

Stormwater Management Report for

Just Store It

2495 Spragues Road,

Township of North Dumfries, Ontario

November 27, 2024

Revised August 31, 2026

Project Reference Number 22-304



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Revision Tracking Table

Revision	Date	Description
	November 27, 2024	Issued for Review
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Introduction

This Stormwater Management Report provides details on the stormwater management design for the proposed development at 2495 Spragues Road in the Township of North Dumfries, Region of Waterloo, Ontario.

The subject property is currently developed with one building providing self-storage services and five outdoor storage containers at the rear of the building. It is proposed to expand the storage unit business and construct five additional storage buildings on the vacant portion of the site.

Background Information

The subject property is located on the east side of Spragues Road and north of Brant Waterloo Road. The property is currently zoned rural residential with site specific exemption 20.1.206 permitting self-storage facility use. It is bounded by vacant agricultural lands to the north and east, residential lands to the south and the Hillside Lake Park Family Campground to the west.

The site location is shown in Figure 1.

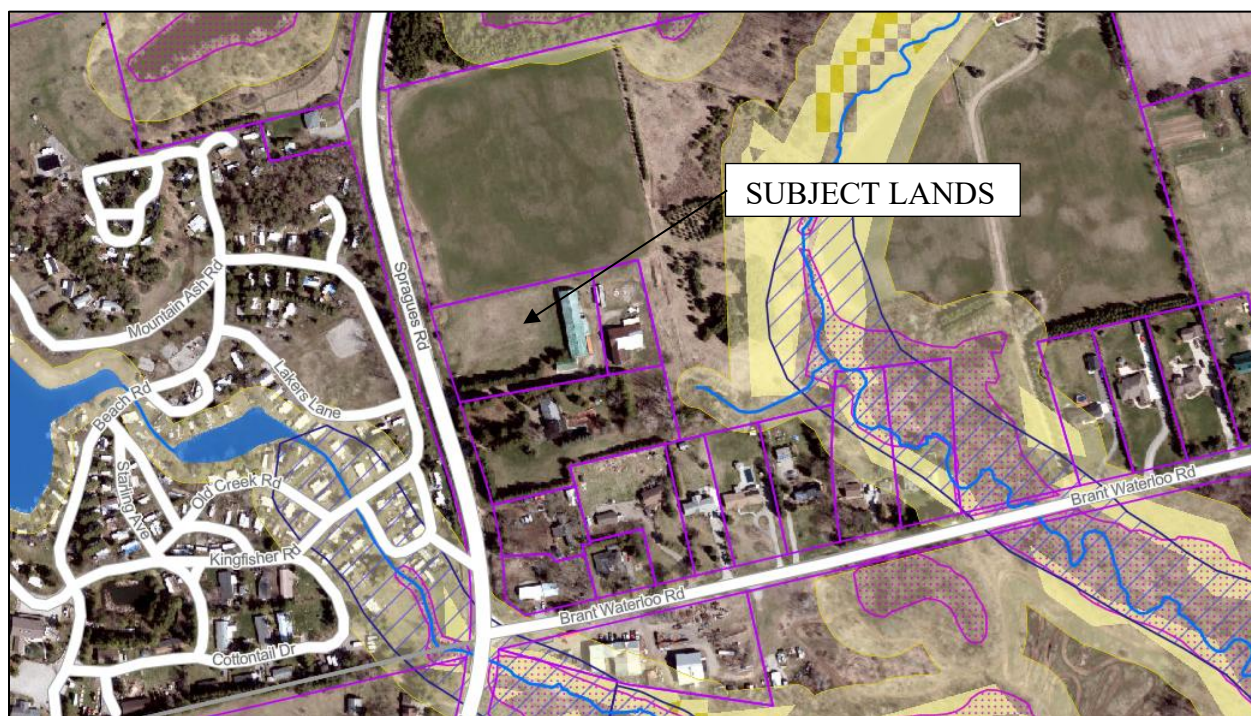


Figure 1: Location of 2495 Spragues Road, Township of North Dumfries (GRCA Interactive Mapping)

Geotechnical Information

A Geotechnical Investigation completed for the site by LVM Inc. dated July 12, 2011 identified soils as brown silt, underlain by brown sand with some dark brown fibrous peat encountered at the test pits at the south and west area of the site. Groundwater was present in the boreholes west of the building at a depth of 1.5m. Based on a particle size distribution analysis conducted on a sample of the surficial fill on the western area of the site, the percolation rate was determined to be 30 mm/hr. The Geotechnical Report is included in Appendix A.

Existing Site Drainage Conditions

There is an external area north of the site that flows overland, across the subject lands, toward the existing road ditch southwest of the site.

The western portion of the site drains overland toward the Spragues Road ditch, while the eastern portion of the site generally drains overland toward the south property line and onto the adjacent property.

There are no on-site storm sewers or any stormwater management components to the existing drainage system.

Proposed Site Drainage Conditions

The proposed development consists of four additional storage buildings west of the existing building as well as an outdoor storage area at the north end of the property line.

To provide conveyance for the runoff from the external lands, it is proposed to install storm sewers sized for the 100 year storm event to route the runoff from the external drainage area to the north around the perimeter of the proposed development area to the existing road ditch.

The site will be graded to direct runoff to new on-site catchbasins which convey runoff towards the proposed stormwater management pond and the new storm sewers south of the site. The SWM pond will provide stormwater storage with a vortex valve controlled discharge to the existing road ditch. A riprap overflow from the pond is installed for major storm events.

SWM Design Criteria

The stormwater management design criteria for the proposed development area are summarized here.

1. Quantity Control:
Attenuation of the 2-year through 100-year storm events to existing conditions.
2. External Lands Drainage Conveyance
Convey drainage from external contributing drainage around safely to outfall.

Quantity Control

Quantity control of runoff will be provided through the SWM pond for storage and orifice-controlled discharge at the outlet.

The computer model MIDUSS has been used to model the existing condition and the proposed development with stormwater controls. The modeling demonstrates that the proposed design can provide adequate quantity control of runoff.

Stormwater Model Input Parameters

The design storm hyetographs are derived using IDF curve data presented in the Ayr Stormwater Management Guiding Principles (IBI Group, 2022). The MIDUSS Model built in Curve Fit Tool was used to drive the A, B and C parameters for the 3-hour Chicago Storm distribution. The IDF parameters used in the MIDUSS model are shown in Table 1.

Table 1: IDF Parameters for the Township of North Dumfries

Parameter	2 Year	5 Year	10 Year	20 Year	50 Year	100 Year
A	823.502	1058.046	1226.738	1406.070	1574.053	1723.128
B	11.103	11.103	11.098	11.324	11.090	11.090
C	0.818	0.816	0.818	0.821	0.816	0.816

Table 1 below shows the catchment area parameters input into the model under the existing condition and the proposed condition. Catchment area drawings and model output files are included in Appendix B.

Table 2: Model Input Parameters

Catchment	Description	Area	Percent Impervious	Overland Slope	Flow Length
Existing Condition					
1001	External Area North of Site	2.784 ha	0%	2.0%	130 m
101	Existing Site to Spragues Road	0.352 ha	5%	1.0%	65 m
102	Existing Site Southeast Adjacent Lands	0.521 ha	35%	1.0%	60 m
Proposed Conditions					
1001	External Areas to the North	2.784 ha	0%	2.0%	130 m
201	Proposed Site to Stormwater Pond	0.659 ha	80%	1.0%	20 m
202	Uncontrolled Entrance way to Road	0.022 ha	20%	4.0%	10 m
203	Existing Site to Southeast Adjacent Lands	0.192 ha	95%	1.0%	40 m

The proposed SWM pond stage storage discharge curve was calculated based on the stormwater pond dimensions and the hydraulics of the vortex valve.

The MIDUSS computer modeling results are summarized below. Pond design calculations are included in Appendix C. MIDUSS Model output is included in Appendix E.

Table 3: Summary of SWM Pond Design Details

Stormwater Management Pond Details (Catchment 201)	
Storage Volume Provided	597 m ³
Bottom Elevation	294.5 m
Top Elevation	295.5 m
Vortex Valve Location	DICB1
Vortex Valve Model	Hydro-Brake SCU-0070-6000-1370-6000
Overflow Elevation	295.3 m

Table 4: Performance of Stormwater Management Components

Design Storm	Peak Inflow	Peak Outflow	Maximum Water Level	Maximum Storage Volume
2 Year	0.092 m ³ /s	0.005 m ³ /s	294.82	112.2 m ³
5 Year	0.125 m ³ /s	0.005 m ³ /s	294.92	164.9 m ³
10 Year	0.147 m ³ /s	0.005 m ³ /s	294.98	200.0 m ³
20 Year	0.168 m ³ /s	0.005 m ³ /s	295.04	235.8 m ³
50 Year	0.198 m ³ /s	0.006 m ³ /s	295.12	283.6 m ³
100 Year	0.219 m ³ /s	0.006 m ³ /s	295.17	319.1 m ³

Table 5: MIDUSS Model Results Summary

	To Road Ditch		To South East Lands	
	Existing	Proposed	Existing	Proposed
2 Year Storm	0.020 m ³ /s	0.023 m ³ /s	0.032 m ³ /s	0.031 m ³ /s
5 Year Storm	0.046 m ³ /s	0.046 m ³ /s	0.042 m ³ /s	0.040 m ³ /s
10 Year Storm	0.070 m ³ /s	0.067 m ³ /s	0.050 m ³ /s	0.047 m ³ /s
20 Year Storm	0.099 m ³ /s	0.082 m ³ /s	0.057 m ³ /s	0.055 m ³ /s
50 Year Storm	0.142 m ³ /s	0.130 m ³ /s	0.067 m ³ /s	0.064 m ³ /s
100 Year Storm	0.183 m ³ /s	0.164 m ³ /s	0.0074 m ³ /s	0.071 m ³ /s

Under proposed conditions, the peak flow to the road ditch is less than under Existing Conditions for the 5 to 100 year storm events. The peak flow is slightly higher under proposed conditions for the 2-year storm event. However, the 0.003 m³/s can be considered to be within acceptable modeling error.

The SWM Pond has been sized to provide sufficient storage volume to store the entirety of the 100 year storm event. During major storm events that exceed the volume of the SWM Pond, storm water will overflow to the existing ditch.

Under the proposed conditions, the area of the existing site that drains uncontrolled to the adjacent land to the south east is reduced compared to existing conditions. As a result, the peak flows to the south east are reduced as well, as seen in the modeling results.

The proposed stormwater management pond with controlled discharge will provide sufficient control of runoff from the site so that the peak flows under proposed conditions are less than the peak flows under existing conditions.

External Lands Stormwater Conveyance System

The lands to the north of the subject property currently drain onto the subject property, continuing across the property to the road ditch. The proposed development would block the existing overland drainage route for this area. Therefore, it is proposed to install a ditch inlet catchbasin structure to collect the surface flow and route it around the perimeter of the site, discharging to the road ditch.

The external 2.784 ha of land contributing runoff to the site are identified as Catchment area 1001 as shown in Table 2. The MIDUSS Model was used to identify the 100 year peak flow as 0.161 m³/s. The MIDUSS model was also used to confirm the pipe size required to convey this peak flow without surcharging. A 525mm diameter pipe at 0.5% has capacity to convey the 100 year peak flow. Modeling is included in Appendix E.

The MTO Design Chart 4.19 from the MTO Hydrotechnical Design Charts was referenced to identify the inlet capacity of the double catchbasin and the resulting maximum ponding depth during the 100 year storm event. During the 100 year storm event, the maximum ponding depth is 0.21m. It should be noted that ponding is temporary, and will not remain beyond the length of the storm event, as the proposed 525mm pipe has capacity to convey the peak flow. The MTO Design Chart is included in Appendix F.

The external catchment re-routing details are summarized in Table 6.

Table 6: External Lands Stormwater Routing

External Catchment Information	
Catchment Area	2.784 ha
Percent Impervious	0%
Flow Length	130 m
Overland Slope	2%
100 Year Peak Runoff	0.161 m ³ /s
Catchasin Inlet Information	
Structure	Double Catchbasin DCB1
Grate	OPSD 400.01
Inlet Capacity @ Ponding Depth	0.161 m ³ /s @ 0.143 m
Storm Sewer Information	
Manning's n	0.013
Pipe Diameter	525 mm
Pipe slope	0.5 %
Pipe Length	125.5 m
Pipe Capacity	0.304 m ³ /s
100 Year Flow Depth	0.271 m

Maintenance Procedures

The following maintenance is recommended.

SWM Component	Function	Maintenance Activity	Maintenance Frequency
Catchbasins	Provide inlet into the on site storm sewers	• Ensure CB Grates are clear of debris	• After major rainfall events
Stormwater Pond	Provide ponding area during rainfall events	• Maintain vegetation by mowing and weeding • Remove accumulated sediments	• Bi-weekly or as required
Vortex Valve at DICB1	Provide restricted discharge rate to existing road ditch	• Inspect for debris and dirt clogging orifice	• Annually and after major rain events

Conclusions

In summary, the proposed development will reduce the peak discharge rates to the existing road ditch through the implementation of SWM pond storage with controlled discharge to the road ditch. The proposed development will reduce the area of the site that drains uncontrolled to the south east adjacent property, thereby reducing the peak discharge rates to the south east.

All of which is respectfully submitted:



Sandra Swanton, P.Eng.
K. Smart Associates Limited



Appendix A

Geotechnical Report by LVM Inc, July 12, 2011

SPH Engineering

Proposed Commercial Storage Building Regional Road 78 Township of North Dumfries, Ontario

Geotechnical Investigation Report



Prepared by:

William Loghrin, P.Eng.

Project Engineer



Reviewed by :

Dave S. Naylor, P.Eng.

Senior Consulting Engineer

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Test results mentioned herein are only valid for the sample(s) stated in this report.

LVM inc.'s subcontractors who may have accomplished work either on site or in laboratory are duly qualified as stated in our Quality Manual's procurement procedure. Should you require any further information, please contact your Project Manager."

Client:

SPH Engineering
65 Springbank Avenue North
Woodstock, Ontario N4S 8V8
Attention: Mr. Sean Panjer P.Eng.

REVISION AND PUBLICATION REGISTER		
Revision N°	Date	Modification And/Or Publication Details
00	2011-07-26	Report Issued

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INTRODUCTION

LVM inc. (LVM) was retained by SPH Engineering to carry out a geotechnical investigation at the site of the proposed storage facility development in the Township of North Dumfries, Ontario. This work was authorized by Mr Sean Panjer, P.Eng. in an email dated June 17, 2011, following submission of a fee proposal for the geotechnical investigation

The project involves the proposed construction of multiple single story storage buildings, to be built on a parcel of land located in the Township of North Dumfries, at the site shown on the appended Location Plan.

The purpose of the investigation was to explore the subsurface soil and groundwater conditions at the site. Based on that information, we have prepared this engineering report with geotechnical recommendations pertaining to development. Specific considerations include site grading, excavations, building foundations and floor slabs, and stormwater infiltration.

1 INVESTIGATION METHODOLOGY

The fieldwork for this investigation was carried out on July 12, 2011 and involved seven test pits advanced to depths between 2.0 and 2.6 m below existing grade. The test pit locations are shown the appended Site Plan.

The test pits were excavated by CTS Excavating, working under the direction of a member of our engineering staff. LVM established the test pit locations, documented the subsurface soil and groundwater conditions encountered, and processed recovered samples.

Representative samples of the overburden were recovered throughout the depths explored. Soil samples secured during this investigation were returned to our laboratory for further visual examination, as well as moisture content tests. The moisture content test results are plotted on the appended test pit logs. One particle size distribution analysis was also conducted on soil likely to be used for on-site infiltration, and the results are presented on Figure 1.

2 SUMMARIZED FINDINGS

We refer to the appended test pit logs for detailed soil descriptions and stratigraphies; moisture content profiles; and, groundwater observations. In general, the subsurface stratigraphy comprised respective layers of fill, over native sand and silt.

2.1 FILL

Surficial fill was encountered in Test Pits 03-11 to 07-11 to depths between 0.4 to 1.7 m below existing grades. The fill generally comprised 150 to 400 mm of topsoil, underlain by sand. Numerous pieces of wood were encountered in the fill at Test Pit 04-11.

2.2 TOPSOIL AND BURIED PEAT

Surficial topsoil was encountered in Test Pit 02-11, located at the east side of the site. Buried coarse fibrous peat was encountered below the fill, at the west side of the site, in Test Pits 04-11 and 06-11.

2.3 SILT AND SAND

Compact sand and silt soils were encountered below the near surface soils (fill, topsoil, and peat) in all of the test holes. These soils were typically moist above 1.5 m depth and wet below, corresponding to moisture contents between 2 and 20%.

As per the Ontario Building Code, a seismic site Class D may be used for design.

The founding subgrade should be inspected and approved prior to concrete placement. Any soft areas encountered during proof-rolling should be subexcavated and backfilled with structural fill. Lean mix concrete may be used in place of structural fill.

The slabs should be wet-cured to minimize problems associated with shrinkage and curling. The wet-curing procedure typically involves placing water over the slab then covering the slab with burlap or moisture vapour barrier. The wet burlap or moisture vapour barrier should be left-in-place for at least ninety-six hours.

Given the proposed foundation system, the founding soils will not have the minimum 1.2 m of earth necessary for frost protection. At least 50 mm of polystyrene insulation will be required over the founding subgrade to provide to the necessary thermal protection.

3.4 STORMWATER MANAGEMENT

At-source infiltration is being considered. One particle size distribution analysis was conducted on a sample of the surficial fill (from Test Pit 06-11), to determine its infiltration parameters, the results are appended. Based on the results, a percolation rate of 30 mm/hr may be used for design of infiltration systems in the onsite sand fill.

Generally, soak-away pits or can be used when located in areas where the natural groundwater level is below the bottom of the pit and the native soils are relatively free-draining. Soak-away pits generally require a minimum separation between the bottom of the pit to the seasonally high water table of 1 m.

Based on the investigation findings, conventional buried infiltrations systems are generally feasible for buildings constructed on the high ground found at the east side of the site (Test Pits 01-11 and 02-11). At the west side of the site, the infiltration system design must consider the typical 1.5 m depth to groundwater. Moreover, it may not be possible to provide the appropriate separation and earth cover to infiltration pipes in this area. Alternative systems including surface storage and infiltration ponds or ditching may be considered for at-source infiltration.

The soak-away pits must be checked by LVM at the time of construction to confirm satisfactory soil conditions, and to check that the pits are being constructed in accordance with the specifications.

D=14

4 CONSTRUCTION INSPECTION AND TESTING

Geotechnical inspections and insitu density testing should be conducted during site grading in order to verify that all loose fill and organics have been properly stripped and to ensure that all fill materials are being adequately compacted. For footings, the founding subsoils must be field reviewed by LVM to ensure that the founding soil is consistent with the design bearing intended by the geotechnical engineer. During the placement of concrete, testing should be performed to determine the slump and air content of the concrete; and, concrete cylinders should be cast for compressive strength testing.

LVM operates a Canadian Council of Independent Laboratories (CCIL) certified soils and aggregates laboratory in, Brantford, Kitchener, London, and Stratford. LVM is a licensed operator of appropriate nuclear density gauges for on-site compaction testing work. LVM staff also provide quality testing services for building envelope, structural steel, reinforcing steel and roofing.

5 STATEMENT OF LIMITATIONS

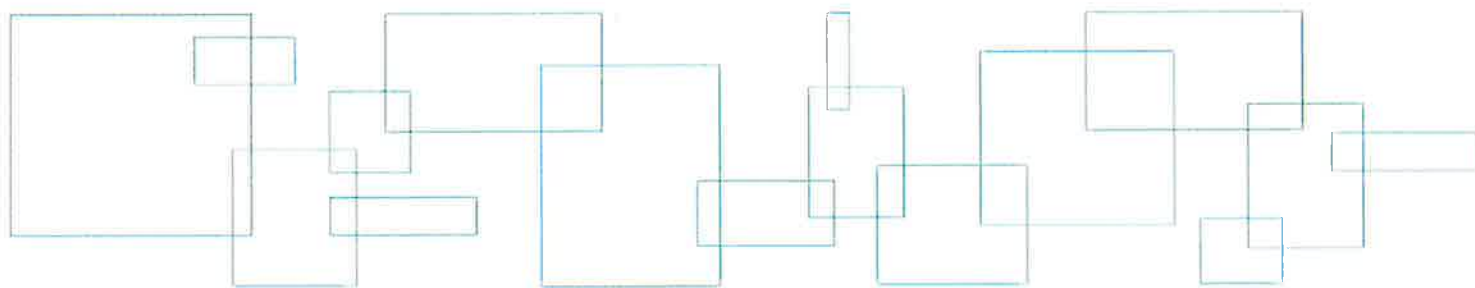
The geotechnical recommendations provided in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known at the time of report preparation, we recommend that we be retained during the final design stage to verify that the geotechnical recommendations have been correctly interpreted in the design. We also recommend that we be retained during construction to confirm that the subsurface conditions do not deviate materially from those encountered in the test pits and to ensure that our recommendations are properly understood.

