
Neighbourhood Park [Blk. 1092,1093]:	4.647 ha
Parkette [Blk. 1094]:	0.592 ha
Storm Water Management Pond [Blk. 1095]:	5.445 ha
Water Treatment/Sewage Pumping Station [Blk.1096]:	0.619 ha
Trail Blocks [Blks. 1097-1101]:	0.579 ha
Future Well Site [Blks. 1102,1103]:	0.059 ha
Road Widenings [Blks. 1104-1107]:	0.280 ha
Future Roads [Blks. 1108-1112]:	0.305 ha
Future Laneway (8.5m) [Blk. 1113]:	0.028 ha
0.3m Reserves [Blks. 1114-1125]:	0.040 ha
Road:	25.276 ha
TOTAL:	97.240 ha

WESTON CONSULTING
planning + urban design
1-800,363,3558 westonconsulting.com

Vaughan: 201 Millway Ave, Suite 19
Vaughan, Ontario L4K 5K8
T. 905.738.8080 F. 905.738.6637
Oakville: 1660 North Service Rd. E, Suite 114
Oakville, Ontario L6H 7G3
T. 905.844.8749 F. 905.738.6637
Toronto: 127 Berkeley St.
Toronto, Ontario M5A 2X1
T. 416.640.9917 F. 905.738.6637

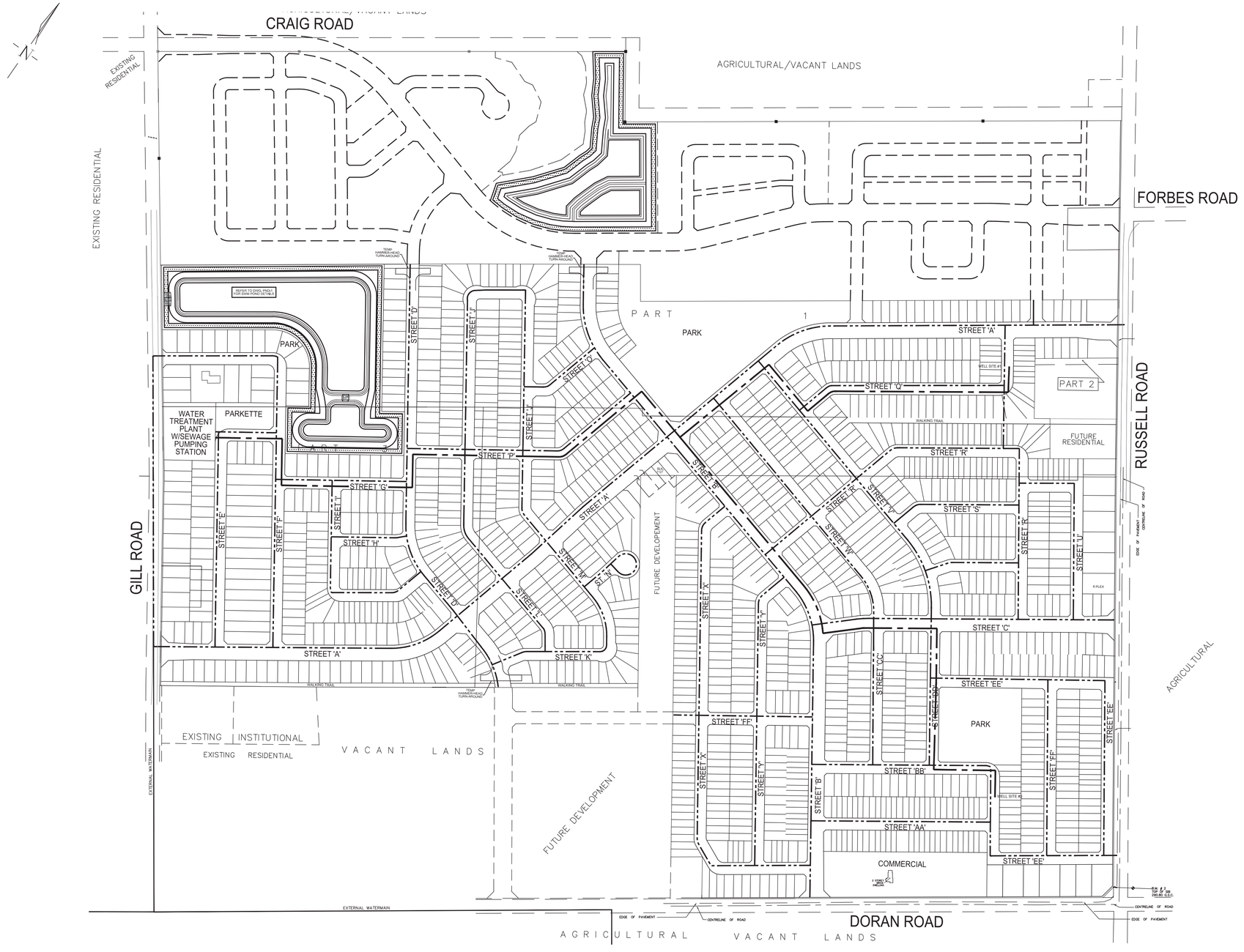
REVISIONS LIST

27 MAY 2014	Revise Lot #'s & statistics
23 MAY 2014	Revise Parkette, Transitional Lotting & Future Road Blk.
14 MAY 2014	Revise school/park/adjacent lotting
4 APR 2014	Revised draft plan based on comments received

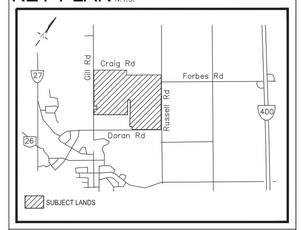
File Number:	4679
Drawn By:	SM / SB
Planner:	RG
Scale:	see scale bar
CAD:	4679/draft plans/D6.dgn

Drawing Number: D6

Figure 2



KEY PLAN N.T.S.