The geotechnical recommendations provided in this report are applicable only to the project described in the text and are intended for the use of the project designer. They are not intended as specifications or instructions to contractors. Any use which a contractor makes of this report, or decisions made based on it, are the responsibility of the contractor. The contractor must also accept the responsibility for means and methods of construction, seek additional information if required, and draw their own conclusions as to how the subsurface conditions may affect them.

It is important to note that the geotechnical investigation involves a limited sampling of the site gathered at specific test hole locations and the conclusions in this report are based on this information gathered. The subsurface conditions between and beyond the test holes will differ from those encountered at the test holes. Should subsurface conditions be encountered which differ materially from those indicated at the test holes, we request that we be notified in order to assess the additional information and determine whether or not changes should be made as a result of the conditions.

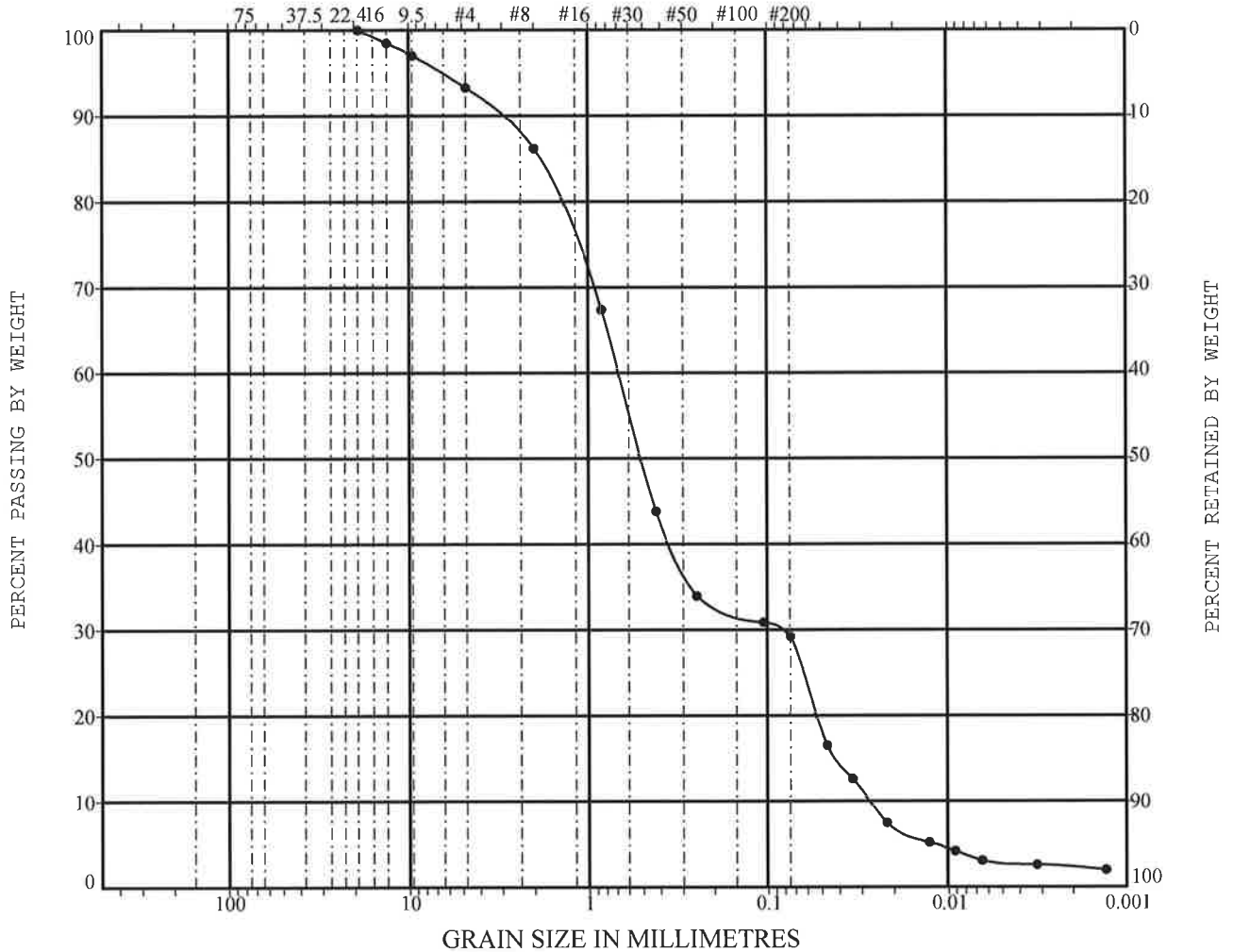
Appendix 1 Figures

Figure 1: Particle Size Distribution Analysis



UNIFIED SOIL CLASSIFICATION

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	
U.S. SIEVE SIZE IN MILLIMETRES			U.S. STANDARD SIEVE No.			HYDROMETER



PROJECT Proposed Storage Buildings

LOCATION Spragues Road, Township of North Dumfries, Ontario

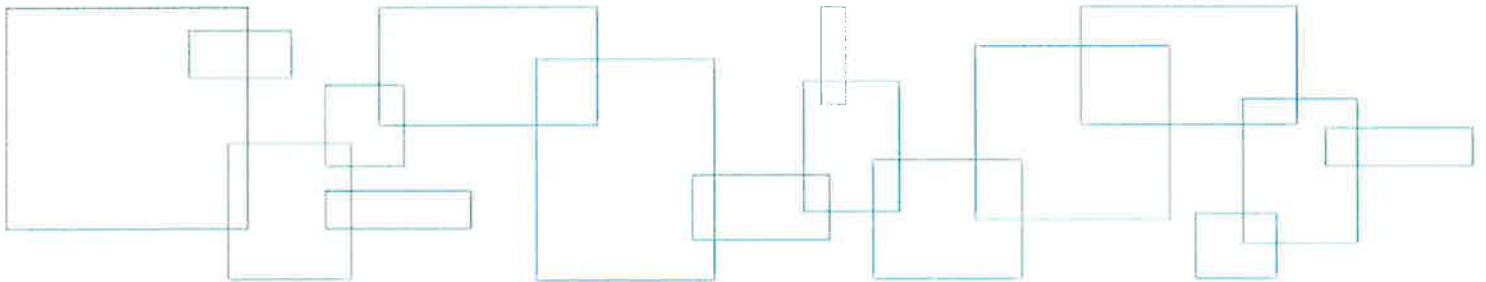
JOB NO. P041419-100

CURVE ID	BOREHOLE/TEST PIT	SAMPLE NO.	DEPTH (m)	SOIL DESCRIPTION
●	TP 06-11	Sa1	0.15-1.7	Silty SAND, trace Gravel

REMARKS _____

Appendix 2 Test Logs

List of Abbreviations
Test Pits 01-11 to 07-11



LIST OF ABBREVIATIONS

The abbreviations commonly employed on the borehole logs, on the figures, and in the text of the report, are as follows:

Sample Types		Soil Tests and Properties	
AS	auger sample	SPT	Standard Penetration Test
CS	chunk sample	UC	unconfined compression
RC	rock core	FV	field vane test
SS	split spoon	ϕ	angle of internal friction
TW	thin-walled, open	γ	unit weight
WS	wash sample	w_p	plastic limit
		w	water content
		w_l	liquid limit
		I_L	liquidity index
		I_p	plasticity index
		PP	pocket penetrometer

Penetration Resistances	
Dynamic Penetration Resistance	The number of blows by a 63.5 kg (140 lb.) hammer dropped 0.76 m (30 in.) required to drive a 50 mm (2 in.) diameter 60° cone a distance 0.30 m (12 in.). The cone is attached to 'A' size drill rods and casing is not used.
Standard Penetration Resistance, N (ASTM D1586)	The number of blows by a 63.5 kg. (140 lb.) hammer dropped 0.76 m (30 in.) required to drive a standard split spoon sampler 0.30 m (12 in.)
WH	sampler advanced by static weight of hammer
PH	sampler advanced by hydraulic pressure
PM	sampler advanced by manual pressure

Soil Description		
Cohesionless Soils	SPT N-Value	D_r (%)
Relative Density (D_r)	(blows per 0.30 m)	
Very Loose	0 to 4	0 to 20
Loose	4 to 10	20 to 40
Compact	10 to 30	40 to 60
Dense	30 to 50	60 to 80
Very Dense	over 50	80 to 100
Cohesive Soils	Undrained Shear Strength (C_u)	
Consistency	kPa	psf
Very Soft	less than 12	less than 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1000
Stiff	50 to 100	1000 to 2000
Very Stiff	100 to 200	2000 to 4000
Hard	over 200	over 4000
DTPL	Drier than plastic limit	
APL	About plastic limit	
WTPL	Wetter than plastic limit	



Test Pit Number: 01-11

Ground Elevation: N/A

Project: Proposed Storage Buildings

Job No.: P041419-100

Location: Just Store It - Spragues Road, Township of North Dumfries, ON

Excavation Date: 2011-07-11

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation (m)	Number		
0,00	Ground Elevation		0,00			
	SAND: loose to compact brown gravelly sand, trace silt, moist					
			-0,50			
			-1,00			
			-1,50			
			-2,00			
	Test Pit terminated at 2.1 m		-2,50			

Reviewed by: WLoghrin
Field Tech: WLoghrin
Notes:

Drafted by: SMeteer
Sheet: 1 of 1



Project: *Proposed Storage Buildings*

Location: *Just Store It - Spragues Road, Township of North Dumfries, ON*

Test Pit Number: 02-11

Ground Elevation: *N/A*

Job No.: *P041419-100*

Excavation Date: *2011-07-11*

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation (m)	Number		
0.00	Ground Elevation		0.00			
	TOPSOIL: dark brown silty sand, moist					
	SAND: compact brown silty sand, moist					
			-0.50			
			-1.00			
			-1.50			
			-2.00			
2.00	Test Pit terminated at 2.0 m		-2.00			
			-2.50			

Reviewed by: *WLoghrin*
Field Tech: *WLoghrin*
Notes:

Drafted by: *SMeteer*
Sheet: *1 of 1*

Upon completion of excavation, test pit
sidewalls stable

No free groundwater encountered



Test Pit Number: 03-11

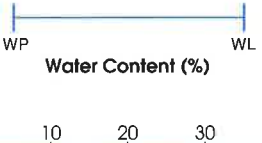
Ground Elevation: N/A

Project: Proposed Storage Buildings

Job No.: P041419-100

Location: Just Store It - Spragues Road, Township of North Dumfries, ON

Excavation Date: 2011-07-11

SOIL PROFILE				SAMPLE		Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation (m)	Number		
0.00	Ground Elevation		0.00			
	FILL: dark brown sand (topsoil), some gravel and silt, moist					
	SAND: sand, some silt and gravel, moist					
1.00			-1.00			
	wet		-1.50			Major groundwater seepage encountered at 1.5 m
2.00	Test Pit terminated at 2.0 m		-2.00			Upon completion of excavation, test pit sidewalls unstable with cave at 1.5 m
			-2.50			

Reviewed by: *WLoghrin*
Field Tech: *WLoghrin*
Notes:

Drafted by: *SMeteer*
Sheet: 1 of 1



Test Pit Number: 04-11

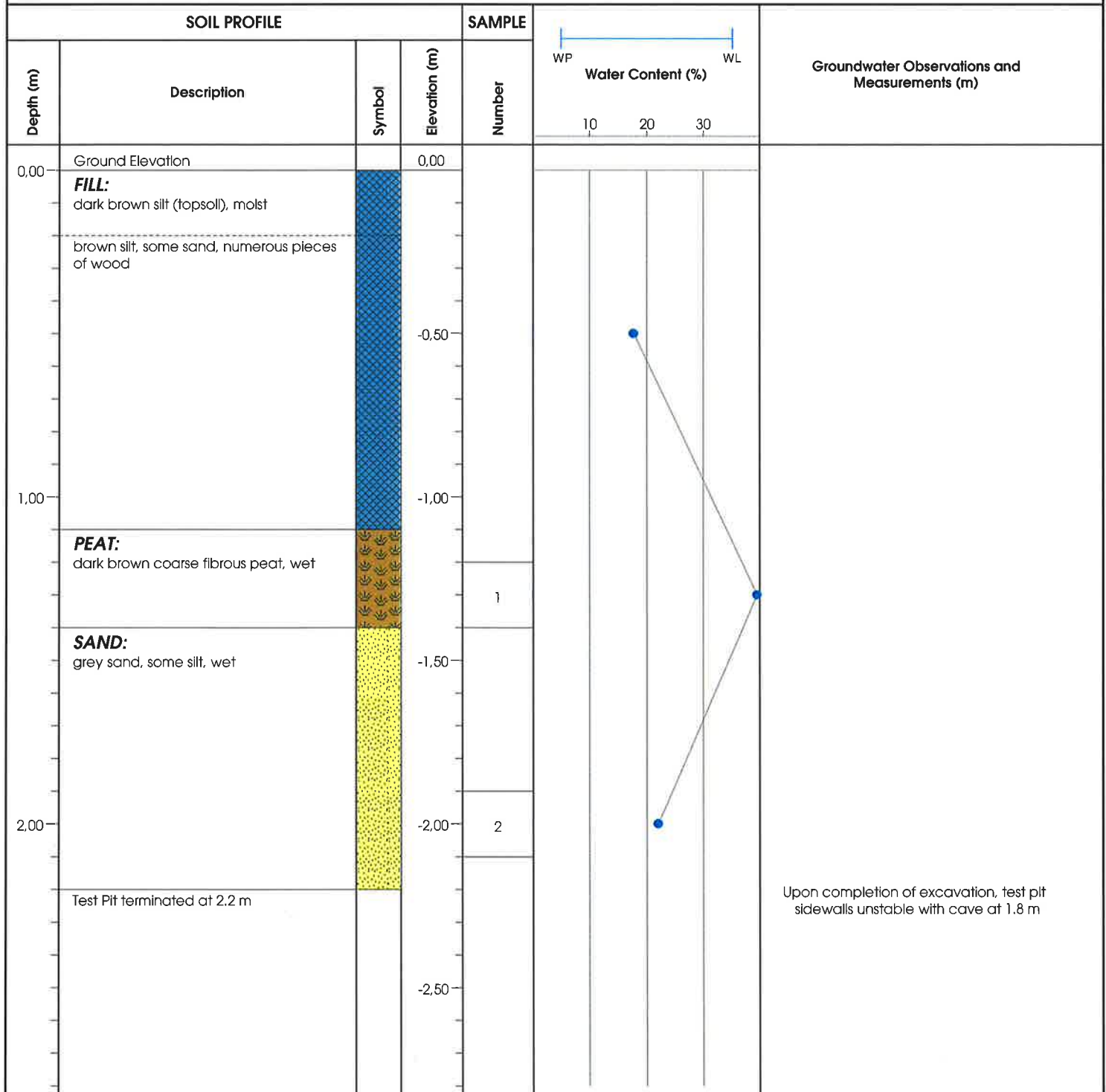
Ground Elevation: N/A

Project: Proposed Storage Buildings

Job No.: P041419-100

Location: Just Store It - Spragues Road, Township of North Dumfries, ON

Excavation Date: 2011-07-11



Reviewed by: *WLoghrin*
Field Tech: *WLoghrin*
Notes:

Drafted by: *SMeteer*
Sheet: 1 of 1



Test Pit Number: 05-11

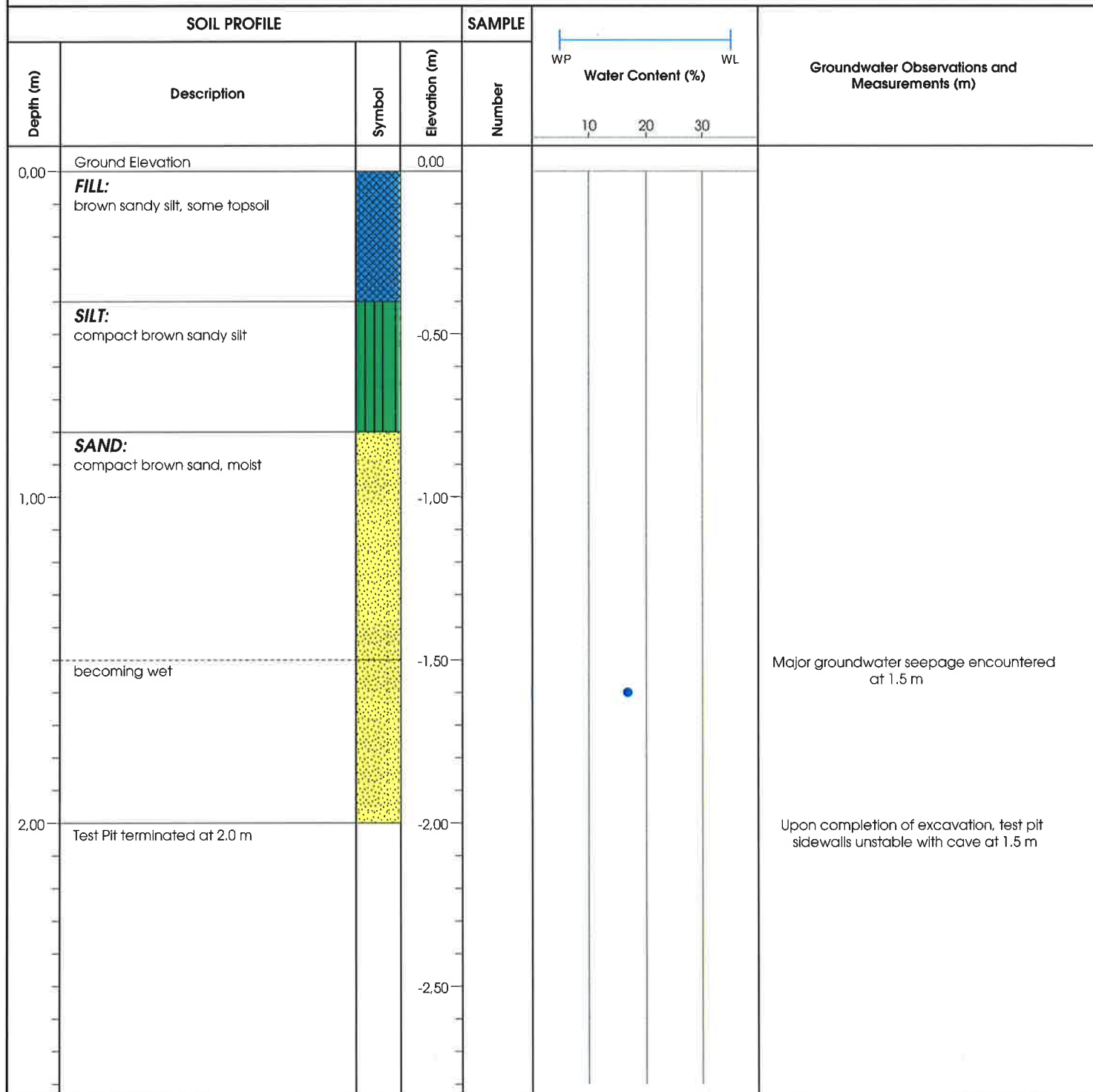
Ground Elevation: N/A

Project: Proposed Storage Buildings

Job No.: P041419-100

Location: Just Store It - Spragues Road, Township of North Dumfries, ON

Excavation Date: 2011-07-11



Reviewed by: WLoghrin
Field Tech: WLoghrin
Notes:

Drafted by: SMeteer
Sheet: 1 of 1



Test Pit Number: 06-11

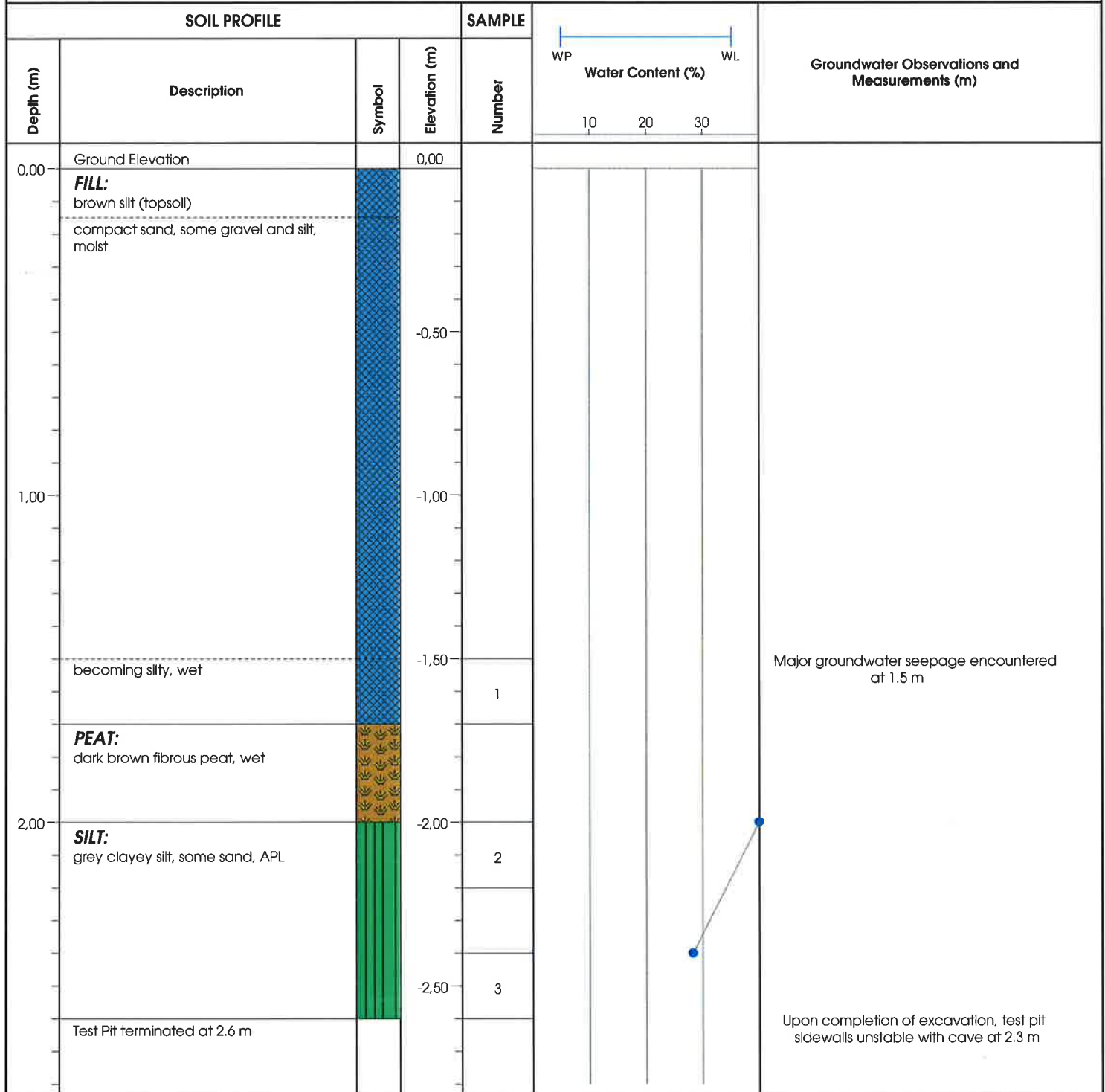
Ground Elevation: N/A

Project: Proposed Storage Buildings

Job No.: P041419-100

Location: Just Store It - Spragues Road, Township of North Dumfries, ON

Excavation Date: 2011-07-11



Reviewed by: WLoghrin
Field Tech: WLoghrin
Notes:

Drafted by: SMeteer
Sheet: 1 of 1



Project: *Proposed Storage Buildings*

Location: *Just Store It - Spragues Road, Township of North Dumfries, ON*

Test Pit Number: 07-11

Ground Elevation: *N/A*

Job No.: *P041419-100*

Excavation Date: *2011-07-11*

SOIL PROFILE				SAMPLE	Water Content (%)	Groundwater Observations and Measurements (m)
Depth (m)	Description	Symbol	Elevation (m)	Number		
0.00	Ground Elevation		0.00			
	FILL: dark brown sandy silt (topsoil), damp loose sand, some silt, moist					
			-0.50			
			-1.00			
			-1.50	1		
	SILT: brown sandy silt, moist					
	SAND: brown sand, some silt, wet					
2.00	Test Pit terminated at 2.0 m		-2.00			
			-2.50			

Reviewed by: *WLoghrin*
Field Tech: *WLoghrin*
Notes:

Drafted by: *SMeteer*
Sheet: *1 of 1*

Major groundwater seepage encountered at 1.5 m

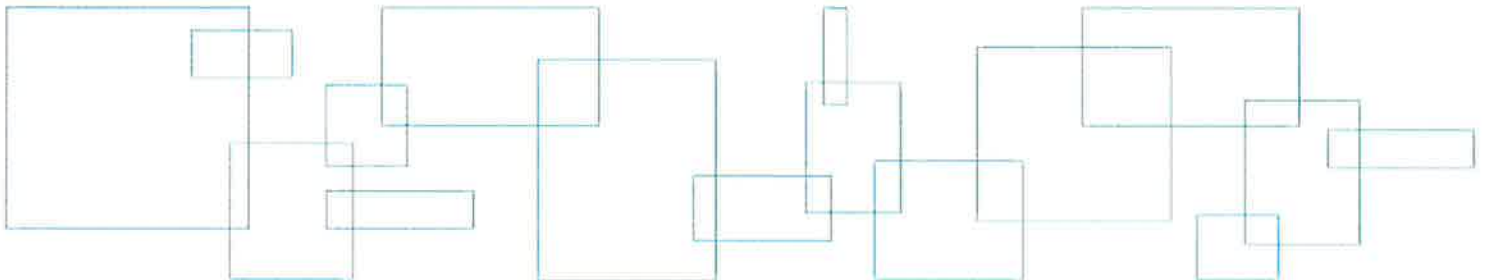
Upon completion of excavation, test pit sidewalls unstable with cave at 1.4 m

Appendix 3 Drawings

Drawing 1: Location Plan

Drawing 2: Site Plan

Drawing 3: Typical Structural Fill Pad



10 cm

5

4

3

2

1

0

**NOTES :**

1-REFERENCES : GRAND RIVER CONSERVATION
AUTHORITY, 2006 aerial photography (2011).

0 100 200 300 400 500 m

SCALE 1:10000

Project

Proposed Storage Buildings

Spragues Road, Township of North Dumfries, Ontario

Title

LOCATION PLAN**LVM inc.**

353, Bridge Street East
Kitchener (Ontario) N2K 2Y5
Telephone : 519.741.1313
Fax : 519.741.5422

Prepared **SMeteer**Drawn **SMeteer**Checked **WLoghrin**Discipline **GEOTECHNICAL**Scale **1:10000**Date **2011-07-19**

Project manager

WLoghrin

Sequence no.

01 of 03

M. dept.

160

Project

P041419

Work pkg.

100

Sub-w.p.

Disc.

GE

Drawing no.

01

Rev.

00

G:\160\PO41419\25_CAD\PO41419_100_01.DWG

10 cm

5

4

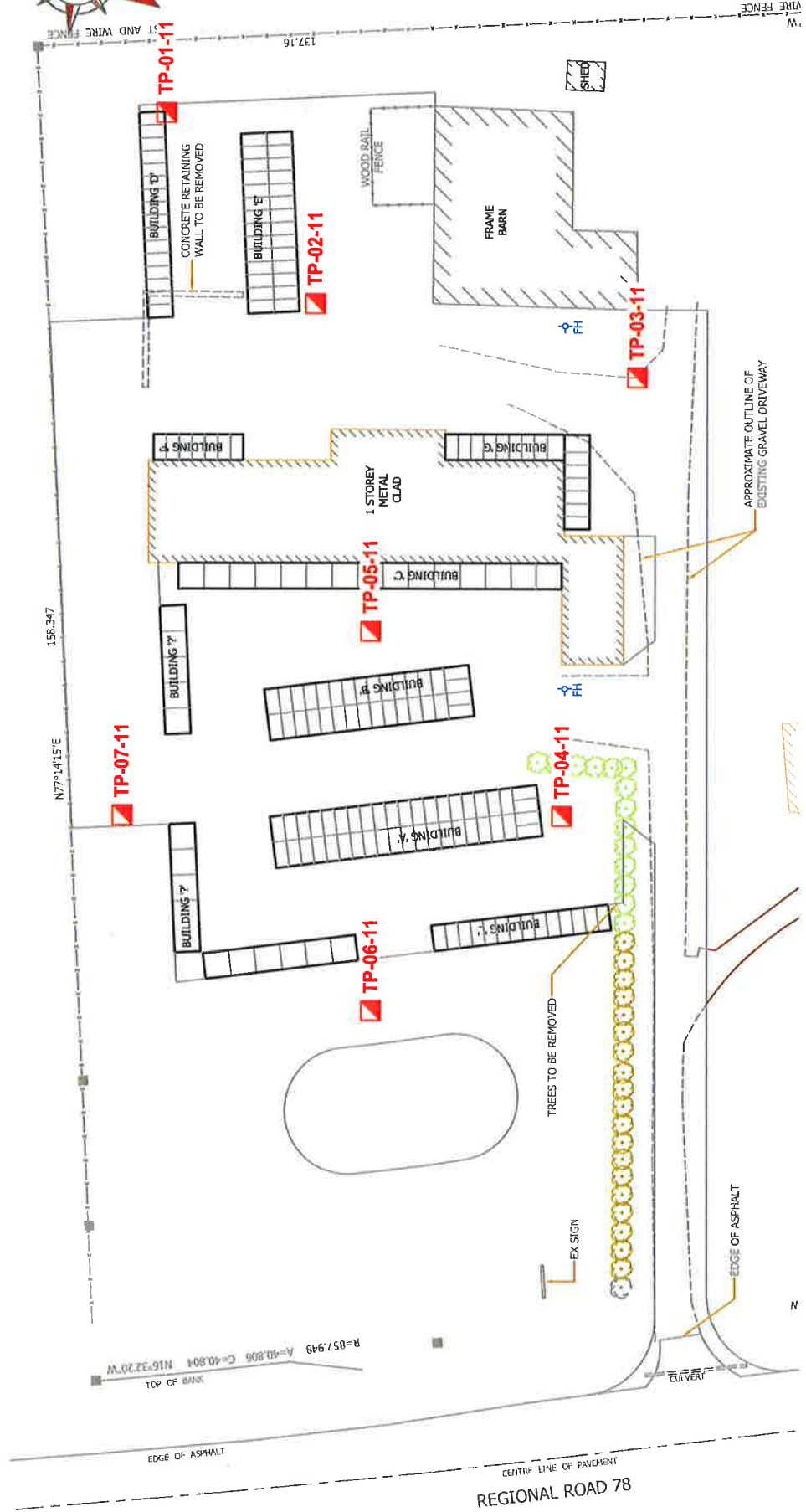
3

2

1

0

G:\160\PO41419\25 CAD\PO41419_100_02.DWG



LEGEND :

TEST PIT LOCATION

NOTES :
1-REFERENCES : SPH ENGINEERING INC., Project 11013, Drawing P1, 2011-03-30

Project

Proposed Storage Buildings

Spragues Road, Township of North Dumfries, Ontario

Title

SITE PLAN



LVM inc.
353, Bridge Street East
Kitchener (Ontario) N2K 2Y5
Telephone : 519.741.1313
Fax : 519.741.5422

Prepared SMeteer	Discipline GEOTECHNICAL	Project manager WLoghrin
Drawn SMeteer	Scale 1:750	Sequence no. 02 of 03
Checked WLoghrin	Date 2011-07-19	
M. dept 160 P041419	Work pkg. 100	Disc. GE
	Sub-w.p. 02	Rev. 00

10 cm

5

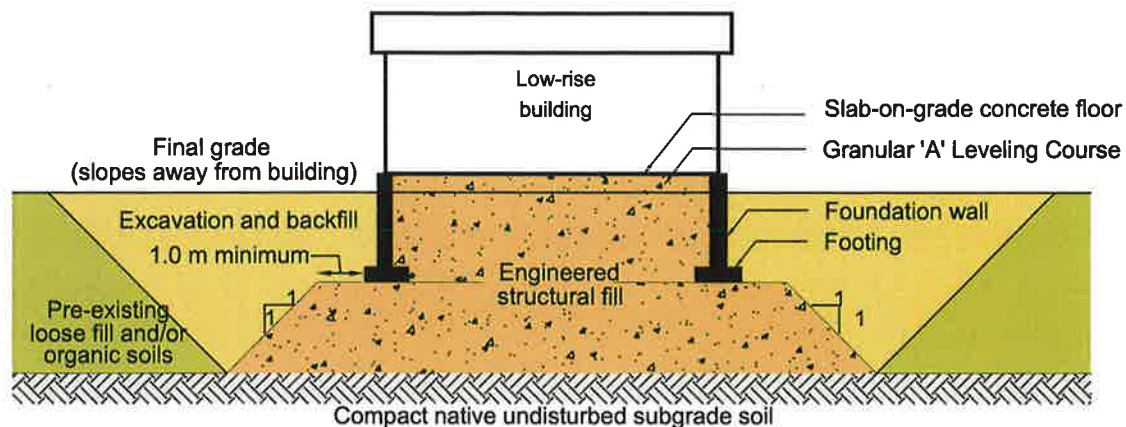
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3

2

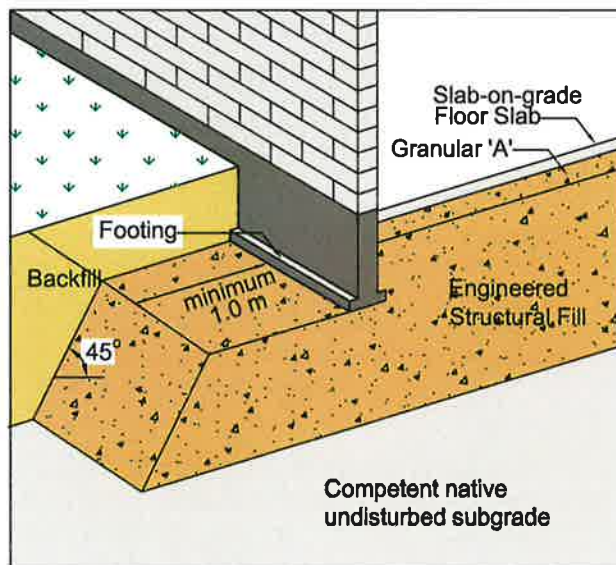
1

0



GENERAL REQUIREMENTS FOR ENGINEERED STRUCTURAL FILL

1. The area must be excavated of all pre-existing loose fill, topsoil, and/or organic soil until compact native undisturbed soil is reached.
2. The excavation should allow for the structural fill to extend 1.0 m beyond the outside edge of the building footings and down to the approved subgrade soil at a slope of 1 horizontal to 1 vertical (45°).
3. The subgrade below the engineered fill should be inspected and approved by a geotechnical engineer prior to fill construction. Fill placement and compaction operations to be carried out under full-time geotechnical supervision.
4. The structural fill should comprise sand and gravel aggregate placed in 300 mm thick lifts and compacted to at least 100% Standard Proctor Maximum Dry Density (SPMDD). The exterior backfill should consist of approved inorganic soil also placed in 300 mm thick lifts and compacted to minimum 95% SPMDD.
5. A minimum 150 mm thick layer of Granular 'A' should be placed directly below the floor slab for leveling and support purposes.
6. Exterior footings should be provided with minimum 1.2 m of soil cover for frost protection, or equivalent insulation
7. All excavations must be carried out in conformance with the current Ontario Occupational Health and Safety Act and Regulations 213/91 for construction projects.



Project

Proposed Storage Buildings

Spragues Road, Township of North Dumfries, Ontario

Title

TYPICAL STRUCTURAL FILL PAD

LVM

LVM inc.

 353, Bridge Street East
 Kitchener (Ontario) N2K 2Y5
 Telephone : 519.741.1313
 Fax : 519.741.5422
Prepared **SMeteer**Drawn **SMeteer**Checked **WLoghrin**Discipline **GEOTECHNICAL**Scale **NTS**Date **2011-07-19**

Project manager

WLoghrin

Sequence no.

03 of 03

M. dept.

160

Project

P041419

Work pkg.

100

Sub-w.p.

GE

Disc.

03

Drawing no.

00

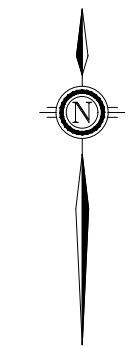
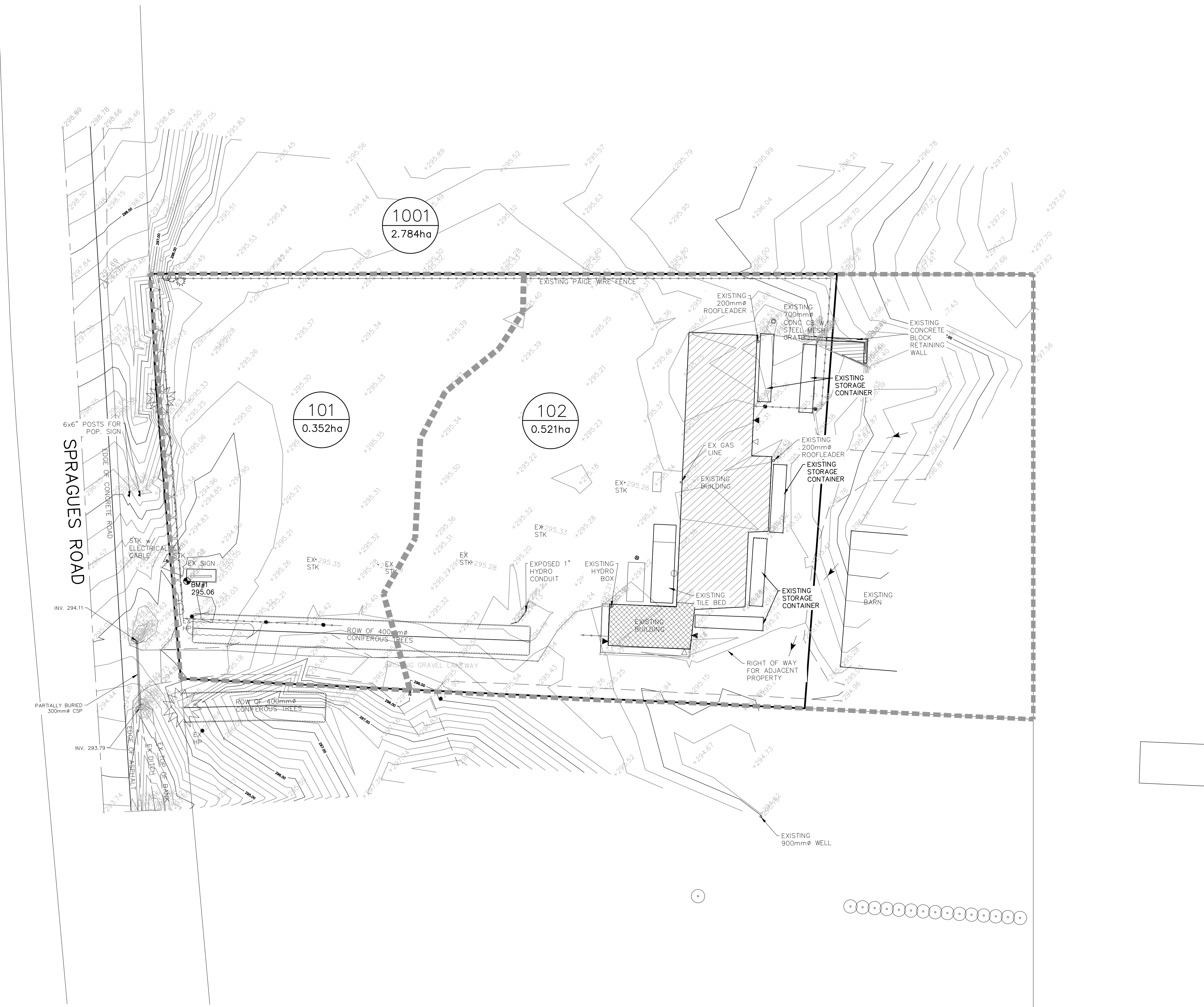
Rev.

00

G:\160P041419\25 CAD\160P041419_100_03.DWG

Appendix B

Catchment Area Plans



KEY PLAN

NOTES:

- 101

0.000ha

EXISTING CATCHMENT AREA I.D.

CATCHMENT AREA
- CATCHMENT AREA BOUNDARY

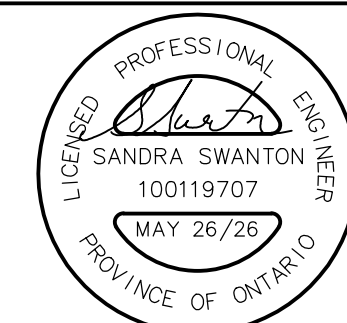
1.	REVISED AS PER SITE PLAN UPDATE	TB	MAY 26, 2026
No.	REVISIONS	BY	DATE
	CONSTRUCTION		
	TENDER		
	ISSUE FOR APPROVALS		
	ISSUE BLOCK		

JUST STORE IT
2495 SPRAGUES ROAD
TOWNSHIP OF NORTH DUMFRIES REGION OF WATERLOO

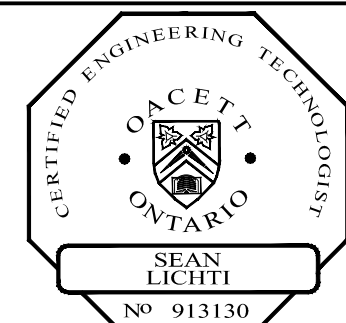
EXISTING CATCHMENT PLAN



K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY



SANDRA SWANTON
100119707
MAY 26/26
PROVINCE OF ONTARIO



SEAN LUCHETTI
No. 913130
PROVINCE OF ONTARIO

DESIGNED BY: S.S.

CHECKED BY: S.S.

DRAWN BY: G.C.

CHECKED BY: S.S.

FILE No. 22-304

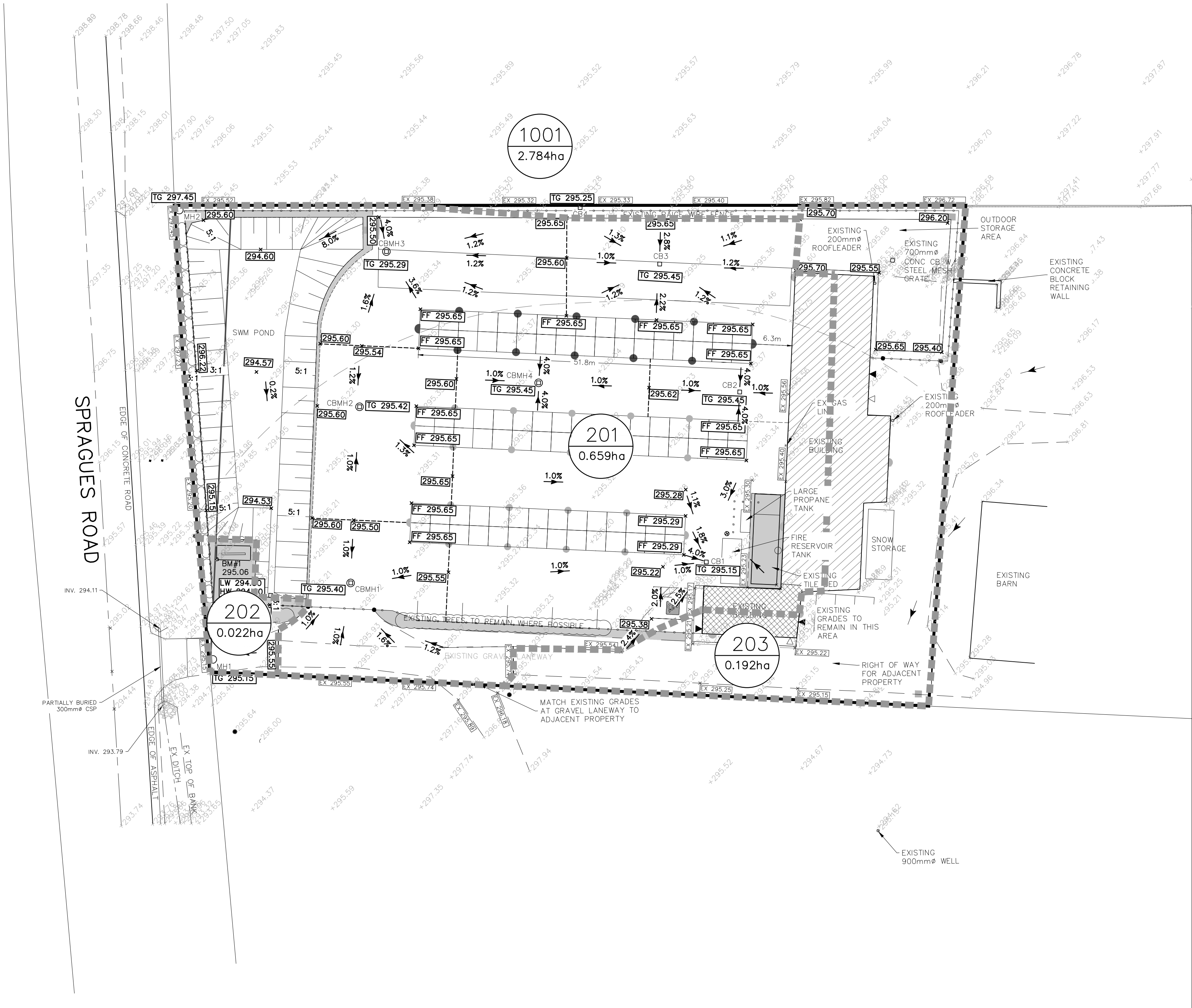
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SCALE 1:400

REVISION No. 1

DATE: MAY 26, 2026

SHEET 1 OF 1



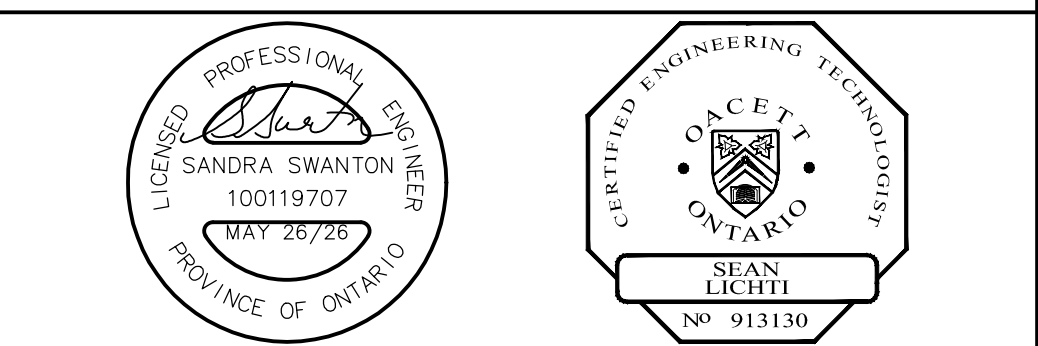
- NOTES:
- 101 PROPOSED CATCHMENT AREA I.D.
 - 0.000ha CATCHMENT AREA
 - CATCHMENT AREA BOUNDARY

1.	REVISED AS PER SITE PLAN UPDATE	TB	MAY 26, 2026
No.	REVISIONS	BY	DATE
	CONSTRUCTION		
	TENDER		
	ISSUE FOR APPROVALS		
	ISSUE BLOCK		

JUST STORE IT
2495 SPRAGUES ROAD
TOWNSHIP OF NORTH DUMFRIES REGION OF WATERLOO

PROPOSED CATCHMENT PLAN

K. SMART ASSOCIATES LIMITED
CONSULTING ENGINEERS AND PLANNERS
KITCHENER SUDBURY



DESIGNED BY: S.S.	0 8 16	DATE: MAY 26, 2026
CHECKED BY: S.S.	SCALE 1:400	
DRAWN BY: G.C.		SHEET
CHECKED BY: S.S.		1 OF 1
FILE No. 22-304	REVISION No. 1	

Appendix C

Pond Design Calculations

STORMWATER CALCULATIONS
2495 Spragues Road, Township of North Dumfries, Ontario

K. Smart Associatestest Limited
Ref. Number 22-304
Date 04-Aug-26

Pond	
Bottom Elevation	294.5 m
Bottom Grade	0.20%
Bottom Length	40 m
Bottom Width	8 m
Side Slopes	5 :1

Orifice #1		
Orifice Flow $Q=CA(2gh)^{0.5}$		
C	Coefficient	0.65
d	diameter	0 m
A	Area	0 m2
g	Gravitational Acc	9.81 m/s2
Invert	invert	293.93 m

Weir #1	
Spillway Weir $Q=CLH^{1.5}$	
Weir Length	1.5 m
Weir Elevation	295.3
Coefficient	1.84

Vortex Valve used to obtain greater flow control. Refer to Vortex Valve Hydraulics for Discharge

Stormwater Storage Calculations

Elevation	Pond							
	Bottom Width (m)	Bottom Length (m)	Total End Area (m ²)	Incremental Volume (m ³)	Cumulative Volume (m ³)	Orifice Flow (m ³ /s)	Vortex Valve (m3/s)	Weir Flow (m ³ /s)
293.93	0.6	0.6	0.36			0.0000	0.0000	
294.50	8.0	0	0	0.2	0.2	0.0000	0.0040	
294.55	8.5	25.0	212.50	5.3	5.5	0.0000	0.0041	
294.60	9.0	41	369	14.5	20.1	0.0000	0.0043	
294.65	9.5	41.5	394.25	19.1	39.1	0.0000	0.0044	
294.70	10.0	42	420	20.4	59.5	0.0000	0.0046	
294.75	10.5	42.5	446.25	21.7	81.1	0.0000	0.0047	
294.80	11.0	43	473	23.0	104.1	0.0000	0.0048	
294.85	11.5	43.5	500.25	24.3	128.5	0.0000	0.0050	
294.90	12.0	44	528	25.7	154.2	0.0000	0.0051	
294.95	12.5	44.5	556.25	27.1	181.3	0.0000	0.0052	
295.00	13.0	45	585	28.5	209.8	0.0000	0.0053	
295.05	13.5	45.5	614.25	30.0	239.8	0.0000	0.0054	
295.10	14.0	46	644	31.5	271.2	0.0000	0.0056	
295.15	14.5	46.5	674.25	33.0	304.2	0.0000	0.0057	
295.20	15.0	47	705	34.5	338.7	0.0000	0.0058	
295.25	15.5	47.5	736.25	36.0	374.7	0.0000	0.0059	
295.30	16.0	48	768	37.6	412.3	0.0000	0.0060	0.00
295.35	16.5	48.5	800.25	39.2	451.5	0.0000	0.0061	0.03
295.40	17.0	49	833	40.8	492.4	0.0000	0.0062	0.09

MIDUSS - Stage Storage Discharge Table

Stage (m)	Discharge (m ³ /s)	Storage (m ³)
293.93	0.0000	0
294.50	0.0040	0.205
294.55	0.0041	5.518
294.60	0.0043	20.055
294.65	0.0044	39.136
294.70	0.0046	59.493
294.75	0.0047	81.149
294.80	0.0048	104.130
294.85	0.0050	128.461
294.90	0.0051	154.168
294.95	0.0052	181.274
295.00	0.0053	209.805
295.05	0.0054	239.786
295.10	0.0056	271.243
295.15	0.0057	304.199
295.20	0.0058	338.680
295.25	0.0059	374.711
295.30	0.0060	412.318
295.35	0.0369	451.524
295.40	0.0934	492.355

Appendix D

Vortex Valve Hydraulic Modelling Data

Technical Specification

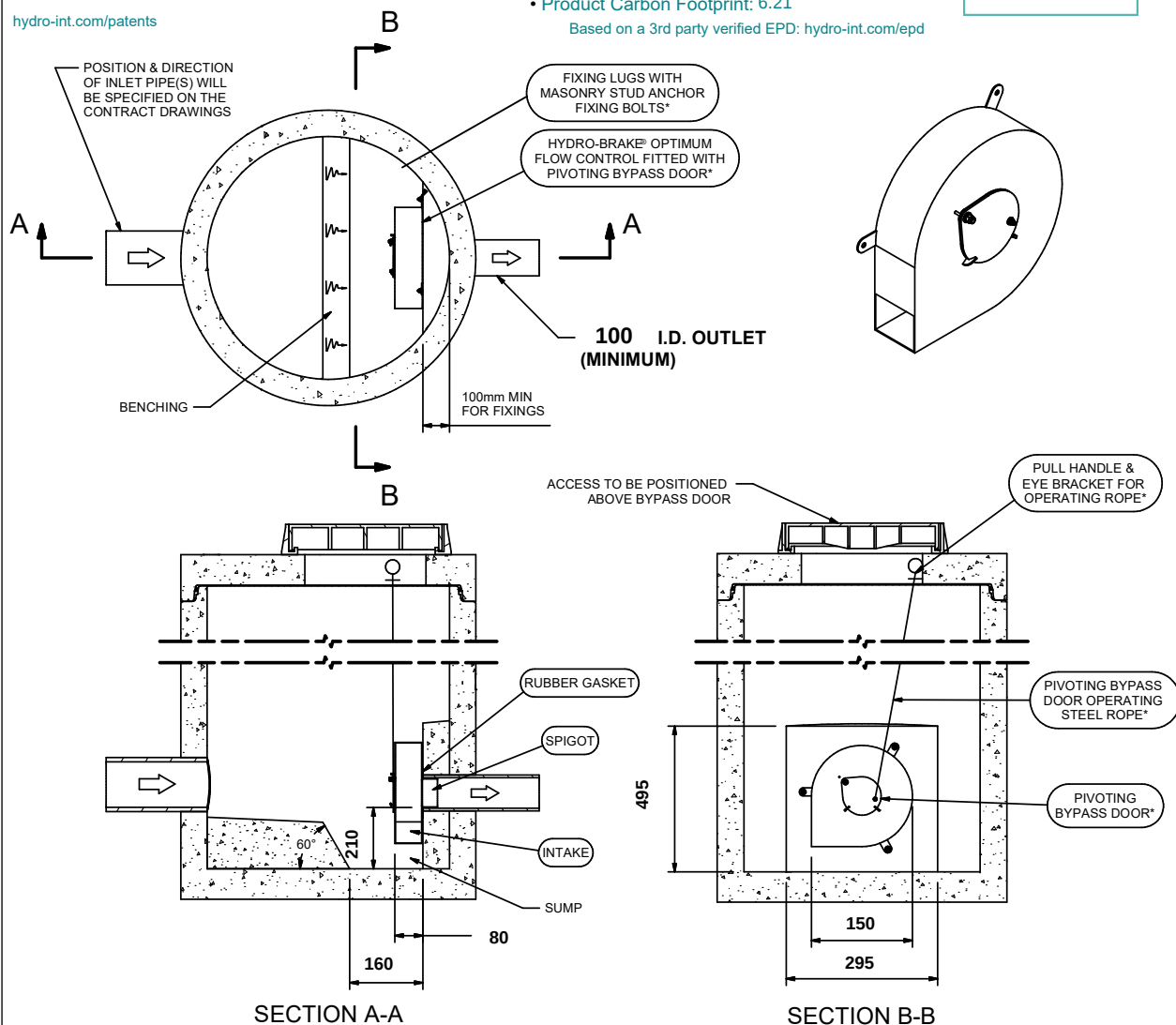
Control Point	Head (m)	Flow (l/s)
Primary Design	1.370	6.000
Flush-Flo™	0.096	1.868
Kick-Flo®	0.106	1.860
Mean Flow		4.082

hydro-int.com/patents

This Hydro-Brake® Optimum includes:

- All in 3 mm Grade 304L stainless steel
- Integral pivoting by-pass door allowing clear line of sight through to outlet, c/w operating rope
- Media blasted for corrosion resistance
- Variable flow rate post installation via adjustable inlet (if necessary)
- Indicative Weight: 5 kg
- Product Carbon Footprint: 6.21

Based on a 3rd party verified EPD: hydro-int.com/epd



IMPORTANT:  LIMIT OF HYDRO INTERNATIONAL SUPPLY
 THE DEVICE WILL BE HANDED TO SUIT SITE CONDITIONS
 FOR SITE SPECIFIC DETAILS AND MINIMUM CHAMBER SIZE REFER TO HYDRO INTERNATIONAL
 ALL CIVIL AND INSTALLATION WORK BY OTHERS
 * WHERE SUPPLIED
 HYDRO-BRAKE® IS A REGISTERED TRADEMARK FOR FLOW CONTROLS DESIGNED AND MANUFACTURED EXCLUSIVELY BY
 HYDRO INTERNATIONAL

THIS DESIGN LAYOUT IS FOR ILLUSTRATIVE PURPOSES ONLY. NOT TO SCALE.

DESIGN ADVICE



The head/flow characteristics of this SCU-0070-6000-1370-6000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modelling evaluates the full head/flow characteristic curve.
The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

Hydro International
 A CRH COMPANY

DATE	8/4/2026 7:48 PM	SCU-0070-6000-1370-6000 Hydro-Brake® Optimum
SITE	2495 Spragues Road	
DESIGNER	Sandra Swanton	
REF	DICB	

© 2026 Hydro International Ltd, 94 Hutchins Drive, Portland, Maine, 04102-1930. Tel: +1 (207) 756 6200 Fax: +1 (207) 756 6212 Website: hydro-int.com Email: enquiries@hydro-int.com

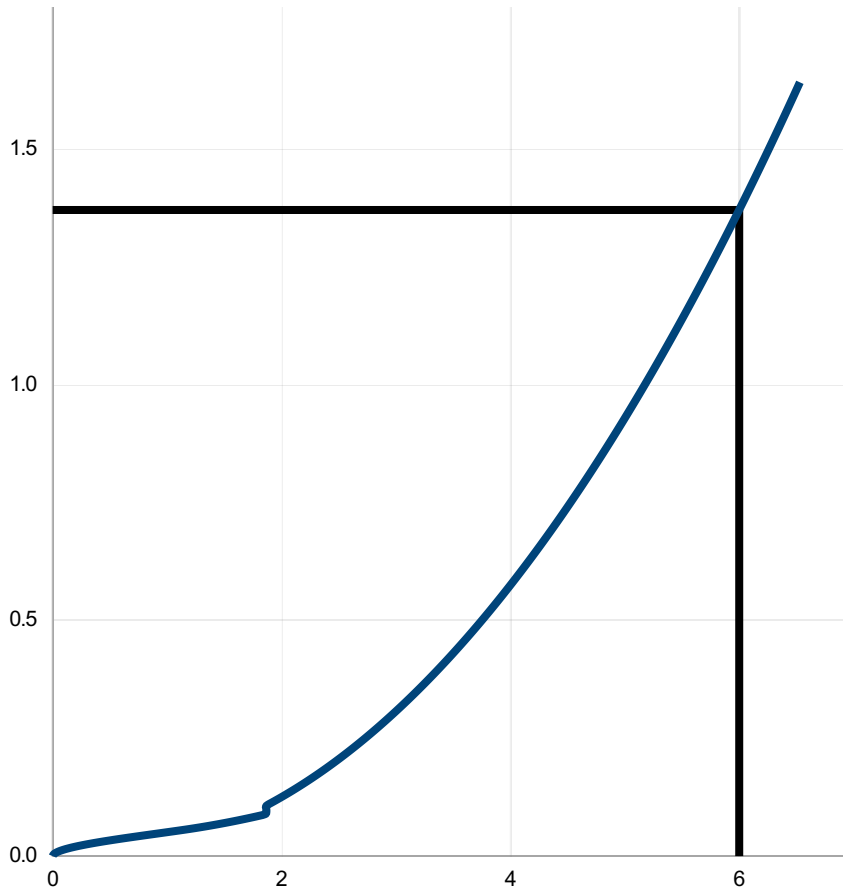
sswanton@ksmart.ca

Technical Specification

Control Point	Head (m)	Flow (l/s)
Primary Design	1.370	6.000
Flush-Flo™	0.096	1.868
Kick-Flo®	0.106	1.860
Mean Flow		4.082



hydro-int.com/patents



Head (m)	Flow (l/s)
0.000	0.000
0.047	0.897
0.094	1.868
0.142	2.114
0.189	2.406
0.236	2.661
0.283	2.892
0.331	3.102
0.378	3.298
0.425	3.481
0.472	3.654
0.520	3.819
0.567	3.975
0.614	4.125
0.661	4.270
0.709	4.409
0.756	4.543
0.803	4.673
0.850	4.799
0.898	4.921
0.945	5.041
0.992	5.157
1.039	5.270
1.087	5.381
1.134	5.489
1.181	5.595
1.228	5.699
1.276	5.801
1.323	5.901
1.370	5.999

DESIGN ADVICE



The head/flow characteristics of this SCU-0070-6000-1370-6000 Hydro-Brake® Optimum Flow Control are unique. Dynamic hydraulic modeling evaluates the full head/flow characteristic curve.

The use of any other flow control will invalidate any design based on this data and could constitute a flood risk.