SURVEY NOTES:

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7. PRIOR TO ANY WORKS ON MUNICIPAL PROPERTY A ROAD OCCUPANCY PERMIT SHALL BE OBTAINED FROM THE TOWNSHIP OF SPRINGWATER.

LEGEND:

- SUBJECT PROPERTY LINE
- PROP. EASEMENT
- PROP. RAW WATERMAIN
- PROP. WATERMAIN (SIZE TO BE DETERMINED AT DETAILED DESIGN STAGE)
- EXTERNAL RAW WATERMAIN
- EXTERNAL WATERMAIN

ITEM	DESCRIPTION	DATE	BY	APPRV'D
1	1st SUBMISSION	APRIL/2013	M.T.	M.T.

SCHEDULE OF REVISIONS

ENGINEER'S SEAL

PROJECT: MIDHURST HEIGHTS DEVELOPMENT

TITLE: CONCEPETUAL LOT GRADING PLAN

mnt consulting group, inc.
5387 Fifth Line
Alliston, Ontario | L9R 1V2
www.mntconsulting.ca

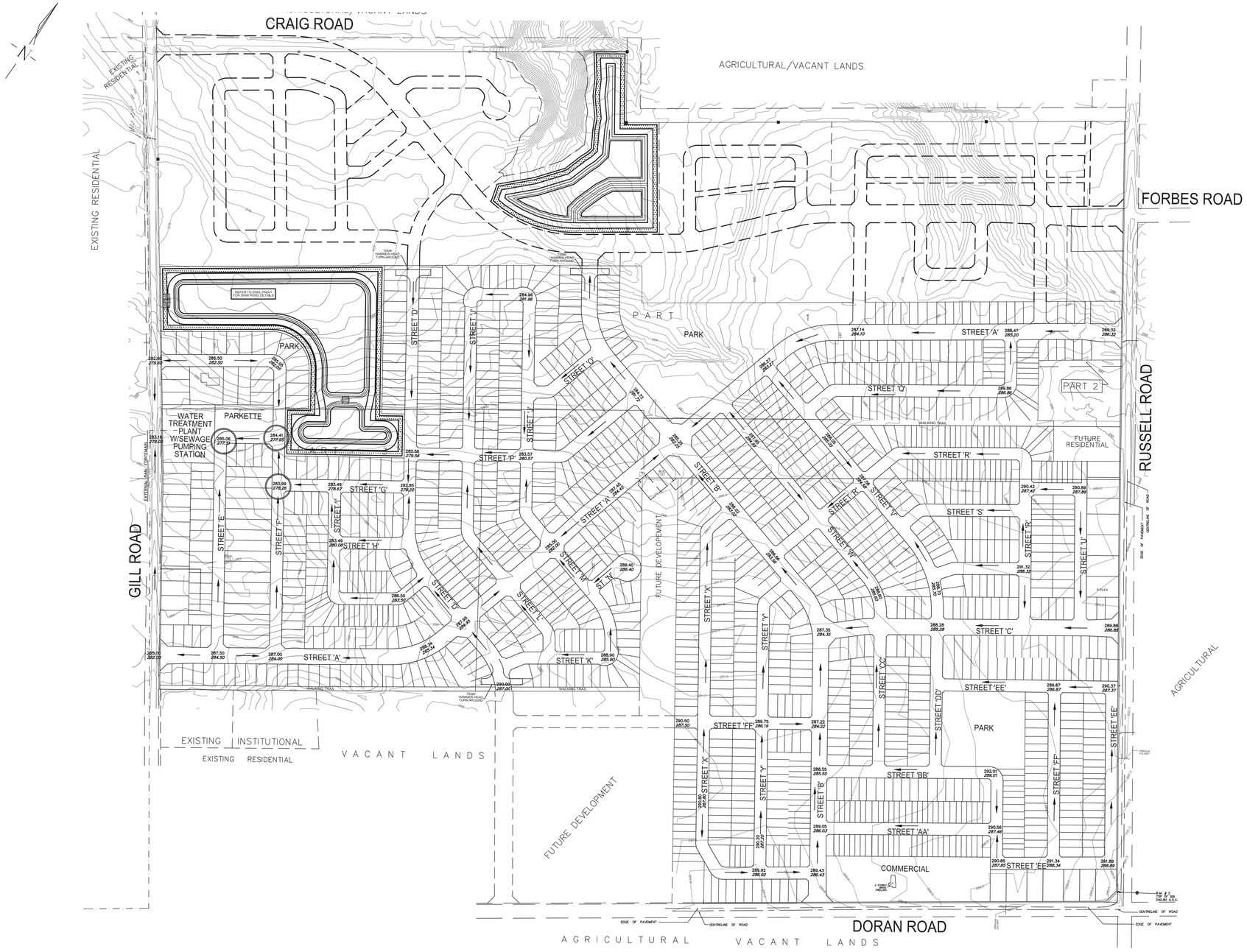
TOWNSHIP OF SPRINGWATER

DRAWN: GEMCAD	SCALE: HOR: 1:2500	DWG. No.	PROJECT No.
DESIGNED: M.T.		WAT-1	1001
CHECKED: M.T.	DATE: APRIL/2013		

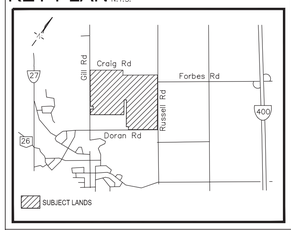
Figure 3

Obtained from the Master Servicing Report for the Midhurst Heights Development (MNT, 2013)

Scale Adjusted to 1:3000



KEY PLAN N.T.S.



SURVEY NOTES:

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7. PRIOR TO ANY WORKS ON MUNICIPAL PROPERTY A ROAD OCCUPANCY PERMIT SHALL BE OBTAINED FROM THE TOWNSHIP OF SPRINGWATER.

LEGEND:

- SUBJECT PROPERTY LINE
- PROP. EASEMENT
- 284.53 / 278.09 — PROP. TOP OF SAN. MH. LID / PROP. SAN. MH. INVERT
- INDICATES A SAN. SEW. DEPTH OF GREATER THAN 5m
- PROP. SAN. SEWER & FLOW DIRECTION
- EXTERNAL SANITARY FORCEMAIN

ITEM	DESCRIPTION	DATE	BY	APPRV'D
1	1st SUBMISSION	APRIL/2013	M.T.	M.T.

SCHEDULE OF REVISIONS

ENGINEER'S SEAL

PROJECT: MIDHURST HEIGHTS DEVELOPMENT

TITLE: SANITARY DRAINAGE PLAN

mnt consulting group, inc.
5387 Fifth Line
Alliston, Ontario | L9R 1V2
www.mntconsulting.ca

TOWNSHIP OF SPRINGWATER

DRAWN: GEMCAD	SCALE: HOR: 1:2500	DWG. No.	PROJECT No.
DESIGNED: M.T.		SAN-1	1001
CHECKED: M.T.	DATE: APRIL/2013		

Figure 4

Obtained from the Master Servicing Report for the Midhurst Heights Development (MNT, 2013)

Scale Adjusted to 1:3000

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\3675 FSR.dwg, FIG 5A, 8/1/2014 10:07:22 AM, lwaters

EN MILLS

Horseshoe Valley Rd (County Rd 22)

Nursery Rd.

Hendrie Rd.

Wilson Dr.

County Road 27

WILLOW CREEK

MATHESON CREEK TRIBUTARY OF MATHESON CREEK

HIGHWAY 400

HIGHWAY 26

Gill Rd.

Russell Rd.

Craig Rd.

Forbes Rd.

Walt Rd.

Doran Rd.