**Hydro
International**
A CRH COMPANY

DATE	8/4/2026 7:48 PM
Site	2495 Spragues Road
DESIGNER	Sandra Swanton
Ref	DICB

SCU-0070-6000-1370-6000
Hydro-Brake® Optimum

Appendix E

MIDUSS Model Output Files

```

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"      MIDUSS created          February 7, 2010"
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"                                Aug 2026"
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"      Licensee name:           Sandra Swanton"
"      Company                   K. Smart Associates Limited"
"      Date & Time last used:    2026-08-04 at 1:33:23 PM"
" 85  IDF CURVE FIT"
"      6  Number of Storms"
"      1  Storm no."
"      2  Return interval"
"      12 Data Pairs"
"          5.000   10.000   15.000   30.000   60.000"
"          120.000 180.000 240.000 360.000 720.000"
"          1080.000 1440.000 minutes"
"          6.633   11.600   15.375   20.150   23.900"
"          29.600   33.900    0.000   39.000   43.200"
"          48.600   52.800    mm"
"          79.600   69.600   61.500   40.300   23.900"
"          14.800   11.300    0.000    6.500    3.600"
"          2.700    2.200   mm/hr"
"      823.502 mm/hr 'A' coeff."
"      11.1033 minutes 'B' coeff."
"      0.81848 'C' exponent"
"      1.8559 Std.error of estimate"
"      2  Storm no."
"      5  Return interval"
"      12 Data Pairs"
"          5.000   10.000   15.000   30.000   60.000"
"          120.000 180.000 240.000 360.000 720.000"
"          1080.000 1440.000 minutes"
"          8.608   14.867   19.975   26.200   31.000"
"          38.600   44.100    0.000   50.400   56.400"
"          63.000   69.600    mm"
"          103.300  89.200   79.900   52.400   31.000"
"          19.300   14.700    0.000    8.400    4.700"
"          3.500    2.900   mm/hr"
"      1058.046 mm/hr 'A' coeff."
"      11.1033 minutes 'B' coeff."
"      0.81619 'C' exponent"
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"          5.000   10.000   15.000   30.000   60.000"
"          120.000 180.000 240.000 360.000 720.000"
"          1080.000 1440.000 minutes"

```

```

"          9.925   17.117   23.025   30.150   35.700"
"          44.400   50.700    0.000   58.200   64.800"
"          72.000   79.200    mm"
"          119.100 102.700   92.100   60.300   35.700"
"          22.200   16.900    0.000    9.700    5.400"
"          4.000    3.300   mm/hr"
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"          120.000 180.000 240.000 360.000 720.000"
"          1080.000 1440.000 minutes"
"          11.183   19.300   25.950   34.000   40.300"
"          50.000   57.300    0.000   65.400   73.200"
"          81.000   88.800    mm"
"          134.200 115.800 103.800   68.000   40.300"
"          25.000   19.100    0.000   10.900    6.100"
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"          1080.000 1440.000 minutes"
"          12.808   22.100   29.725   38.950   46.100"
"          57.400   65.700    0.000   75.000   84.000"
"          93.600   103.200   mm"
"          153.700 132.600 118.900   77.900   46.100"
"          28.700   21.900    0.000   12.500    7.000"
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"          120.000 180.000 240.000 360.000 720.000"
"          1080.000 1440.000 minutes"
"          14.033   24.217   32.550   42.650   50.500"
"          62.800   71.700    0.000   82.200   92.400"

```

"		102.600	112.800	mm"		
"		168.400	145.300	130.200	85.300	50.500"
"		31.400	23.900	0.000	13.700	7.700"
"		5.700	4.700	mm/hr"		
"	1723.128	mm/hr	'A' coeff."			
"	11.0903	minutes	'B' coeff."			
"	0.81621		'C' exponent"			
"	1.8297		Std.error of estimate"			
" 38		START/RE-START TOTALS	"			
"	3	Runoff Totals on EXIT"				
"		Total Catchment area		0.000	hectare"	
"		Total Impervious area		0.000	hectare"	
"		Total % impervious		0.000"		
" 19		EXIT"				

EXISTING CONDITIONS

2 Year Storm Event

5 Year Storm Event

10 Year Storm Event

20 Year Storm Event

50 Year Storm Event

100 Year Storm Event

```

"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                 S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:            Existing 2 Year Run 1.out"
"          Licensee name:              Sandra Swanton"
"          Company                     K. Smart Associates Limited"
"          Date & Time last used:      2026-08-04 at 2:35:58 PM"
" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          823.502 Coefficient A"
"          11.103 Constant B"
"          0.818 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity            84.804 mm/hr"
"          Total depth                  33.629 mm"
"          6 002hyd Hydrograph extension used in this file"
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"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          1001 External Area North of Site"
"          0.000 % Impervious"
"          2.784 Total Area"
"          130.000 Flow length"
"          2.000 Overland Slope"
"          2.784 Pervious Area"
"          130.000 Pervious length"
"          2.000 Pervious slope"
"          0.000 Impervious Area"
"          130.000 Impervious length"
"          2.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.137 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

```

"          0.018 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 63.714 5.902 63.714 minutes"
"          Time to Centroid 176.540 97.068 176.540 minutes"
"          Rainfall depth 33.629 33.629 33.629 mm"
"          Rainfall volume 936.22 0.00 936.22 c.m"
"          Rainfall losses 29.025 5.142 29.025 mm"
"          Runoff depth 4.603 28.487 4.603 mm"
"          Runoff volume 128.16 0.00 128.16 c.m"
"          Runoff coefficient 0.137 0.000 0.137 "
"          Maximum flow 0.018 0.000 0.018 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"          0.018 0.018 0.000 0.000"
" 33      CATCHMENT 101"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          101 Existing Site"
"          5.000 % Impervious"
"          0.352 Total Area"
"          65.000 Flow length"
"          1.000 Overland Slope"
"          0.334 Pervious Area"
"          65.000 Pervious length"
"          1.000 Pervious slope"
"          0.018 Impervious Area"
"          65.000 Impervious length"
"          1.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.137 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.845 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"
"          0.003 0.018 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.334 0.018 0.352 hectare"
"          Time of concentration 51.752 4.794 40.240 minutes"
"          Time to Centroid 163.474 95.508 146.811 minutes"
"          Rainfall depth 33.629 33.629 33.629 mm"
"          Rainfall volume 112.45 5.92 118.37 c.m"
"          Rainfall losses 29.025 5.223 27.835 mm"
"          Runoff depth 4.603 28.406 5.793 mm"
"          Runoff volume 15.39 5.00 20.39 c.m"

```

"	Runoff coefficient	0.137	0.845	0.172	"
"	Maximum flow	0.002	0.003	0.003	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.003 0.020 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.003 0.020 0.020 0.000"				
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				
"	1 Node #"				
"	Road Ditch"				
"	Maximum flow	0.020		c.m/sec"	
"	Hydrograph volume	148.550		c.m"	
"	0.003 0.020 0.020 0.020"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.003 0.000 0.020 0.020"				
" 33	CATCHMENT 102"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	102 Existing Site to South East"				
"	35.000 % Impervious"				
"	0.521 Total Area"				
"	60.000 Flow length"				
"	1.000 Overland Slope"				
"	0.339 Pervious Area"				
"	60.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.182 Impervious Area"				
"	60.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.170 Pervious Manning 'n'"				
"	72.000 Pervious SCS Curve No."				
"	0.137 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	9.878 Pervious Initial abstraction"				
"	0.015 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.845 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.032 0.000 0.020 0.020 c.m/sec"				
"	Catchment 102 Pervious Impervious Total Area "				
"	Surface Area 0.339 0.182 0.521 hectare"				
"	Time of concentration 49.325 4.569 14.923 minutes"				
"	Time to Centroid 160.827 95.190 110.375 minutes"				
"	Rainfall depth 33.629 33.629 33.629 mm"				
"	Rainfall volume 113.88 61.32 175.21 c.m"				

"	Rainfall losses	29.025	5.223	20.694	mm"
"	Runoff depth	4.603	28.406	12.934	mm"
"	Runoff volume	15.59	51.80	67.39	c.m"
"	Runoff coefficient	0.137	0.845	0.385	"
"	Maximum flow	0.003	0.032	0.032	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.032 0.032 0.020 0.020"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.032 0.032 0.032 0.020"				
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	South East Property"				
"	Maximum flow	0.032		c.m/sec"	
"	Hydrograph volume	67.387		c.m"	
"	0.032 0.032 0.032 0.032"				
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		3.657	hectare"	
"	Total Impervious area		0.200	hectare"	
"	Total % Impervious		5.468"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                 S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:            Existing 5 Year Run 1.out"
"          Licensee name:              Sandra Swanton"
"          Company                     K. Smart Associates Limited"
"          Date & Time last used:      2026-08-04 at 2:37:33 PM"
" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          1058.046 Coefficient A"
"          11.103 Constant B"
"          0.816 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity            109.564 mm/hr"
"          Total depth                  43.663 mm"
"          6 005hyd Hydrograph extension used in this file"
" 33      CATCHMENT 1001"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          1001 External Area North of Site"
"          0.000 % Impervious"
"          2.784 Total Area"
"          130.000 Flow length"
"          2.000 Overland Slope"
"          2.784 Pervious Area"
"          130.000 Pervious length"
"          2.000 Pervious slope"
"          0.000 Impervious Area"
"          130.000 Impervious length"
"          2.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.197 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

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"          0.041 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 47.171 5.268 47.171 minutes"
"          Time to Centroid 158.046 95.435 158.046 minutes"
"          Rainfall depth 43.663 43.663 43.663 mm"
"          Rainfall volume 1215.57 0.00 1215.57 c.m"
"          Rainfall losses 35.056 5.446 35.056 mm"
"          Runoff depth 8.607 38.217 8.607 mm"
"          Runoff volume 239.62 0.00 239.62 c.m"
"          Runoff coefficient 0.197 0.000 0.197 "
"          Maximum flow 0.041 0.000 0.041 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"          0.041 0.041 0.000 0.000"
" 33      CATCHMENT 101"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          101 Existing Site"
"          5.000 % Impervious"
"          0.352 Total Area"
"          65.000 Flow length"
"          1.000 Overland Slope"
"          0.334 Pervious Area"
"          65.000 Pervious length"
"          1.000 Pervious slope"
"          0.018 Impervious Area"
"          65.000 Impervious length"
"          1.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.197 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.874 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"
"          0.006 0.041 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.334 0.018 0.352 hectare"
"          Time of concentration 38.315 4.279 31.878 minutes"
"          Time to Centroid 147.917 94.023 137.725 minutes"
"          Rainfall depth 43.663 43.663 43.663 mm"
"          Rainfall volume 146.01 7.68 153.69 c.m"
"          Rainfall losses 35.055 5.522 33.579 mm"
"          Runoff depth 8.607 38.141 10.084 mm"
"          Runoff volume 28.78 6.71 35.50 c.m"

```

"	Runoff coefficient	0.197	0.874	0.231	"
"	Maximum flow	0.006	0.004	0.006	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.006 0.046 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.006 0.046 0.046 0.000"				
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				
"	1 Node #"				
"	Road Ditch"				
"	Maximum flow	0.046		c.m/sec"	
"	Hydrograph volume	275.113		c.m"	
"	0.006 0.046 0.046 0.046"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.006 0.000 0.046 0.046"				
" 33	CATCHMENT 102"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	102 Existing Site to South East"				
"	35.000 % Impervious"				
"	0.521 Total Area"				
"	60.000 Flow length"				
"	1.000 Overland Slope"				
"	0.339 Pervious Area"				
"	60.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.182 Impervious Area"				
"	60.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.170 Pervious Manning 'n'"				
"	72.000 Pervious SCS Curve No."				
"	0.197 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	9.878 Pervious Initial abstraction"				
"	0.015 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.872 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.042 0.000 0.046 0.046 c.m/sec"				
"	Catchment 102 Pervious Impervious Total Area "				
"	Surface Area 0.339 0.182 0.521 hectare"				
"	Time of concentration 36.518 4.078 13.667 minutes"				
"	Time to Centroid 145.855 93.760 109.158 minutes"				
"	Rainfall depth 43.663 43.663 43.663 mm"				
"	Rainfall volume 147.86 79.62 227.48 c.m"				

"	Rainfall losses	35.057	5.574	24.738	mm"
"	Runoff depth	8.606	38.089	18.925	mm"
"	Runoff volume	29.14	69.46	98.60	c.m"
"	Runoff coefficient	0.197	0.872	0.433	"
"	Maximum flow	0.006	0.041	0.042	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.042 0.042 0.046 0.046"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.042 0.042 0.042 0.046"				
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	South East Property"				
"	Maximum flow	0.042		c.m/sec"	
"	Hydrograph volume	98.599		c.m"	
"	0.042 0.042 0.042 0.042"				
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		3.657	hectare"	
"	Total Impervious area		0.200	hectare"	
"	Total % Impervious		5.468"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                 S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:           Existing 10 Year Run 1.out"
"          Licensee name:             Sandra Swanton"
"          Company                    K. Smart Associates Limited"
"          Date & Time last used:     2026-08-04 at 2:38:45 PM"
" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          1226.738 Coefficient A"
"          11.098 Constant B"
"          0.818 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity          126.361 mm/hr"
"          Total depth                50.096 mm"
"          6 010hyd Hydrograph extension used in this file"
" 33      CATCHMENT 1001"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          1001 External Area North of Site"
"          0.000 % Impervious"
"          2.784 Total Area"
"          130.000 Flow length"
"          2.000 Overland Slope"
"          2.784 Pervious Area"
"          130.000 Pervious length"
"          2.000 Pervious slope"
"          0.000 Impervious Area"
"          130.000 Impervious length"
"          2.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.232 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

```

"          0.061 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 40.466 4.954 40.466 minutes"
"          Time to Centroid 150.424 94.551 150.424 minutes"
"          Rainfall depth 50.096 50.096 50.096 mm"
"          Rainfall volume 1394.68 0.00 1394.68 c.m"
"          Rainfall losses 38.464 5.576 38.464 mm"
"          Runoff depth 11.632 44.520 11.632 mm"
"          Runoff volume 323.85 0.00 323.85 c.m"
"          Runoff coefficient 0.232 0.000 0.232 "
"          Maximum flow 0.061 0.000 0.061 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"          0.061 0.061 0.000 0.000"
" 33      CATCHMENT 101"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          101 Existing Site"
"          5.000 % Impervious"
"          0.352 Total Area"
"          65.000 Flow length"
"          1.000 Overland Slope"
"          0.334 Pervious Area"
"          65.000 Pervious length"
"          1.000 Pervious slope"
"          0.018 Impervious Area"
"          65.000 Impervious length"
"          1.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.232 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.885 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"
"          0.009 0.061 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.334 0.018 0.352 hectare"
"          Time of concentration 32.868 4.024 28.047 minutes"
"          Time to Centroid 141.456 93.252 133.398 minutes"
"          Rainfall depth 50.096 50.096 50.096 mm"
"          Rainfall volume 167.52 8.82 176.34 c.m"
"          Rainfall losses 38.466 5.743 36.829 mm"
"          Runoff depth 11.631 44.353 13.267 mm"
"          Runoff volume 38.89 7.81 46.70 c.m"

```

"	Runoff coefficient	0.232	0.885	0.265	"
"	Maximum flow	0.008	0.005	0.009	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.009 0.070 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.009 0.070 0.070 0.000"				
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				
"	1 Node #"				
"	Road Ditch"				
"	Maximum flow	0.070	c.m/sec"		
"	Hydrograph volume	370.548	c.m"		
"	0.009 0.070 0.070 0.070"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.009 0.000 0.070 0.070"				
" 33	CATCHMENT 102"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	102 Existing Site to South East"				
"	35.000 % Impervious"				
"	0.521 Total Area"				
"	60.000 Flow length"				
"	1.000 Overland Slope"				
"	0.339 Pervious Area"				
"	60.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.182 Impervious Area"				
"	60.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.170 Pervious Manning 'n'"				
"	72.000 Pervious SCS Curve No."				
"	0.232 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	9.878 Pervious Initial abstraction"				
"	0.015 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.882 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.050 0.000 0.070 0.070 c.m/sec"				
"	Catchment 102 Pervious Impervious Total Area "				
"	Surface Area 0.339 0.182 0.521 hectare"				
"	Time of concentration 31.327 3.835 12.863 minutes"				
"	Time to Centroid 139.635 92.999 108.313 minutes"				
"	Rainfall depth 50.096 50.096 50.096 mm"				
"	Rainfall volume 169.65 91.35 261.00 c.m"				

"	Rainfall losses	38.465	5.913	27.071	mm"
"	Runoff depth	11.632	44.183	23.025	mm"
"	Runoff volume	39.39	80.57	119.96	c.m"
"	Runoff coefficient	0.232	0.882	0.460	"
"	Maximum flow	0.009	0.048	0.050	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.050 0.050 0.070 0.070"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.050 0.050 0.050 0.070"				
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	South East Property"				
"	Maximum flow	0.050	c.m/sec"		
"	Hydrograph volume	119.959	c.m"		
"	0.050 0.050 0.050 0.050"				
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		3.657	hectare"	
"	Total Impervious area		0.200	hectare"	
"	Total % impervious		5.468"		
" 19	EXIT"				

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"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                 S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:           Existing 20 Year Run 1.out"
"          Licensee name:             Sandra Swanton"
"          Company                    K. Smart Associates Limited"
"          Date & Time last used:     2026-08-04 at 2:40:08 PM"
" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          1406.070 Coefficient A"
"          11.324 Constant B"
"          0.821 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity          141.996 mm/hr"
"          Total depth                56.467 mm"
"          6 020hyd Hydrograph extension used in this file"
" 33      CATCHMENT 1001"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          1001 External Area North of Site"
"          0.000 % Impervious"
"          2.784 Total Area"
"          130.000 Flow length"
"          2.000 Overland Slope"
"          2.784 Pervious Area"
"          130.000 Pervious length"
"          2.000 Pervious slope"
"          0.000 Impervious Area"
"          130.000 Impervious length"
"          2.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.264 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

```

"          0.086 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 35.949 4.714 35.949 minutes"
"          Time to Centroid 144.788 93.840 144.788 minutes"
"          Rainfall depth 56.467 56.467 56.467 mm"
"          Rainfall volume 1572.04 0.00 1572.04 c.m"
"          Rainfall losses 41.539 5.625 41.539 mm"
"          Runoff depth 14.928 50.842 14.928 mm"
"          Runoff volume 415.60 0.00 415.60 c.m"
"          Runoff coefficient 0.264 0.000 0.264 "
"          Maximum flow 0.086 0.000 0.086 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"          0.086 0.086 0.000 0.000"
" 33      CATCHMENT 101"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          101 Existing Site"
"          5.000 % Impervious"
"          0.352 Total Area"
"          65.000 Flow length"
"          1.000 Overland Slope"
"          0.334 Pervious Area"
"          65.000 Pervious length"
"          1.000 Pervious slope"
"          0.018 Impervious Area"
"          65.000 Impervious length"
"          1.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.264 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.892 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"
"          0.013 0.086 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.334 0.018 0.352 hectare"
"          Time of concentration 29.200 3.829 25.370 minutes"
"          Time to Centroid 136.673 92.631 130.025 minutes"
"          Rainfall depth 56.467 56.467 56.467 mm"
"          Rainfall volume 188.83 9.94 198.76 c.m"
"          Rainfall losses 41.548 6.074 39.775 mm"
"          Runoff depth 14.919 50.393 16.692 mm"
"          Runoff volume 49.89 8.87 58.76 c.m"

```

"	Runoff coefficient	0.264	0.892	0.296	"
"	Maximum flow	0.012	0.005	0.013	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.013 0.099 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.013 0.099 0.099 0.000"				
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				
"	1 Node #"				
"	Road Ditch"				
"	Maximum flow	0.099		c.m/sec"	
"	Hydrograph volume	474.356		c.m"	
"	0.013 0.099 0.099 0.099"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.013 0.000 0.099 0.099"				
" 33	CATCHMENT 102"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	102 Existing Site to South East"				
"	35.000 % Impervious"				
"	0.521 Total Area"				
"	60.000 Flow length"				
"	1.000 Overland Slope"				
"	0.339 Pervious Area"				
"	60.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.182 Impervious Area"				
"	60.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.170 Pervious Manning 'n'"				
"	72.000 Pervious SCS Curve No."				
"	0.264 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	9.878 Pervious Initial abstraction"				
"	0.015 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.888 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.057 0.000 0.099 0.099 c.m/sec"				
"	Catchment 102 Pervious Impervious Total Area "				
"	Surface Area 0.339 0.182 0.521 hectare"				
"	Time of concentration 27.831 3.649 12.255 minutes"				
"	Time to Centroid 135.011 92.403 107.566 minutes"				
"	Rainfall depth 56.467 56.467 56.467 mm"				
"	Rainfall volume 191.23 102.97 294.19 c.m"				

"	Rainfall losses	41.544	6.303	29.210	mm"
"	Runoff depth	14.923	50.164	27.258	mm"
"	Runoff volume	50.54	91.47	142.01	c.m"
"	Runoff coefficient	0.264	0.888	0.483	"
"	Maximum flow	0.013	0.053	0.057	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.057 0.057 0.099 0.099"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.057 0.057 0.057 0.099"				
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	South East Property"				
"	Maximum flow	0.057		c.m/sec"	
"	Hydrograph volume	142.012		c.m"	
"	0.057 0.057 0.057 0.057"				
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		3.657	hectare"	
"	Total Impervious area		0.200	hectare"	
"	Total % Impervious		5.468"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                  S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:            Existing 50 Year Run 1.out"
"          Licensee name:              Sandra Swanton"
"          Company                     K. Smart Associates Limited"
"          Date & Time last used:      2026-08-04 at 2:41:12 PM"
" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          1574.053 Coefficient A"
"          11.090 Constant B"
"          0.816 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity            163.106 mm/hr"
"          Total depth                  64.961 mm"
"          6 050hyd Hydrograph extension used in this file"
" 33      CATCHMENT 1001"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          1001 External Area North of Site"
"          0.000 % Impervious"
"          2.784 Total Area"
"          130.000 Flow length"
"          2.000 Overland Slope"
"          2.784 Pervious Area"
"          130.000 Pervious length"
"          2.000 Pervious slope"
"          0.000 Impervious Area"
"          130.000 Impervious length"
"          2.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.303 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

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```

"          0.124 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 31.604 4.446 31.604 minutes"
"          Time to Centroid 139.415 93.205 139.415 minutes"
"          Rainfall depth 64.961 64.961 64.961 mm"
"          Rainfall volume 1808.50 0.00 1808.50 c.m"
"          Rainfall losses 45.261 5.812 45.261 mm"
"          Runoff depth 19.700 59.149 19.700 mm"
"          Runoff volume 548.44 0.00 548.44 c.m"
"          Runoff coefficient 0.303 0.000 0.303 "
"          Maximum flow 0.124 0.000 0.124 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"          0.124 0.124 0.000 0.000"
" 33      CATCHMENT 101"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          101 Existing Site"
"          5.000 % Impervious"
"          0.352 Total Area"
"          65.000 Flow length"
"          1.000 Overland Slope"
"          0.334 Pervious Area"
"          65.000 Pervious length"
"          1.000 Pervious slope"
"          0.018 Impervious Area"
"          65.000 Impervious length"
"          1.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.303 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.900 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"
"          0.018 0.124 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.334 0.018 0.352 hectare"
"          Time of concentration 25.670 3.611 22.689 minutes"
"          Time to Centroid 132.121 92.063 126.707 minutes"
"          Rainfall depth 64.961 64.961 64.961 mm"
"          Rainfall volume 217.23 11.43 228.66 c.m"
"          Rainfall losses 45.270 6.490 43.331 mm"
"          Runoff depth 19.691 58.471 21.630 mm"
"          Runoff volume 65.85 10.29 76.14 c.m"

```

"	Runoff coefficient	0.303	0.900	0.333	"
"	Maximum flow	0.017	0.006	0.018	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.018 0.142 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.018 0.142 0.142 0.000"				
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				
"	1 Node #"				
"	Road Ditch"				
"	Maximum flow	0.142	c.m/sec"		
"	Hydrograph volume	624.573	c.m"		
"	0.018 0.142 0.142 0.142"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.018 0.000 0.142 0.142"				
" 33	CATCHMENT 102"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	102 Existing Site to South East"				
"	35.000 % Impervious"				
"	0.521 Total Area"				
"	60.000 Flow length"				
"	1.000 Overland Slope"				
"	0.339 Pervious Area"				
"	60.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.182 Impervious Area"				
"	60.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.170 Pervious Manning 'n'"				
"	72.000 Pervious SCS Curve No."				
"	0.303 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	9.878 Pervious Initial abstraction"				
"	0.015 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.901 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.067 0.000 0.142 0.142 c.m/sec"				
"	Catchment 102 Pervious Impervious Total Area "				
"	Surface Area 0.339 0.182 0.521 hectare"				
"	Time of concentration 24.466 3.442 11.529 minutes"				
"	Time to Centroid 130.649 91.795 106.740 minutes"				
"	Rainfall depth 64.961 64.961 64.961 mm"				
"	Rainfall volume 219.99 118.46 338.45 c.m"				

"	Rainfall losses	45.250	6.399	31.652	mm"
"	Runoff depth	19.711	58.561	33.309	mm"
"	Runoff volume	66.75	106.79	173.54	c.m"
"	Runoff coefficient	0.303	0.901	0.513	"
"	Maximum flow	0.018	0.061	0.067	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.067 0.067 0.142 0.142"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.067 0.067 0.067 0.142"				
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	South East Property"				
"	Maximum flow	0.067	c.m/sec"		
"	Hydrograph volume	173.537	c.m"		
"	0.067 0.067 0.067 0.067"				
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		3.657	hectare"	
"	Total Impervious area		0.200	hectare"	
"	Total % Impervious		5.468"		
" 19	EXIT"				

```

"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                 S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:            Existing 100 Year Run 1.out"
"          Licensee name:              Sandra Swanton"
"          Company                     K. Smart Associates Limited"
"          Date & Time last used:      2026-08-04 at 2:44:16 PM"
" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          1723.128 Coefficient A"
"          11.090 Constant B"
"          0.816 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity            178.553 mm/hr"
"          Total depth                  71.113 mm"
"          6 100hyd Hydrograph extension used in this file"
" 33      CATCHMENT 1001"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          1001 External Area North of Site"
"          0.000 % Impervious"
"          2.784 Total Area"
"          130.000 Flow length"
"          2.000 Overland Slope"
"          2.784 Pervious Area"
"          130.000 Pervious length"
"          2.000 Pervious slope"
"          0.000 Impervious Area"
"          130.000 Impervious length"
"          2.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.329 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

```

"          0.161 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 29.212 4.281 29.212 minutes"
"          Time to Centroid 136.197 92.748 136.197 minutes"
"          Rainfall depth 71.113 71.113 71.113 mm"
"          Rainfall volume 1979.78 0.00 1979.78 c.m"
"          Rainfall losses 47.692 5.974 47.692 mm"
"          Runoff depth 23.421 65.139 23.421 mm"
"          Runoff volume 652.05 0.00 652.05 c.m"
"          Runoff coefficient 0.329 0.000 0.329 "
"          Maximum flow 0.161 0.000 0.161 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"          0.161 0.161 0.000 0.000"
" 33      CATCHMENT 101"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          101 Existing Site"
"          5.000 % Impervious"
"          0.352 Total Area"
"          65.000 Flow length"
"          1.000 Overland Slope"
"          0.334 Pervious Area"
"          65.000 Pervious length"
"          1.000 Pervious slope"
"          0.018 Impervious Area"
"          65.000 Impervious length"
"          1.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.329 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.008 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"
"          0.024 0.161 0.000 0.000 c.m/sec"
"          Catchment 101 Pervious Impervious Total Area "
"          Surface Area 0.334 0.018 0.352 hectare"
"          Time of concentration 23.727 3.477 21.162 minutes"
"          Time to Centroid 129.380 91.626 124.597 minutes"
"          Rainfall depth 71.113 71.113 71.113 mm"
"          Rainfall volume 237.80 12.52 250.32 c.m"
"          Rainfall losses 47.691 6.556 45.634 mm"
"          Runoff depth 23.422 64.557 25.479 mm"
"          Runoff volume 78.32 11.36 89.69 c.m"

```

"	Runoff coefficient	0.329	0.908	0.358	"
"	Maximum flow	0.022	0.006	0.024	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.024 0.183 0.000 0.000"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.024 0.183 0.183 0.000"				
" 40	HYDROGRAPH Combine 1"				
"	6 Combine "				
"	1 Node #"				
"	Road Ditch"				
"	Maximum flow	0.183	c.m/sec"		
"	Hydrograph volume	741.732	c.m"		
"	0.024 0.183 0.183 0.183"				
" 40	HYDROGRAPH Start - New Tributary"				
"	2 Start - New Tributary"				
"	0.024 0.000 0.183 0.183"				
" 33	CATCHMENT 102"				
"	1 Triangular SCS"				
"	1 Equal length"				
"	1 SCS method"				
"	102 Existing Site to South East"				
"	35.000 % Impervious"				
"	0.521 Total Area"				
"	60.000 Flow length"				
"	1.000 Overland Slope"				
"	0.339 Pervious Area"				
"	60.000 Pervious length"				
"	1.000 Pervious slope"				
"	0.182 Impervious Area"				
"	60.000 Impervious length"				
"	1.000 Impervious slope"				
"	0.170 Pervious Manning 'n'"				
"	72.000 Pervious SCS Curve No."				
"	0.329 Pervious Runoff coefficient"				
"	0.100 Pervious Ia/S coefficient"				
"	9.878 Pervious Initial abstraction"				
"	0.015 Impervious Manning 'n'"				
"	98.000 Impervious SCS Curve No."				
"	0.908 Impervious Runoff coefficient"				
"	0.100 Impervious Ia/S coefficient"				
"	0.518 Impervious Initial abstraction"				
"	0.074 0.000 0.183 0.183 c.m/sec"				
"	Catchment 102 Pervious Impervious Total Area "				
"	Surface Area 0.339 0.182 0.521 hectare"				
"	Time of concentration 22.615 3.314 11.076 minutes"				
"	Time to Centroid 128.008 91.378 106.108 minutes"				
"	Rainfall depth 71.113 71.113 71.113 mm"				
"	Rainfall volume 240.82 129.67 370.50 c.m"				

"	Rainfall losses	47.715	6.512	33.294	mm"
"	Runoff depth	23.397	64.601	37.819	mm"
"	Runoff volume	79.24	117.80	197.03	c.m"
"	Runoff coefficient	0.329	0.908	0.532	"
"	Maximum flow	0.023	0.067	0.074	c.m/sec"
" 40	HYDROGRAPH Add Runoff "				
"	4 Add Runoff "				
"	0.074 0.074 0.183 0.183"				
" 40	HYDROGRAPH Copy to Outflow"				
"	8 Copy to Outflow"				
"	0.074 0.074 0.074 0.183"				
" 40	HYDROGRAPH Combine 2"				
"	6 Combine "				
"	2 Node #"				
"	South East Property"				
"	Maximum flow	0.074	c.m/sec"		
"	Hydrograph volume	197.035	c.m"		
"	0.074 0.074 0.074 0.074"				
" 38	START/RE-START TOTALS 102"				
"	3 Runoff Totals on EXIT"				
"	Total Catchment area		3.657	hectare"	
"	Total Impervious area		0.200	hectare"	
"	Total % Impervious		5.468"		
" 19	EXIT"				

PROPOSED CONDITIONS

2 Year Storm Event

5 Year Storm Event

10 Year Storm Event

20 Year Storm Event

50 Year Storm Event

100 Year Storm Event

```

"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                 S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:            Proposed 2 Year Run 1.out"
"          Licensee name:              Sandra Swanton"
"          Company                     K. Smart Associates Limited"
"          Date & Time last used:      2026-08-04 at 3:49:38 PM"
" 31 TIME PARAMETERS"
"      5.000 Time Step"
"      180.000 Max. Storm length"
"      1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
"      1 Chicago storm"
"      823.502 Coefficient A"
"      11.103 Constant B"
"      0.818 Exponent C"
"      0.400 Fraction R"
"      180.000 Duration"
"      1.000 Time step multiplier"
"          Maximum intensity            84.804 mm/hr"
"          Total depth                  33.629 mm"
"          6 002hyd Hydrograph extension used in this file"
" 33 CATCHMENT 1001"
"      1 Triangular SCS"
"      1 Equal length"
"      1 SCS method"
"      1001 External Areas to the North"
"      0.000 % Impervious"
"      2.784 Total Area"
"      130.000 Flow length"
"      2.000 Overland Slope"
"      2.784 Pervious Area"
"      130.000 Pervious length"
"      2.000 Pervious slope"
"      0.000 Impervious Area"
"      130.000 Impervious length"
"      2.000 Impervious slope"
"      0.170 Pervious Manning 'n'"
"      72.000 Pervious SCS Curve No."
"      0.137 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"      98.000 Impervious SCS Curve No."
"      0.000 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"

```

```

"          0.018 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 63.714 5.902 63.714 minutes"
"          Time to Centroid 176.540 97.068 176.540 minutes"
"          Rainfall depth 33.629 33.629 33.629 mm"
"          Rainfall volume 936.22 0.00 936.22 c.m"
"          Rainfall losses 29.025 5.142 29.025 mm"
"          Runoff depth 4.603 28.487 4.603 mm"
"          Runoff volume 128.16 0.00 128.16 c.m"
"          Runoff coefficient 0.137 0.000 0.137 "
"          Maximum flow 0.018 0.000 0.018 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"          0.018 0.018 0.000 0.000"
" 51 PIPE DESIGN"
"      0.018 Current peak flow c.m/sec"
"      0.013 Manning 'n'"
"      0.525 Diameter metre"
"      0.500 Gradient %"
"          Depth of flow 0.086 metre"
"          Velocity 0.764 m/sec"
"          Pipe capacity 0.304 c.m/sec"
"          Critical depth 0.086 metre"
" 53 ROUTE Pipe Route 126"
"      125.50 Pipe Route 126 Reach length ( metre)"
"      0.467 X-factor <= 0.5"
"      123.165 K-lag ( seconds)"
"      0.000 Default(0) or user spec.(1) values used"
"      0.500 X-factor <= 0.5"
"      30.000 K-lag ( seconds)"
"      0.500 Beta weighting factor"
"      100.000 Routing time step ( seconds)"
"          1 No. of sub-reaches"
"          Peak outflow 0.018 c.m/sec"
"          0.018 0.018 0.018 0.000 c.m/sec"
" 40 HYDROGRAPH Combine 1"
"      6 Combine "
"      1 Node #"
"          Road Ditch"
"          Maximum flow 0.018 c.m/sec"
"          Hydrograph volume 128.157 c.m"
"          0.018 0.018 0.018 0.018"
" 40 HYDROGRAPH Start - New Tributary"
"      2 Start - New Tributary"
"          0.018 0.000 0.018 0.018"
" 33 CATCHMENT 201"
"      1 Triangular SCS"
"      1 Equal length"
"      1 SCS method"

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"      201 Proposed Site to Pond"
" 80.000 % Impervious"
"    0.659 Total Area"
" 20.000 Flow length"
"    1.000 Overland Slope"
"    0.132 Pervious Area"
" 20.000 Pervious length"
"    1.000 Pervious slope"
"    0.527 Impervious Area"
" 20.000 Impervious length"
"    1.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
" 72.000 Pervious SCS Curve No."
"    0.137 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"
"    9.878 Pervious Initial abstraction"
"    0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
"    0.837 Impervious Runoff coefficient"
"    0.100 Impervious Ia/S coefficient"
"    0.518 Impervious Initial abstraction"
"      0.092      0.000      0.018      0.018 c.m/sec"
"      Catchment 201      Pervious      Impervious Total Area "
"      Surface Area      0.132      0.527      0.659      hectare"
"      Time of concentration      25.515      2.363      3.272      minutes"
"      Time to Centroid      134.818      92.015      93.695      minutes"
"      Rainfall depth      33.629      33.629      33.629      mm"
"      Rainfall volume      44.32      177.29      221.61      c.m"
"      Rainfall losses      29.032      5.494      10.201      mm"
"      Runoff depth      4.597      28.135      23.427      mm"
"      Runoff volume      6.06      148.33      154.39      c.m"
"      Runoff coefficient      0.137      0.837      0.697      "
"      Maximum flow      0.001      0.092      0.092      c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
"      0.092      0.092      0.018      0.018"
" 54 POND DESIGN"
"    0.092 Current peak flow      c.m/sec"
"    0.074 Target outflow      c.m/sec"
"    154.4 Hydrograph volume      c.m"
"    20. Number of stages"
"    0.000 Minimum water level      metre"
"    3.000 Maximum water level      metre"
"    0.000 Starting water level      metre"
"    0 Keep Design Data: 1 = True; 0 = False"
"      Level Discharge      Volume"
"      293.930      0.000      0.000"
"      294.500      0.00400      0.2050"
"      294.550      0.00410      5.518"
"      294.600      0.00430      20.055"

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"      294.650      0.00440      39.136"
"      294.700      0.00460      59.493"
"      294.750      0.00470      81.149"
"      294.800      0.00480      104.130"
"      294.850      0.00500      128.461"
"      294.900      0.00510      154.168"
"      294.950      0.00520      181.274"
"      295.000      0.00530      209.805"
"      295.050      0.00540      239.786"
"      295.100      0.00560      271.243"
"      295.150      0.00570      304.199"
"      295.200      0.00580      338.680"
"      295.250      0.00590      374.711"
"      295.300      0.00600      412.318"
"      295.350      0.03690      451.524"
"      295.400      0.09340      492.355"
"      Peak outflow      0.005      c.m/sec"
"      Maximum level      294.817      metre"
"      Maximum storage      112.195      c.m"
"      Centroidal lag      5.290      hours"
"      0.092      0.092      0.005      0.018 c.m/sec"
" 40 HYDROGRAPH Combine 1"
" 6 Combine "
" 1 Node #"
"      Road Ditch"
"      Maximum flow      0.022      c.m/sec"
"      Hydrograph volume      282.807      c.m"
"      0.092      0.092      0.005      0.022"
" 40 HYDROGRAPH Start - New Tributary"
" 2 Start - New Tributary"
"      0.092      0.000      0.005      0.022"
" 33 CATCHMENT 202"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 202 Uncontrolled Entranceway to Road"
" 20.000 % Impervious"
"    0.022 Total Area"
"    10.000 Flow length"
"    4.000 Overland Slope"
"    0.018 Pervious Area"
"    10.000 Pervious length"
"    4.000 Pervious slope"
"    0.004 Impervious Area"
"    10.000 Impervious length"
"    4.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
"    72.000 Pervious SCS Curve No."
"    0.137 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"

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"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.825 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"          0.001 0.000 0.005 0.022 c.m/sec"
"      Catchment 202 Pervious Impervious Total Area "
"      Surface Area 0.018 0.004 0.022 hectare"
"      Time of concentration 11.106 1.029 5.043 minutes"
"      Time to Centroid 119.066 89.951 101.548 minutes"
"      Rainfall depth 33.629 33.629 33.629 mm"
"      Rainfall volume 5.92 1.48 7.40 c.m"
"      Rainfall losses 29.036 5.878 24.404 mm"
"      Runoff depth 4.593 27.750 9.224 mm"
"      Runoff volume 0.81 1.22 2.03 c.m"
"      Runoff coefficient 0.137 0.825 0.274 "
"      Maximum flow 0.000 0.001 0.001 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"          0.001 0.001 0.005 0.022"
" 40 HYDROGRAPH Copy to Outflow"
"      8 Copy to Outflow"
"          0.001 0.001 0.001 0.022"
" 40 HYDROGRAPH Combine 1"
"      6 Combine "
"      1 Node #"
"      Road Ditch"
"      Maximum flow 0.023 c.m/sec"
"      Hydrograph volume 284.837 c.m"
"          0.001 0.001 0.001 0.023"
" 40 HYDROGRAPH Start - New Tributary"
"      2 Start - New Tributary"
"          0.001 0.000 0.001 0.023"
" 33 CATCHMENT 203"
"      1 Triangular SCS"
"      1 Equal length"
"      1 SCS method"
"      203 Existing Site to Southeast Adjacent Lands"
"    95.000 % Impervious"
"      0.192 Total Area"
"    40.000 Flow length"
"      1.000 Overland Slope"
"      0.010 Pervious Area"
"    40.000 Pervious length"
"      1.000 Pervious slope"
"      0.182 Impervious Area"
"    40.000 Impervious length"
"      1.000 Impervious slope"
"      0.170 Pervious Manning 'n'"

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"    72.000 Pervious SCS Curve No."
"      0.137 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.834 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"          0.031 0.000 0.001 0.023 c.m/sec"
"      Catchment 203 Pervious Impervious Total Area "
"      Surface Area 0.010 0.182 0.192 hectare"
"      Time of concentration 38.674 3.582 3.883 minutes"
"      Time to Centroid 149.189 93.858 94.331 minutes"
"      Rainfall depth 33.629 33.629 33.629 mm"
"      Rainfall volume 3.23 61.34 64.57 c.m"
"      Rainfall losses 29.027 5.578 6.750 mm"
"      Runoff depth 4.602 28.051 26.878 mm"
"      Runoff volume 0.44 51.16 51.61 c.m"
"      Runoff coefficient 0.137 0.834 0.799 "
"      Maximum flow 0.000 0.031 0.031 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"          0.031 0.031 0.001 0.023"
" 40 HYDROGRAPH Copy to Outflow"
"      8 Copy to Outflow"
"          0.031 0.031 0.031 0.023"
" 40 HYDROGRAPH Combine 2"
"      6 Combine "
"      2 Node #"
"      Southeast Land"
"      Maximum flow 0.031 c.m/sec"
"      Hydrograph volume 51.607 c.m"
"          0.031 0.031 0.031 0.031"
" 38 START/RE-START TOTALS 203"
"      3 Runoff Totals on EXIT"
"      Total Catchment area 3.657 hectare"
"      Total Impervious area 0.714 hectare"
"      Total % impervious 19.524"
" 19 EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                 S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:            Proposed 5 Year Run 1.out"
"          Licensee name:              Sandra Swanton"
"          Company                     K. Smart Associates Limited"
"          Date & Time last used:      2026-08-04 at 3:48:12 PM"
" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          1058.046 Coefficient A"
"          11.103 Constant B"
"          0.816 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity            109.564 mm/hr"
"          Total depth                  43.663 mm"
"          6 005hyd Hydrograph extension used in this file"
" 33      CATCHMENT 1001"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          1001 External Areas to the North"
"          0.000 % Impervious"
"          2.784 Total Area"
"          130.000 Flow length"
"          2.000 Overland Slope"
"          2.784 Pervious Area"
"          130.000 Pervious length"
"          2.000 Pervious slope"
"          0.000 Impervious Area"
"          130.000 Impervious length"
"          2.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.197 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

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"          0.041 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 47.171 5.268 47.171 minutes"
"          Time to Centroid 158.046 95.435 158.046 minutes"
"          Rainfall depth 43.663 43.663 43.663 mm"
"          Rainfall volume 1215.57 0.00 1215.57 c.m"
"          Rainfall losses 35.056 5.446 35.056 mm"
"          Runoff depth 8.607 38.217 8.607 mm"
"          Runoff volume 239.62 0.00 239.62 c.m"
"          Runoff coefficient 0.197 0.000 0.197 "
"          Maximum flow 0.041 0.000 0.041 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"          0.041 0.041 0.000 0.000"
" 51      PIPE DESIGN"
"          0.041 Current peak flow c.m/sec"
"          0.013 Manning 'n'"
"          0.525 Diameter metre"
"          0.500 Gradient %"
"          Depth of flow 0.130 metre"
"          Velocity 0.977 m/sec"
"          Pipe capacity 0.304 c.m/sec"
"          Critical depth 0.132 metre"
" 53      ROUTE Pipe Route 126"
"          125.50 Pipe Route 126 Reach length ( metre)"
"          0.446 X-factor <= 0.5"
"          96.336 K-lag ( seconds)"
"          0.000 Default(0) or user spec.(1) values used"
"          0.500 X-factor <= 0.5"
"          30.000 K-lag ( seconds)"
"          0.500 Beta weighting factor"
"          100.000 Routing time step ( seconds)"
"          1 No. of sub-reaches"
"          Peak outflow 0.041 c.m/sec"
"          0.041 0.041 0.041 0.000 c.m/sec"
" 40      HYDROGRAPH Combine 1"
"          6 Combine "
"          1 Node #"
"          Road Ditch"
"          Maximum flow 0.041 c.m/sec"
"          Hydrograph volume 239.617 c.m"
"          0.041 0.041 0.041 0.041"
" 40      HYDROGRAPH Start - New Tributary"
"          2 Start - New Tributary"
"          0.041 0.000 0.041 0.041"
" 33      CATCHMENT 201"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"

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"      201 Proposed Site to Pond"
" 80.000 % Impervious"
"    0.659 Total Area"
" 20.000 Flow length"
"    1.000 Overland Slope"
"    0.132 Pervious Area"
" 20.000 Pervious length"
"    1.000 Pervious slope"
"    0.527 Impervious Area"
" 20.000 Impervious length"
"    1.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
" 72.000 Pervious SCS Curve No."
"    0.197 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"
"    9.878 Pervious Initial abstraction"
"    0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
"    0.869 Impervious Runoff coefficient"
"    0.100 Impervious Ia/S coefficient"
"    0.518 Impervious Initial abstraction"
"      0.125 0.000 0.041 0.041 c.m/sec"
"      Catchment 201 Pervious Impervious Total Area "
"      Surface Area 0.132 0.527 0.659 hectare"
"      Time of concentration 18.890 2.110 3.009 minutes"
"      Time to Centroid 125.681 90.835 92.702 minutes"
"      Rainfall depth 43.663 43.663 43.663 mm"
"      Rainfall volume 57.55 230.19 287.74 c.m"
"      Rainfall losses 35.072 5.720 11.591 mm"
"      Runoff depth 8.591 37.943 32.072 mm"
"      Runoff volume 11.32 200.03 211.36 c.m"
"      Runoff coefficient 0.197 0.869 0.735 "
"      Maximum flow 0.003 0.125 0.125 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
"      0.125 0.125 0.041 0.041"
" 54 POND DESIGN"
"    0.125 Current peak flow c.m/sec"
"    0.074 Target outflow c.m/sec"
"    211.4 Hydrograph volume c.m"
"    20. Number of stages"
"    0.000 Minimum water level metre"
"    3.000 Maximum water level metre"
"    0.000 Starting water level metre"
"    0 Keep Design Data: 1 = True; 0 = False"
"      Level Discharge Volume"
"      293.930 0.000 0.000"
"      294.500 0.00400 0.2050"
"      294.550 0.00410 5.518"
"      294.600 0.00430 20.055"

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"      294.650 0.00440 39.136"
"      294.700 0.00460 59.493"
"      294.750 0.00470 81.149"
"      294.800 0.00480 104.130"
"      294.850 0.00500 128.461"
"      294.900 0.00510 154.168"
"      294.950 0.00520 181.274"
"      295.000 0.00530 209.805"
"      295.050 0.00540 239.786"
"      295.100 0.00560 271.243"
"      295.150 0.00570 304.199"
"      295.200 0.00580 338.680"
"      295.250 0.00590 374.711"
"      295.300 0.00600 412.318"
"      295.350 0.03690 451.524"
"      295.400 0.09340 492.355"
"      Peak outflow 0.005 c.m/sec"
"      Maximum level 294.920 metre"
"      Maximum storage 164.864 c.m"
"      Centroidal lag 6.623 hours"
"      0.125 0.125 0.005 0.041 c.m/sec"
" 40 HYDROGRAPH Combine 1"
" 6 Combine "
" 1 Node #"
"      Road Ditch"
"      Maximum flow 0.046 c.m/sec"
"      Hydrograph volume 450.870 c.m"
"      0.125 0.125 0.005 0.046"
" 40 HYDROGRAPH Start - New Tributary"
" 2 Start - New Tributary"
"      0.125 0.000 0.005 0.046"
" 33 CATCHMENT 202"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 202 Uncontrolled Entranceway to Road"
" 20.000 % Impervious"
"    0.022 Total Area"
" 10.000 Flow length"
"    4.000 Overland Slope"
"    0.018 Pervious Area"
" 10.000 Pervious length"
"    4.000 Pervious slope"
"    0.004 Impervious Area"
" 10.000 Impervious length"
"    4.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
" 72.000 Pervious SCS Curve No."
"    0.196 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"

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"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.850 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"              0.001      0.000      0.005      0.046 c.m/sec"
"      Catchment 202 Pervious Impervious Total Area "
"      Surface Area 0.018 0.004 0.022 hectare"
"      Time of concentration 8.222 0.918 4.428 minutes"
"      Time to Centroid 113.500 89.164 100.856 minutes"
"      Rainfall depth 43.663 43.663 43.663 mm"
"      Rainfall volume 7.68 1.92 9.61 c.m"
"      Rainfall losses 35.086 6.561 29.381 mm"
"      Runoff depth 8.577 37.101 14.282 mm"
"      Runoff volume 1.51 1.63 3.14 c.m"
"      Runoff coefficient 0.196 0.850 0.327 "
"      Maximum flow 0.001 0.001 0.001 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"              0.001      0.001      0.005      0.046"
" 40 HYDROGRAPH Copy to Outflow"
"      8 Copy to Outflow"
"              0.001      0.001      0.001      0.046"
" 40 HYDROGRAPH Combine 1"
"      6 Combine "
"      1 Node #"
"      Road Ditch"
"      Maximum flow 0.046 c.m/sec"
"      Hydrograph volume 454.012 c.m"
"              0.001      0.001      0.001      0.046"
" 40 HYDROGRAPH Start - New Tributary"
"      2 Start - New Tributary"
"              0.001      0.000      0.001      0.046"
" 33 CATCHMENT 203"
"      1 Triangular SCS"
"      1 Equal length"
"      1 SCS method"
"      203 Existing Site to Southeast Adjacent Lands"
"    95.000 % Impervious"
"      0.192 Total Area"
"    40.000 Flow length"
"      1.000 Overland Slope"
"      0.010 Pervious Area"
"    40.000 Pervious length"
"      1.000 Pervious slope"
"      0.182 Impervious Area"
"    40.000 Impervious length"
"      1.000 Impervious slope"
"      0.170 Pervious Manning 'n'"