NORTH OUTLET

WEST OUTLET

JOHNS LANDS

SITE

FRANKCOM LANDS

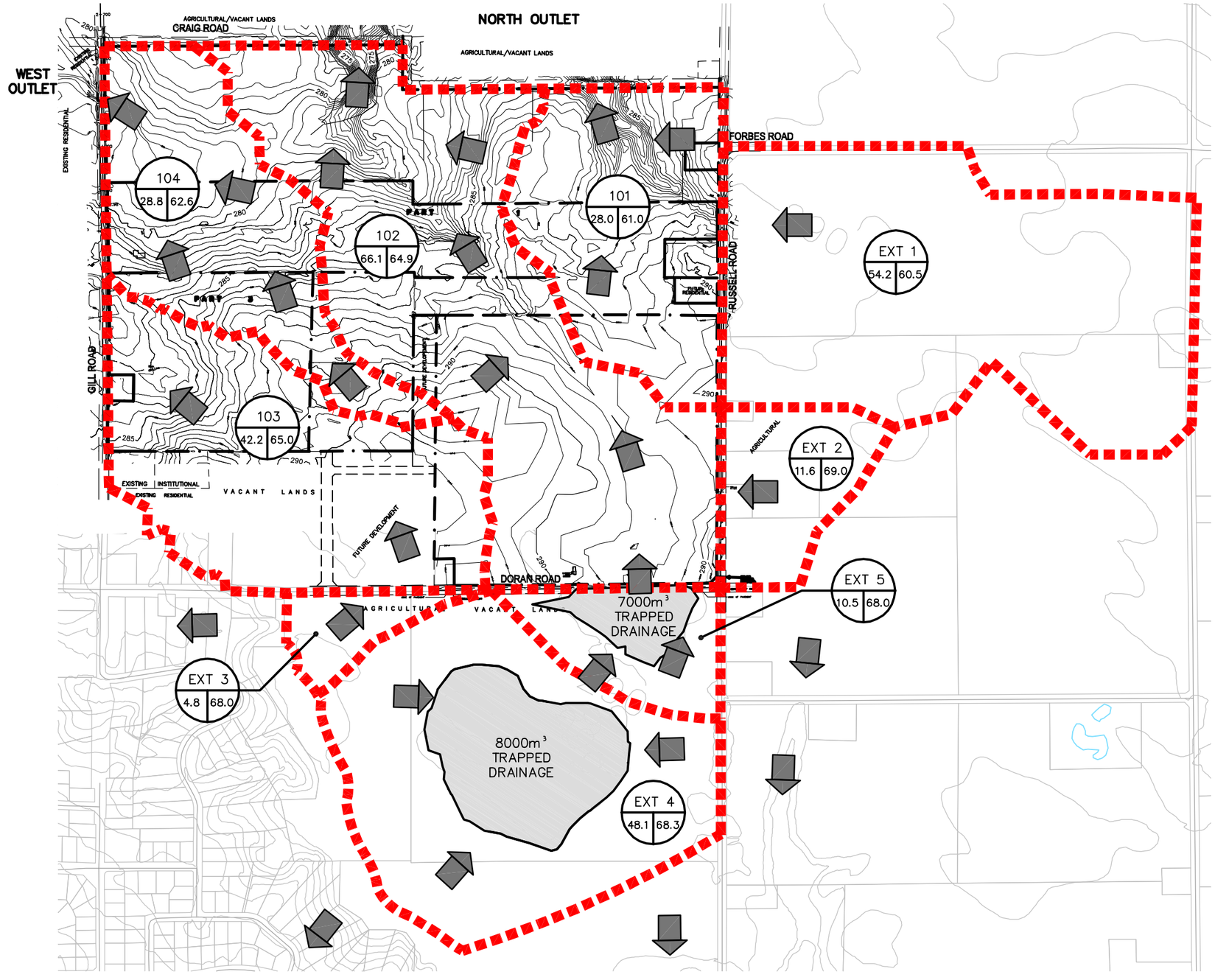
240 230 220 210 270 290

Project
MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing
DRAINAGE CONTEXT PLAN

CROZIER & ASSOCIATES Consulting Engineers
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project
L.W.	L.W.	845-3675
Scale	Date	Check By	Drawing
1:30 000	06/24/2014	C.F.C.	FIG 5A



NOTE:
DELINEATION OF CATCHMENTS EXT3, EXT4, AND EXT5 FROM SCS CONSULTING GROUP.

LEGEND

- PROPERTY BOUNDARY
- OVERLAND DRAINAGE DIRECTION
- EXISTING CONTOUR
- PRE-DEVELOPMENT DRAINAGE CATCHMENT BOUNDARY (MNT 2013)
- CATCHMENT AREA ID
- CURVE NUMBER
- CATCHMENT AREA (ha)

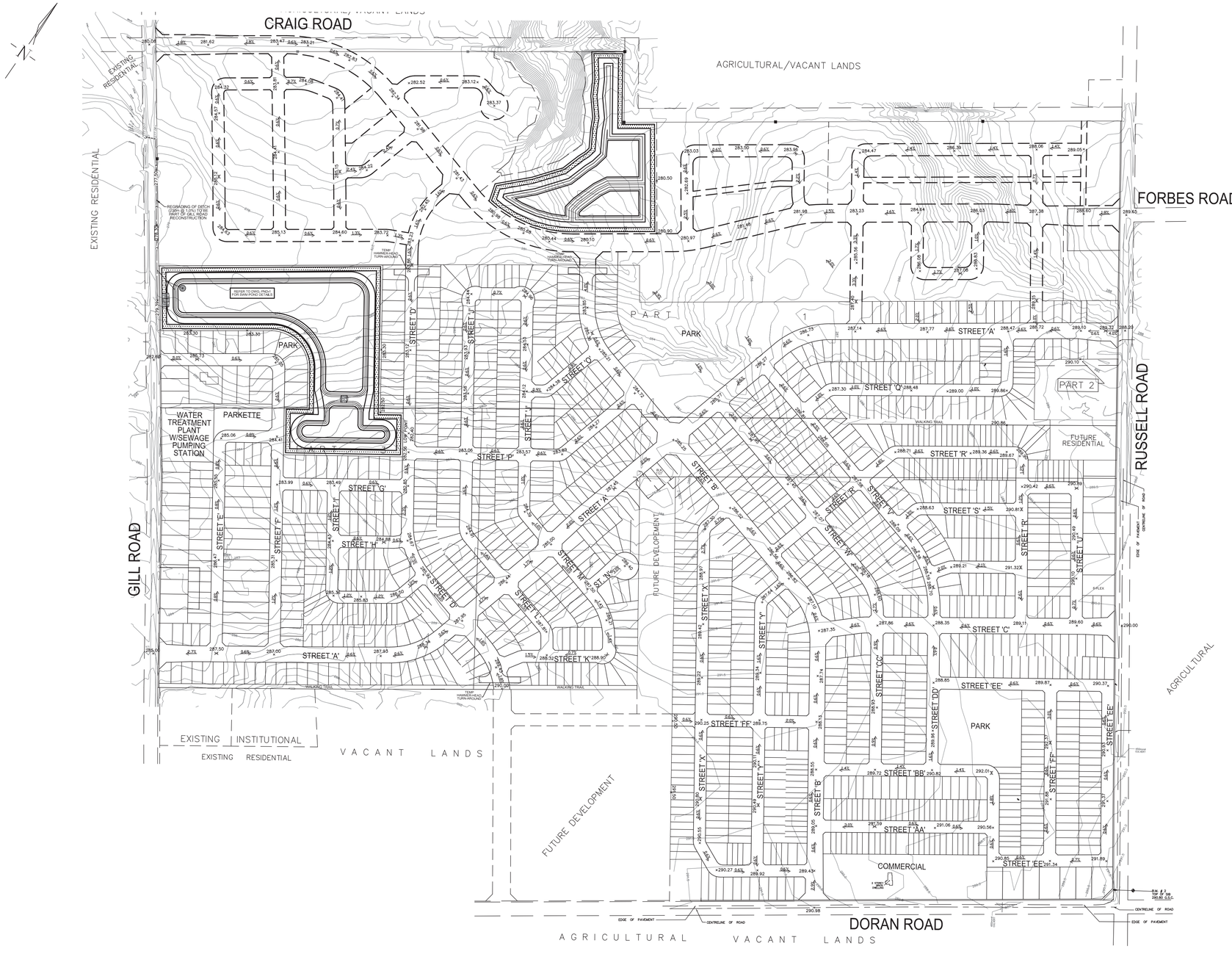
Project
MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing
PRE-DEVELOPMENT
DRAINAGE AREA PLAN

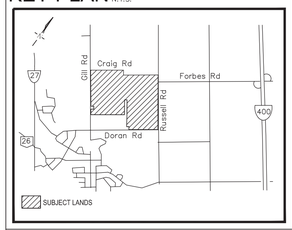
CROZIER & ASSOCIATES Consulting Engineers
The HarbourEdge Building,
40 Huron Street, Suite 301,
Collingwood, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project
L.W.	L.W.	845-3675
Scale	Date	Check By	Drawing
1:10000	06/24/2014	C.F.C.	FIG 5B

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\3675 FSR.dwg, FIG 5B, 8/1/2014 10:09:10 AM, lwaters



KEY PLAN N.T.S.



SURVEY NOTES:

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LEGEND:

———	SUBJECT PROPERTY LINE
— · — · —	PROP. EASEMENT
290.00 / *290.00*	PROP. ELEVATION / EX. ELEVATION
0.6%	PROP. ROAD GRADE
) (	PROP. HIGH POINT
×288.38	PROP. SPOT ELEVATION
	ENHANCED GRASS SWALES ALONG THIS AREA OF GILL ROAD

ITEM	DESCRIPTION	DATE	BY	APPR'D
1	1st SUBMISSION	APRIL/2013	M.T.	M.T.

SCHEDULE OF REVISIONS

ENGINEER'S SEAL

PROJECT: MIDHURST HEIGHTS DEVELOPMENT

TITLE: CONCEPETUAL LOT GRADING PLAN

mnt consulting group, inc.
5387 Fifth Line
Alliston, Ontario | L9R 1V2
www.mntconsulting.ca