```

```

"    72.000 Pervious SCS Curve No."
"      0.197 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.867 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"              0.040      0.000      0.001      0.046 c.m/sec"
"      Catchment 203 Pervious Impervious Total Area "
"      Surface Area 0.010 0.182 0.192 hectare"
"      Time of concentration 28.632 3.198 3.498 minutes"
"      Time to Centroid 136.829 92.507 93.031 minutes"
"      Rainfall depth 43.663 43.663 43.663 mm"
"      Rainfall volume 4.19 79.64 83.83 c.m"
"      Rainfall losses 35.061 5.823 7.285 mm"
"      Runoff depth 8.602 37.840 36.378 mm"
"      Runoff volume 0.83 69.02 69.85 c.m"
"      Runoff coefficient 0.197 0.867 0.833 "
"      Maximum flow 0.000 0.040 0.040 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"              0.040      0.040      0.001      0.046"
" 40 HYDROGRAPH Copy to Outflow"
"      8 Copy to Outflow"
"              0.040      0.040      0.040      0.046"
" 40 HYDROGRAPH Combine 2"
"      6 Combine "
"      2 Node #"
"      Southeast Land"
"      Maximum flow 0.040 c.m/sec"
"      Hydrograph volume 69.845 c.m"
"              0.040      0.040      0.040      0.040"
" 38 START/RE-START TOTALS 203"
"      3 Runoff Totals on EXIT"
"      Total Catchment area 3.657 hectare"
"      Total Impervious area 0.714 hectare"
"      Total % impervious 19.524"
" 19 EXIT"

```

```

"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                 S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:            Proposed 10 Year Run 1.out"
"          Licensee name:              Sandra Swanton"
"          Company                     K. Smart Associates Limited"
"          Date & Time last used:      2026-08-05 at 11:47:21 AM"
" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          1226.738 Coefficient A"
"          11.098 Constant B"
"          0.818 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity            126.361 mm/hr"
"          Total depth                  50.096 mm"
"          6 010hyd Hydrograph extension used in this file"
" 33      CATCHMENT 1001"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          1001 External Areas to the North"
"          0.000 % Impervious"
"          2.784 Total Area"
"          130.000 Flow length"
"          2.000 Overland Slope"
"          2.784 Pervious Area"
"          130.000 Pervious length"
"          2.000 Pervious slope"
"          0.000 Impervious Area"
"          130.000 Impervious length"
"          2.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.232 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

```

```

"          0.061 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 40.466 4.954 40.466 minutes"
"          Time to Centroid 150.424 94.551 150.424 minutes"
"          Rainfall depth 50.096 50.096 50.096 mm"
"          Rainfall volume 1394.68 0.00 1394.68 c.m"
"          Rainfall losses 38.464 5.576 38.464 mm"
"          Runoff depth 11.632 44.520 11.632 mm"
"          Runoff volume 323.85 0.00 323.85 c.m"
"          Runoff coefficient 0.232 0.000 0.232 "
"          Maximum flow 0.061 0.000 0.061 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"          0.061 0.061 0.000 0.000"
" 51      PIPE DESIGN"
"          0.061 Current peak flow c.m/sec"
"          0.013 Manning 'n'"
"          0.525 Diameter metre"
"          0.500 Gradient %"
"          Depth of flow 0.160 metre"
"          Velocity 1.098 m/sec"
"          Pipe capacity 0.304 c.m/sec"
"          Critical depth 0.162 metre"
" 53      ROUTE Pipe Route 126"
"          125.50 Pipe Route 126 Reach length ( metre)"
"          0.431 X-factor <= 0.5"
"          85.711 K-lag ( seconds)"
"          0.000 Default(0) or user spec.(1) values used"
"          0.500 X-factor <= 0.5"
"          30.000 K-lag ( seconds)"
"          0.500 Beta weighting factor"
"          75.000 Routing time step ( seconds)"
"          1 No. of sub-reaches"
"          Peak outflow 0.061 c.m/sec"
"          0.061 0.061 0.061 0.000 c.m/sec"
" 40      HYDROGRAPH Combine 1"
"          6 Combine "
"          1 Node #"
"          Road Ditch"
"          Maximum flow 0.061 c.m/sec"
"          Hydrograph volume 323.849 c.m"
"          0.061 0.061 0.061 0.061"
" 40      HYDROGRAPH Start - New Tributary"
"          2 Start - New Tributary"
"          0.061 0.000 0.061 0.061"
" 33      CATCHMENT 201"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"

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"      201 Proposed Site to Pond"
" 80.000 % Impervious"
"    0.659 Total Area"
" 20.000 Flow length"
"    1.000 Overland Slope"
"    0.132 Pervious Area"
" 20.000 Pervious length"
"    1.000 Pervious slope"
"    0.527 Impervious Area"
" 20.000 Impervious length"
"    1.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
" 72.000 Pervious SCS Curve No."
"    0.232 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"
"    9.878 Pervious Initial abstraction"
"    0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
"    0.882 Impervious Runoff coefficient"
"    0.100 Impervious Ia/S coefficient"
"    0.518 Impervious Initial abstraction"
"      0.147      0.000      0.061      0.061 c.m/sec"
"      Catchment 201      Pervious      Impervious Total Area "
"      Surface Area      0.132      0.527      0.659      hectare"
"      Time of concentration      16.205      1.984      2.860      minutes"
"      Time to Centroid      121.798      90.183      92.131      minutes"
"      Rainfall depth      50.096      50.096      50.096      mm"
"      Rainfall volume      66.03      264.11      330.13      c.m"
"      Rainfall losses      38.488      5.908      12.424      mm"
"      Runoff depth      11.609      44.188      37.672      mm"
"      Runoff volume      15.30      232.96      248.26      c.m"
"      Runoff coefficient      0.232      0.882      0.752      "
"      Maximum flow      0.005      0.146      0.147      c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"      0.147      0.147      0.061      0.061"
" 54 POND DESIGN"
"    0.147 Current peak flow      c.m/sec"
"    0.074 Target outflow      c.m/sec"
"    248.3 Hydrograph volume      c.m"
"    20. Number of stages"
"    0.000 Minimum water level      metre"
"    3.000 Maximum water level      metre"
"    0.000 Starting water level      metre"
"    0 Keep Design Data: 1 = True; 0 = False"
"      Level Discharge      Volume"
"      293.930      0.000      0.000"
"      294.500      0.00400      0.2050"
"      294.550      0.00410      5.518"
"      294.600      0.00430      20.055"

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"      294.650      0.00440      39.136"
"      294.700      0.00460      59.493"
"      294.750      0.00470      81.149"
"      294.800      0.00480      104.130"
"      294.850      0.00500      128.461"
"      294.900      0.00510      154.168"
"      294.950      0.00520      181.274"
"      295.000      0.00530      209.805"
"      295.050      0.00540      239.786"
"      295.100      0.00560      271.243"
"      295.150      0.00570      304.199"
"      295.200      0.00580      338.680"
"      295.250      0.00590      374.711"
"      295.300      0.00600      412.318"
"      295.350      0.03690      451.524"
"      295.400      0.09340      492.355"
"      Peak outflow      0.005      c.m/sec"
"      Maximum level      294.983      metre"
"      Maximum storage      199.974      c.m"
"      Centroidal lag      7.505      hours"
"      0.147      0.147      0.005      0.061 c.m/sec"
" 40 HYDROGRAPH Combine 1"
"      6 Combine "
"      1 Node #"
"      Road Ditch"
"      Maximum flow      0.066      c.m/sec"
"      Hydrograph volume      572.444      c.m"
"      0.147      0.147      0.005      0.066"
" 40 HYDROGRAPH Start - New Tributary"
"      2 Start - New Tributary"
"      0.147      0.000      0.005      0.066"
" 33 CATCHMENT 202"
"      1 Triangular SCS"
"      1 Equal length"
"      1 SCS method"
"      202 Uncontrolled Entranceway to Road"
" 20.000 % Impervious"
"    0.022 Total Area"
"    10.000 Flow length"
"    4.000 Overland Slope"
"    0.018 Pervious Area"
"    10.000 Pervious length"
"    4.000 Pervious slope"
"    0.004 Impervious Area"
"    10.000 Impervious length"
"    4.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
"    72.000 Pervious SCS Curve No."
"    0.230 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"

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"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.860 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"              0.002      0.000      0.005      0.066 c.m/sec"
"      Catchment 202      Pervious      Impervious Total Area "
"      Surface Area      0.018      0.004      0.022      hectare"
"      Time of concentration      7.054      0.864      4.067      minutes"
"      Time to Centroid      111.077      88.750      100.304      minutes"
"      Rainfall depth      50.096      50.096      50.096      mm"
"      Rainfall volume      8.82      2.20      11.02      c.m"
"      Rainfall losses      38.551      7.034      32.248      mm"
"      Runoff depth      11.545      43.062      17.849      mm"
"      Runoff volume      2.03      1.89      3.93      c.m"
"      Runoff coefficient      0.230      0.860      0.356      "
"      Maximum flow      0.001      0.001      0.002      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.002      0.002      0.005      0.066"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"              0.002      0.002      0.002      0.066"
" 40      HYDROGRAPH Combine 1"
"      6      Combine "
"      1      Node #"
"      Road Ditch"
"      Maximum flow      0.067      c.m/sec"
"      Hydrograph volume      576.371      c.m"
"              0.002      0.002      0.002      0.067"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"              0.002      0.000      0.002      0.067"
" 33      CATCHMENT 203"
"      1      Triangular SCS"
"      1      Equal length"
"      1      SCS method"
"      203      Existing Site to Southeast Adjacent Lands"
"      95.000 % Impervious"
"      0.192 Total Area"
"      40.000 Flow length"
"      1.000 Overland Slope"
"      0.010 Pervious Area"
"      40.000 Pervious length"
"      1.000 Pervious slope"
"      0.182 Impervious Area"
"      40.000 Impervious length"
"      1.000 Impervious slope"
"      0.170 Pervious Manning 'n'"

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"      72.000 Pervious SCS Curve No."
"      0.232 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.879 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"              0.047      0.000      0.002      0.067 c.m/sec"
"      Catchment 203      Pervious      Impervious Total Area "
"      Surface Area      0.010      0.182      0.192      hectare"
"      Time of concentration      24.562      3.007      3.303      minutes"
"      Time to Centroid      131.642      91.793      92.339      minutes"
"      Rainfall depth      50.096      50.096      50.096      mm"
"      Rainfall volume      4.81      91.38      96.18      c.m"
"      Rainfall losses      38.467      6.073      7.693      mm"
"      Runoff depth      11.630      44.023      42.403      mm"
"      Runoff volume      1.12      80.30      81.41      c.m"
"      Runoff coefficient      0.232      0.879      0.846      "
"      Maximum flow      0.000      0.047      0.047      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"              0.047      0.047      0.002      0.067"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"              0.047      0.047      0.047      0.067"
" 40      HYDROGRAPH Combine 2"
"      6      Combine "
"      2      Node #"
"      Southeast Land"
"      Maximum flow      0.047      c.m/sec"
"      Hydrograph volume      81.415      c.m"
"              0.047      0.047      0.047      0.047"
" 38      START/RE-START TOTALS 203"
"      3      Runoff Totals on EXIT"
"      Total Catchment area      3.657      hectare"
"      Total Impervious area      0.714      hectare"
"      Total % impervious      19.524"
" 19      EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                 S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:            Proposed 20 Year Run 1.out"
"          Licensee name:              Sandra Swanton"
"          Company                     K. Smart Associates Limited"
"          Date & Time last used:      2026-08-05 at 11:50:12 AM"
" 31      TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32      STORM Chicago storm"
"          1 Chicago storm"
"          1406.070 Coefficient A"
"          11.324 Constant B"
"          0.821 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity            141.996 mm/hr"
"          Total depth                  56.467 mm"
"          6 020hyd Hydrograph extension used in this file"
" 33      CATCHMENT 1001"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          1001 External Areas to the North"
"          0.000 % Impervious"
"          2.784 Total Area"
"          130.000 Flow length"
"          2.000 Overland Slope"
"          2.784 Pervious Area"
"          130.000 Pervious length"
"          2.000 Pervious slope"
"          0.000 Impervious Area"
"          130.000 Impervious length"
"          2.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.264 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

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"          0.086 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 35.949 4.714 35.949 minutes"
"          Time to Centroid 144.788 93.840 144.788 minutes"
"          Rainfall depth 56.467 56.467 56.467 mm"
"          Rainfall volume 1572.04 0.00 1572.04 c.m"
"          Rainfall losses 41.539 5.625 41.539 mm"
"          Runoff depth 14.928 50.842 14.928 mm"
"          Runoff volume 415.60 0.00 415.60 c.m"
"          Runoff coefficient 0.264 0.000 0.264 "
"          Maximum flow 0.086 0.000 0.086 c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"          0.086 0.086 0.000 0.000"
" 51      PIPE DESIGN"
"          0.086 Current peak flow c.m/sec"
"          0.013 Manning 'n'"
"          0.525 Diameter metre"
"          0.500 Gradient %"
"          Depth of flow 0.191 metre"
"          Velocity 1.210 m/sec"
"          Pipe capacity 0.304 c.m/sec"
"          Critical depth 0.194 metre"
" 53      ROUTE Pipe Route 126"
"          125.50 Pipe Route 126 Reach length ( metre)"
"          0.415 X-factor <= 0.5"
"          77.818 K-lag ( seconds)"
"          0.000 Default(0) or user spec.(1) values used"
"          0.500 X-factor <= 0.5"
"          30.000 K-lag ( seconds)"
"          0.500 Beta weighting factor"
"          75.000 Routing time step ( seconds)"
"          1 No. of sub-reaches"
"          Peak outflow 0.086 c.m/sec"
"          0.086 0.086 0.086 0.000 c.m/sec"
" 40      HYDROGRAPH Combine 1"
"          6 Combine "
"          1 Node #"
"          Road Ditch"
"          Maximum flow 0.086 c.m/sec"
"          Hydrograph volume 415.598 c.m"
"          0.086 0.086 0.086 0.086"
" 40      HYDROGRAPH Start - New Tributary"
"          2 Start - New Tributary"
"          0.086 0.000 0.086 0.086"
" 33      CATCHMENT 201"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"

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"      201 Proposed Site to Pond"
" 80.000 % Impervious"
"    0.659 Total Area"
" 20.000 Flow length"
"    1.000 Overland Slope"
"    0.132 Pervious Area"
" 20.000 Pervious length"
"    1.000 Pervious slope"
"    0.527 Impervious Area"
" 20.000 Impervious length"
"    1.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
" 72.000 Pervious SCS Curve No."
"    0.264 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"
"    9.878 Pervious Initial abstraction"
"    0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
"    0.894 Impervious Runoff coefficient"
"    0.100 Impervious Ia/S coefficient"
"    0.518 Impervious Initial abstraction"
"      0.168      0.000      0.086      0.086 c.m/sec"
"      Catchment 201      Pervious      Impervious Total Area "
"      Surface Area      0.132      0.527      0.659      hectare"
"      Time of concentration      14.396      1.888      2.748      minutes"
"      Time to Centroid      118.861      89.657      91.666      minutes"
"      Rainfall depth      56.467      56.467      56.467      mm"
"      Rainfall volume      74.42      297.69      372.12      c.m"
"      Rainfall losses      41.558      6.006      13.116      mm"
"      Runoff depth      14.909      50.461      43.351      mm"
"      Runoff volume      19.65      266.03      285.68      c.m"
"      Runoff coefficient      0.264      0.894      0.768      "
"      Maximum flow      0.007      0.167      0.168      c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
"      0.168      0.168      0.086      0.086"
" 54 POND DESIGN"
"    0.168 Current peak flow      c.m/sec"
"    0.074 Target outflow      c.m/sec"
"    285.7 Hydrograph volume      c.m"
"    20. Number of stages"
"    0.000 Minimum water level      metre"
"    3.000 Maximum water level      metre"
"    0.000 Starting water level      metre"
"    0 Keep Design Data: 1 = True; 0 = False"
"      Level Discharge      Volume"
"      293.930      0.000      0.000"
"      294.500      0.00400      0.2050"
"      294.550      0.00410      5.518"
"      294.600      0.00430      20.055"

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"      294.650      0.00440      39.136"
"      294.700      0.00460      59.493"
"      294.750      0.00470      81.149"
"      294.800      0.00480      104.130"
"      294.850      0.00500      128.461"
"      294.900      0.00510      154.168"
"      294.950      0.00520      181.274"
"      295.000      0.00530      209.805"
"      295.050      0.00540      239.786"
"      295.100      0.00560      271.243"
"      295.150      0.00570      304.199"
"      295.200      0.00580      338.680"
"      295.250      0.00590      374.711"
"      295.300      0.00600      412.318"
"      295.350      0.03690      451.524"
"      295.400      0.09340      492.355"
"      Peak outflow      0.005      c.m/sec"
"      Maximum level      295.043      metre"
"      Maximum storage      235.781      c.m"
"      Centroidal lag      8.348      hours"
"      0.168      0.168      0.005      0.086 c.m/sec"
" 40 HYDROGRAPH Combine 1"
" 6 Combine "
" 1 Node #"
"      Road Ditch"
"      Maximum flow      0.091      c.m/sec"
"      Hydrograph volume      701.055      c.m"
"      0.168      0.168      0.005      0.091"
" 40 HYDROGRAPH Start - New Tributary"
" 2 Start - New Tributary"
"      0.168      0.000      0.005      0.091"
" 33 CATCHMENT 202"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 202 Uncontrolled Entranceway to Road"
" 20.000 % Impervious"
"    0.022 Total Area"
"    10.000 Flow length"
"    4.000 Overland Slope"
"    0.018 Pervious Area"
"    10.000 Pervious length"
"    4.000 Pervious slope"
"    0.004 Impervious Area"
"    10.000 Impervious length"
"    4.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
"    72.000 Pervious SCS Curve No."
"    0.262 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"

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"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.867 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"              0.002      0.000      0.005      0.091 c.m/sec"
"      Catchment 202 Pervious Impervious Total Area "
"      Surface Area 0.018 0.004 0.022 hectare"
"      Time of concentration 6.266 0.822 3.800 minutes"
"      Time to Centroid 109.219 88.416 99.796 minutes"
"      Rainfall depth 56.467 56.467 56.467 mm"
"      Rainfall volume 9.94 2.48 12.42 c.m"
"      Rainfall losses 41.690 7.529 34.858 mm"
"      Runoff depth 14.777 48.938 21.609 mm"
"      Runoff volume 2.60 2.15 4.75 c.m"
"      Runoff coefficient 0.262 0.867 0.383 "
"      Maximum flow 0.001 0.001 0.002 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"              0.002      0.002      0.005      0.091"
" 40 HYDROGRAPH Copy to Outflow"
"      8 Copy to Outflow"
"              0.002      0.002      0.002      0.091"
" 40 HYDROGRAPH Combine 1"
"      6 Combine "
"      1 Node #"
"      Road Ditch"
"      Maximum flow 0.092 c.m/sec"
"      Hydrograph volume 705.809 c.m"
"              0.002      0.002      0.002      0.092"
" 40 HYDROGRAPH Start - New Tributary"
"      2 Start - New Tributary"
"              0.002      0.000      0.002      0.092"
" 33 CATCHMENT 203"
"      1 Triangular SCS"
"      1 Equal length"
"      1 SCS method"
"      203 Existing Site to Southeast Adjacent Lands"
"    95.000 % Impervious"
"      0.192 Total Area"
"    40.000 Flow length"
"      1.000 Overland Slope"
"      0.010 Pervious Area"
"    40.000 Pervious length"
"      1.000 Pervious slope"
"      0.182 Impervious Area"
"    40.000 Impervious length"
"      1.000 Impervious slope"
"      0.170 Pervious Manning 'n'"