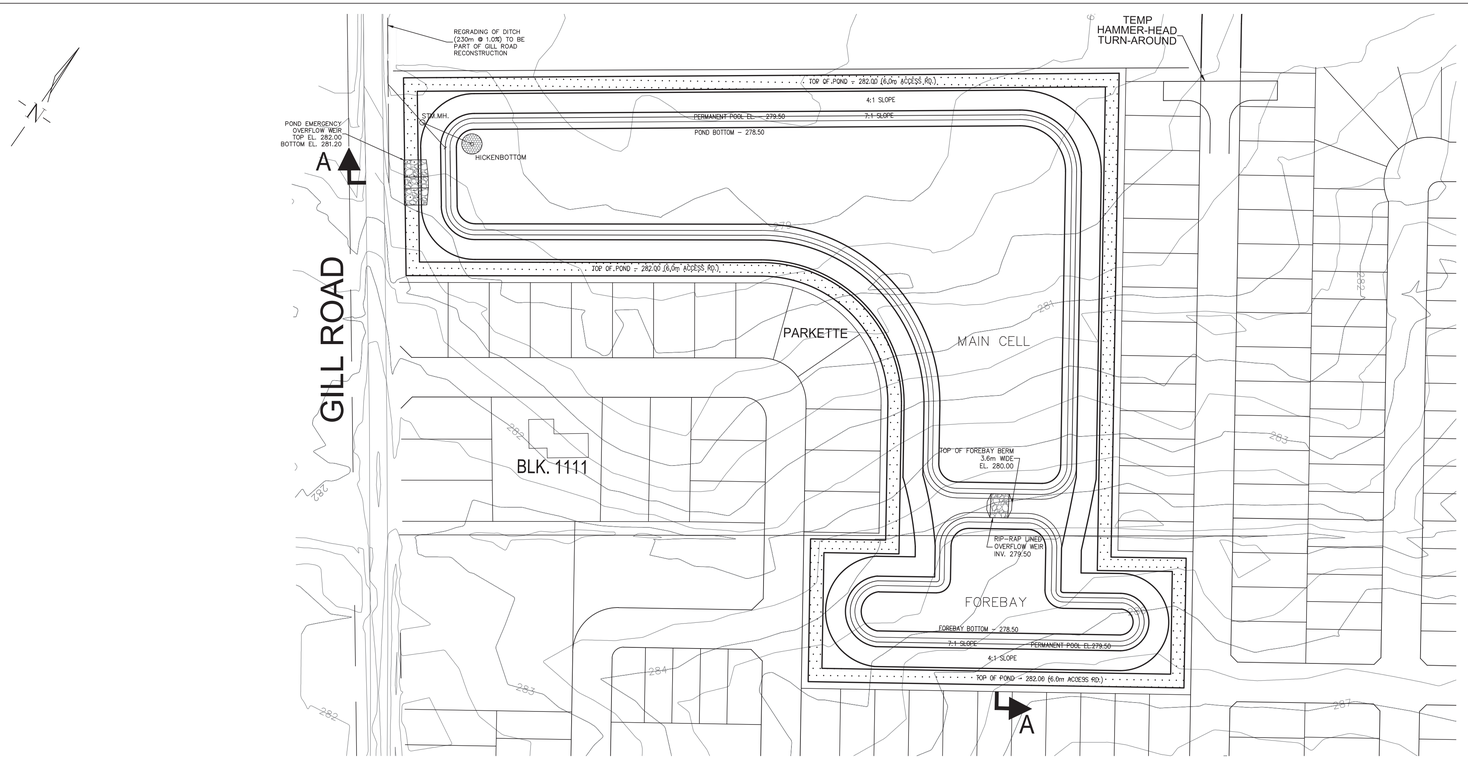
TOWNSHIP OF SPRINGWATER

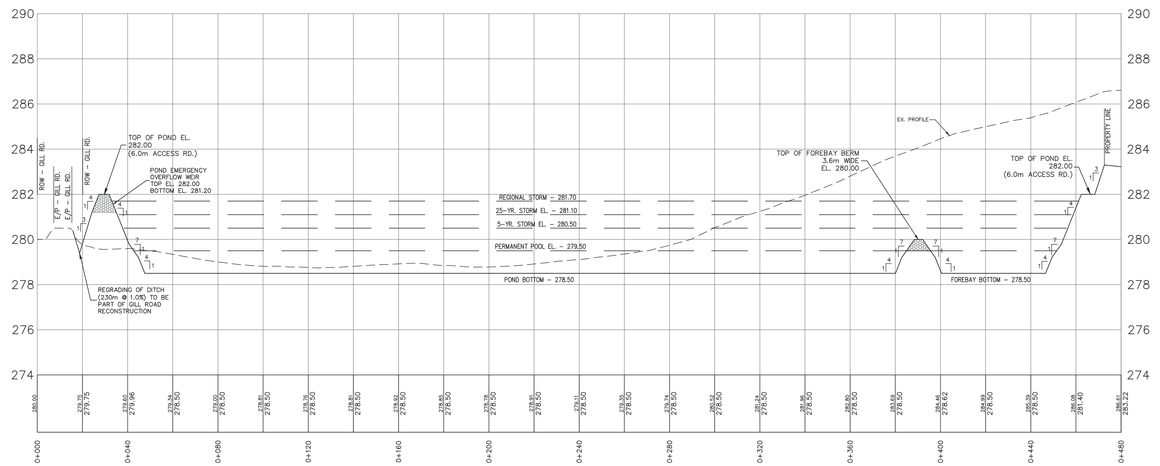
DRAWN: GEMCAD	SCALE: HOR: 1:2500	DWG. No.	PROJECT No.	
DESIGNED: M.T.		SG-1	1001	
CHECKED: M.T.	DATE: APRIL/2013			

Figure 6

Obtained from the Master Servicing Report for the Midhurst Heights Development (MNT, 2013)

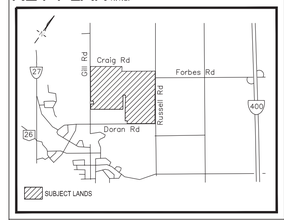
Scale Adjusted to 1:3000





SECTION A-A

KEY PLAN N.T.S.



SURVEY NOTES:

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LEGEND:

SUBJECT PROPERTY LINE

ITEM	DESCRIPTION	DATE	BY	APPRVD
1	1st SUBMISSION	APRIL/2013	M.T.	M.T.

SCHEDULE OF REVISIONS

ENGINEER'S SEAL

PROJECT: MIDHURST HEIGHTS DEVELOPMENT

TITLE: CONCEPTUAL STORMWATER MANAGEMENT POND

mnt consulting group, inc.
5387 Fifth Line
Alliston, Ontario | L9R 1V2
www.mntconsulting.ca

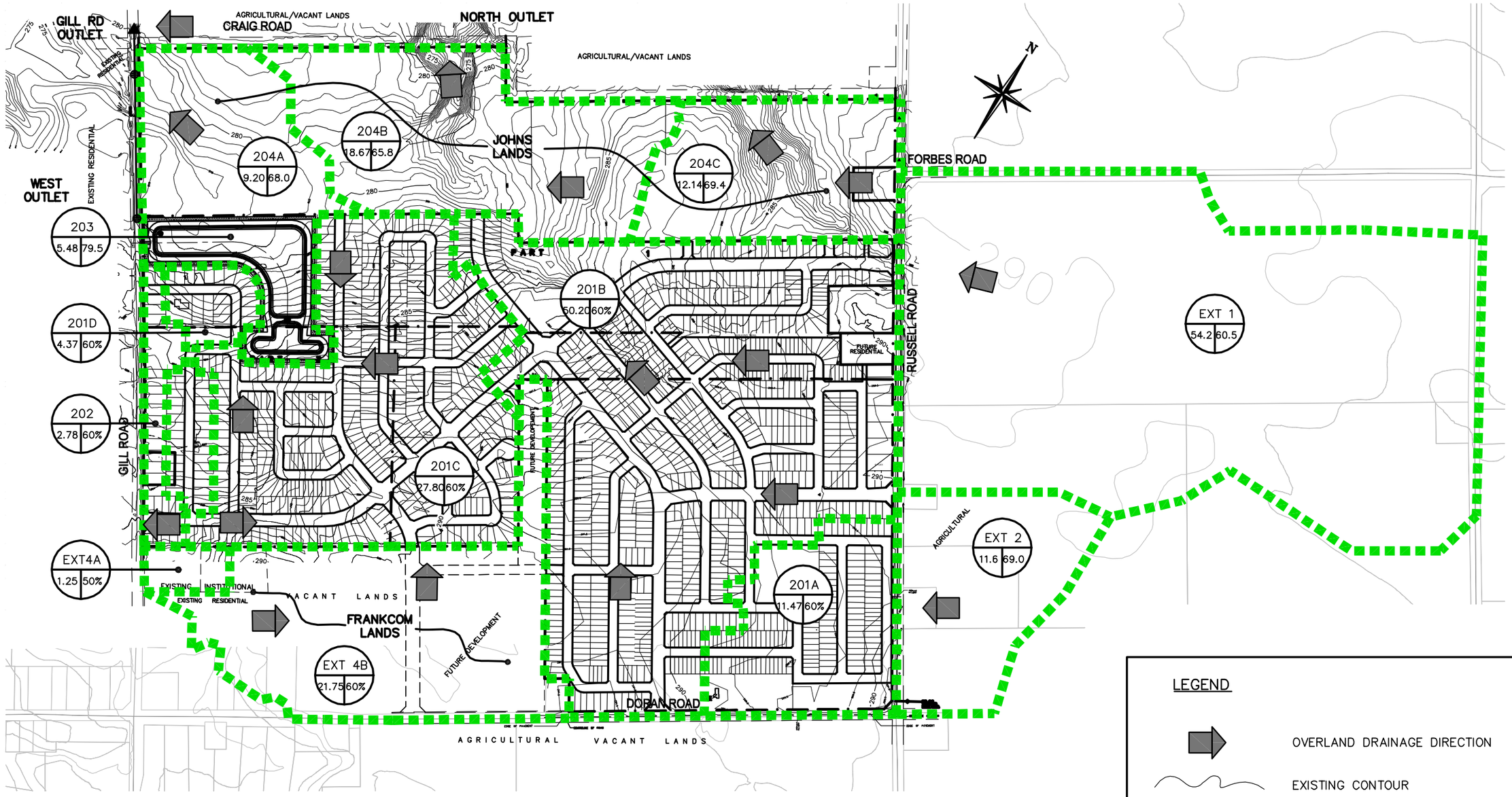
TOWNSHIP OF SPRINGWATER

DRAWN: GEMCAD	SCALE: HOR: 1:1000 VERT: 1:100	DWG. No. PND-1	PROJECT No. 1001
DESIGNED: M.T.			
CHECKED: M.T.	DATE: APRIL/2013		

Figure 7

Obtained from the Master Servicing Report for the Midhurst Heights Development (MNT, 2013)

Scale Adjusted to:
HOR: 1:1250
VERT: 1:125



LEGEND

- OVERLAND DRAINAGE DIRECTION
- EXISTING CONTOUR
- POST-DEVELOPMENT DRAINAGE CATCHMENT BOUNDARY
- 201A / 11.47 / 60% — CATCHMENT AREA ID; CURVE NUMBER OR % IMP; CATCHMENT AREA (ha)

Project: MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing: POST-DEVELOPMENT DRAINAGE AREA PLAN

CROZIER & ASSOCIATES Consulting Engineers
The HarbourEdge Building, 40 Huron Street, Suite 301, Collingwood, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
www.cfcrozier.ca
info@cfcrozier.ca

Drawn By	Design By	Project
L.W.	K.W.	845-3675
Scale	Date	Check By	Drawing
1: 7500	06/24/2014	C.F.C.	FIG 8

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\3675 FSR.dwg, FIG 8, 8/1/2014 10:10:02 AM, lwaters

J:\800\845 - Midhurst Rose Alliance Inc\3675 - Midhurst Heights Development\CAD\3675 FSR.dwg, FIG 9, 8/1/2014 10:11:05 AM, lwaters

FORBES ROAD

600m–1050mmø STM SWR @ 1.1%
CAP = 2.9m³/s

PR. DICB
T/G 287.50
INV. 285.30

INV
288.5

EXTERNAL
DRAINAGE FROM
EXT 1 Q_{TIM}=2.5m³/s

RUSSELL ROAD
0.5%

EXTERNAL
DRAINAGE FROM
EXT 2 Q_{TIM}=0.8m³/s

INV 290.0
(HP)

PR. DICB
T/G 289.50
INV. 288.50

FUTURE
RESIDENTIAL

6-PLEX

STREET 'U'

STREET 'C'

TO SITE
STM SWR

STREET 'R'

STREET 'A'

STREET 'R'

STREET 'S'

LKING TRAIL

INV
278.50

50 0m 50 100 150
SCALE: 1:2000

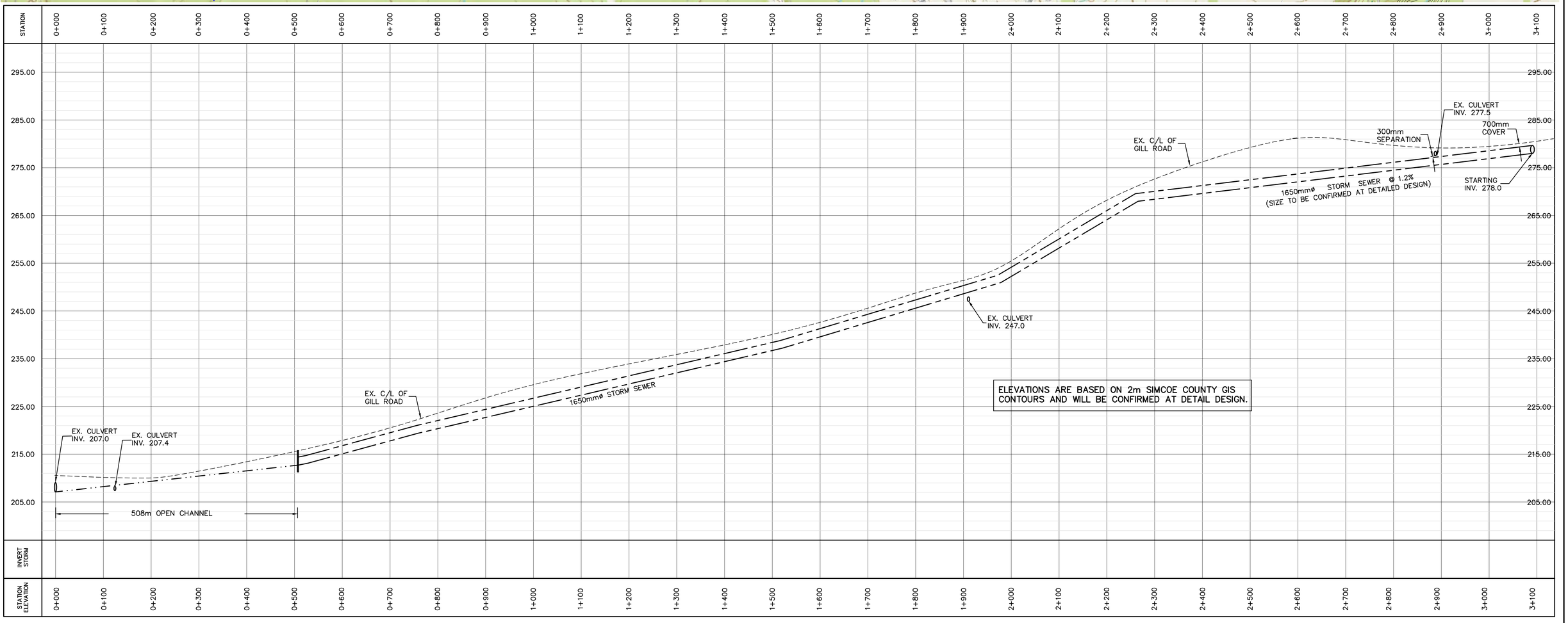
Project
MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing
EXTERNAL FLOWS
CONVEYANCE PLAN

CROZIER & ASSOCIATES Consulting Engineers
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	L.W.	Design By	K.W.	Project	845–3675
Scale	1:2000	Date	06/24/2014	Check By	C.F.C.	Drawing	FIG 9





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TEMPORARY BENCHMARKS

TBM#1–
TBM#2–
TBM#3–

Town

No.	ISSUE / REVISION	DATE: MM/DD/YYYY
0	ISSUED FOR NVCA REVIEW	06/26/2014

Engineer

Engineer

Project

MIDHURST HEIGHTS DEVELOPMENT
TOWNSHIP OF SPRINGWATER

Drawing

PRELIMINARY PLAN & PROFILE
GILL ROAD (STA 0+000 – 3+132)

CROZIER & ASSOCIATES Consulting Engineers
THE HARBOUREDGE BUILDING,
40 HURON STREET, SUITE 301,
COLLINGWOOD, ON L9Y 4R3
705 446-3510 T
705 446-3520 F
WWW.CFCROZIER.CA
INFO@CFCROZIER.CA

Drawn By	Design By	Project
J.O.	K.W.	845–3675
Scale V = 1:400 H = 1:4000	Date 06/24/2014	Check By
		Drawing FIG 10

J:\600\845 – Midhurst Rose Alliance Inc_3675 – Midhurst Heights Development\CAD\3675_FSR.dwg, FIG 10, 6/1/2014 10:11:51 AM, iwaters