```

```

"    72.000 Pervious SCS Curve No."
"      0.264 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.888 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"              0.055      0.000      0.002      0.092 c.m/sec"
"      Catchment 203 Pervious Impervious Total Area "
"      Surface Area 0.010 0.182 0.192 hectare"
"      Time of concentration 21.821 2.861 3.154 minutes"
"      Time to Centroid 127.791 91.211 91.775 minutes"
"      Rainfall depth 56.467 56.467 56.467 mm"
"      Rainfall volume 5.42 103.00 108.42 c.m"
"      Rainfall losses 41.549 6.337 8.097 mm"
"      Runoff depth 14.918 50.130 48.370 mm"
"      Runoff volume 1.43 91.44 92.87 c.m"
"      Runoff coefficient 0.264 0.888 0.857 "
"      Maximum flow 0.000 0.055 0.055 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"              0.055      0.055      0.002      0.092"
" 40 HYDROGRAPH Copy to Outflow"
"      8 Copy to Outflow"
"              0.055      0.055      0.055      0.092"
" 40 HYDROGRAPH Combine 2"
"      6 Combine "
"      2 Node #"
"      Southeast Land"
"      Maximum flow 0.055 c.m/sec"
"      Hydrograph volume 92.870 c.m"
"              0.055      0.055      0.055      0.055"
" 38 START/RE-START TOTALS 203"
"      3 Runoff Totals on EXIT"
"      Total Catchment area 3.657 hectare"
"      Total Impervious area 0.714 hectare"
"      Total % impervious 19.524"
" 19 EXIT"

```

```

"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created              February 7, 2010"
"          10 Units used:              ie METRIC"
"          Job folder:                 S:\2022\22-304\Engineering\MIDUSS\
"                                     Aug 2026"
"          Output filename:            Proposed 50 Year Run 1.out"
"          Licensee name:              Sandra Swanton"
"          Company                     K. Smart Associates Limited"
"          Date & Time last used:      2026-08-05 at 11:51:33 AM"
" 31 TIME PARAMETERS"
"      5.000 Time Step"
"      180.000 Max. Storm length"
"      1500.000 Max. Hydrograph"
" 32 STORM Chicago storm"
"      1 Chicago storm"
"      1574.053 Coefficient A"
"      11.090 Constant B"
"      0.816 Exponent C"
"      0.400 Fraction R"
"      180.000 Duration"
"      1.000 Time step multiplier"
"          Maximum intensity          163.106 mm/hr"
"          Total depth                 64.961 mm"
"          6 050hyd Hydrograph extension used in this file"
" 33 CATCHMENT 1001"
"      1 Triangular SCS"
"      1 Equal length"
"      1 SCS method"
"      1001 External Areas to the North"
"      0.000 % Impervious"
"      2.784 Total Area"
"      130.000 Flow length"
"      2.000 Overland Slope"
"      2.784 Pervious Area"
"      130.000 Pervious length"
"      2.000 Pervious slope"
"      0.000 Impervious Area"
"      130.000 Impervious length"
"      2.000 Impervious slope"
"      0.170 Pervious Manning 'n'"
"      72.000 Pervious SCS Curve No."
"      0.303 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"      98.000 Impervious SCS Curve No."
"      0.000 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"

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"          0.124 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 31.604 4.446 31.604 minutes"
"          Time to Centroid 139.415 93.205 139.415 minutes"
"          Rainfall depth 64.961 64.961 64.961 mm"
"          Rainfall volume 1808.50 0.00 1808.50 c.m"
"          Rainfall losses 45.261 5.812 45.261 mm"
"          Runoff depth 19.700 59.149 19.700 mm"
"          Runoff volume 548.44 0.00 548.44 c.m"
"          Runoff coefficient 0.303 0.000 0.303 "
"          Maximum flow 0.124 0.000 0.124 c.m/sec"
" 40 HYDROGRAPH Add Runoff "
"      4 Add Runoff "
"          0.124 0.124 0.000 0.000"
" 51 PIPE DESIGN"
"      0.124 Current peak flow c.m/sec"
"      0.013 Manning 'n'"
"      0.525 Diameter metre"
"      0.500 Gradient %"
"          Depth of flow 0.233 metre"
"          Velocity 1.333 m/sec"
"          Pipe capacity 0.304 c.m/sec"
"          Critical depth 0.234 metre"
" 53 ROUTE Pipe Route 126"
"      125.50 Pipe Route 126 Reach length ( metre)"
"      0.394 X-factor <= 0.5"
"      70.594 K-lag ( seconds)"
"      0.000 Default(0) or user spec.(1) values used"
"      0.500 X-factor <= 0.5"
"      30.000 K-lag ( seconds)"
"      0.500 Beta weighting factor"
"      75.000 Routing time step ( seconds)"
"      1 No. of sub-reaches"
"          Peak outflow 0.124 c.m/sec"
"          0.124 0.124 0.124 0.000 c.m/sec"
" 40 HYDROGRAPH Combine 1"
"      6 Combine "
"      1 Node #"
"          Road Ditch"
"          Maximum flow 0.124 c.m/sec"
"          Hydrograph volume 548.437 c.m"
"          0.124 0.124 0.124 0.124"
" 40 HYDROGRAPH Start - New Tributary"
"      2 Start - New Tributary"
"          0.124 0.000 0.124 0.124"
" 33 CATCHMENT 201"
"      1 Triangular SCS"
"      1 Equal length"
"      1 SCS method"

```

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"      201 Proposed Site to Pond"
" 80.000 % Impervious"
"    0.659 Total Area"
" 20.000 Flow length"
"    1.000 Overland Slope"
"    0.132 Pervious Area"
" 20.000 Pervious length"
"    1.000 Pervious slope"
"    0.527 Impervious Area"
" 20.000 Impervious length"
"    1.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
" 72.000 Pervious SCS Curve No."
"    0.303 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"
"    9.878 Pervious Initial abstraction"
"    0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
"    0.905 Impervious Runoff coefficient"
"    0.100 Impervious Ia/S coefficient"
"    0.518 Impervious Initial abstraction"
"      0.198      0.000      0.124      0.124 c.m/sec"
"      Catchment 201      Pervious      Impervious Total Area "
"      Surface Area      0.132      0.527      0.659      hectare"
"      Time of concentration      12.656      1.780      2.620      minutes"
"      Time to Centroid      116.154      89.208      91.287      minutes"
"      Rainfall depth      64.961      64.961      64.961      mm"
"      Rainfall volume      85.62      342.47      428.09      c.m"
"      Rainfall losses      45.303      6.179      14.004      mm"
"      Runoff depth      19.658      58.781      50.957      mm"
"      Runoff volume      25.91      309.90      335.80      c.m"
"      Runoff coefficient      0.303      0.905      0.784      "
"      Maximum flow      0.010      0.196      0.198      c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
"      0.198      0.198      0.124      0.124"
" 54 POND DESIGN"
"    0.198 Current peak flow      c.m/sec"
"    0.074 Target outflow      c.m/sec"
"    335.8 Hydrograph volume      c.m"
"    20. Number of stages"
"    0.000 Minimum water level      metre"
"    3.000 Maximum water level      metre"
"    0.000 Starting water level      metre"
"    0 Keep Design Data: 1 = True; 0 = False"
"      Level Discharge      Volume"
"      293.930      0.000      0.000"
"      294.500      0.00400      0.2050"
"      294.550      0.00410      5.518"
"      294.600      0.00430      20.055"

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"      294.650      0.00440      39.136"
"      294.700      0.00460      59.493"
"      294.750      0.00470      81.149"
"      294.800      0.00480      104.130"
"      294.850      0.00500      128.461"
"      294.900      0.00510      154.168"
"      294.950      0.00520      181.274"
"      295.000      0.00530      209.805"
"      295.050      0.00540      239.786"
"      295.100      0.00560      271.243"
"      295.150      0.00570      304.199"
"      295.200      0.00580      338.680"
"      295.250      0.00590      374.711"
"      295.300      0.00600      412.318"
"      295.350      0.03690      451.524"
"      295.400      0.09340      492.355"
"      Peak outflow      0.006      c.m/sec"
"      Maximum level      295.119      metre"
"      Maximum storage      283.594      c.m"
"      Centroidal lag      9.438      hours"
"      0.198      0.198      0.006      0.124 c.m/sec"
" 40 HYDROGRAPH Combine 1"
" 6 Combine "
" 1 Node #"
"      Road Ditch"
"      Maximum flow      0.129      c.m/sec"
"      Hydrograph volume      884.167      c.m"
"      0.198      0.198      0.006      0.129"
" 40 HYDROGRAPH Start - New Tributary"
" 2 Start - New Tributary"
"      0.198      0.000      0.006      0.129"
" 33 CATCHMENT 202"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
"      202 Uncontrolled Entranceway to Road"
" 20.000 % Impervious"
"    0.022 Total Area"
"    10.000 Flow length"
"    4.000 Overland Slope"
"    0.018 Pervious Area"
"    10.000 Pervious length"
"    4.000 Pervious slope"
"    0.004 Impervious Area"
"    10.000 Impervious length"
"    4.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
"    72.000 Pervious SCS Curve No."
"    0.301 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"

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"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.874 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"          0.003      0.000      0.006      0.129 c.m/sec"
"      Catchment 202      Pervious      Impervious Total Area "
"      Surface Area      0.018      0.004      0.022      hectare"
"      Time of concentration 5.509      0.775      3.520      minutes"
"      Time to Centroid      107.408      88.147      99.316      minutes"
"      Rainfall depth      64.961      64.961      64.961      mm"
"      Rainfall volume      11.43      2.86      14.29      c.m"
"      Rainfall losses      45.380      8.214      37.947      mm"
"      Runoff depth      19.581      56.746      27.014      mm"
"      Runoff volume      3.45      2.50      5.94      c.m"
"      Runoff coefficient      0.301      0.874      0.416      "
"      Maximum flow      0.002      0.002      0.003      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.003      0.003      0.006      0.129"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"          0.003      0.003      0.003      0.129"
" 40      HYDROGRAPH Combine 1"
"      6      Combine "
"      1      Node #"
"          Road Ditch"
"          Maximum flow      0.130      c.m/sec"
"          Hydrograph volume      890.110      c.m"
"          0.003      0.003      0.003      0.130"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"          0.003      0.000      0.003      0.130"
" 33      CATCHMENT 203"
"      1      Triangular SCS"
"      1      Equal length"
"      1      SCS method"
"      203      Existing Site to Southeast Adjacent Lands"
"      95.000 % Impervious"
"      0.192 Total Area"
"      40.000 Flow length"
"      1.000 Overland Slope"
"      0.010 Pervious Area"
"      40.000 Pervious length"
"      1.000 Pervious slope"
"      0.182 Impervious Area"
"      40.000 Impervious length"
"      1.000 Impervious slope"
"      0.170 Pervious Manning 'n'"

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"    72.000 Pervious SCS Curve No."
"      0.303 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.899 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"          0.064      0.000      0.003      0.130 c.m/sec"
"      Catchment 203      Pervious      Impervious Total Area "
"      Surface Area      0.010      0.182      0.192      hectare"
"      Time of concentration 19.183      2.699      2.986      minutes"
"      Time to Centroid      124.152      90.689      91.272      minutes"
"      Rainfall depth      64.961      64.961      64.961      mm"
"      Rainfall volume      6.24      118.49      124.72      c.m"
"      Rainfall losses      45.281      6.554      8.491      mm"
"      Runoff depth      19.680      58.406      56.470      mm"
"      Runoff volume      1.89      106.53      108.42      c.m"
"      Runoff coefficient      0.303      0.899      0.869      "
"      Maximum flow      0.001      0.064      0.064      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.064      0.064      0.003      0.130"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"          0.064      0.064      0.064      0.130"
" 40      HYDROGRAPH Combine 2"
"      6      Combine "
"      2      Node #"
"          Southeast Land"
"          Maximum flow      0.064      c.m/sec"
"          Hydrograph volume      108.422      c.m"
"          0.064      0.064      0.064      0.064"
" 38      START/RE-START TOTALS 203"
"      3      Runoff Totals on EXIT"
"          Total Catchment area      3.657      hectare"
"          Total Impervious area      0.714      hectare"
"          Total % impervious      19.524"
" 19      EXIT"

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"          MIDUSS Output ----->"
"          MIDUSS version              Version 2.25 rev. 473"
"          MIDUSS created                February 7, 2010"
"          10 Units used:                  ie METRIC"
"          Job folder:                    S:\2022\22-304\Engineering\MIDUSS\
"                                         Aug 2026"
"          Output filename:                Proposed 100 Year Run 1.out"
"          Licensee name:                  Sandra Swanton"
"          Company                        K. Smart Associates Limited"
"          Date & Time last used:          2026-08-05 at 11:53:31 AM"
" 31          TIME PARAMETERS"
"          5.000 Time Step"
"          180.000 Max. Storm length"
"          1500.000 Max. Hydrograph"
" 32          STORM Chicago storm"
"          1 Chicago storm"
"          1723.128 Coefficient A"
"          11.090 Constant B"
"          0.816 Exponent C"
"          0.400 Fraction R"
"          180.000 Duration"
"          1.000 Time step multiplier"
"          Maximum intensity              178.553 mm/hr"
"          Total depth                    71.113 mm"
"          6 100hyd Hydrograph extension used in this file"
" 33          CATCHMENT 1001"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"
"          1001 External Areas to the North"
"          0.000 % Impervious"
"          2.784 Total Area"
"          130.000 Flow length"
"          2.000 Overland Slope"
"          2.784 Pervious Area"
"          130.000 Pervious length"
"          2.000 Pervious slope"
"          0.000 Impervious Area"
"          130.000 Impervious length"
"          2.000 Impervious slope"
"          0.170 Pervious Manning 'n'"
"          72.000 Pervious SCS Curve No."
"          0.329 Pervious Runoff coefficient"
"          0.100 Pervious Ia/S coefficient"
"          9.878 Pervious Initial abstraction"
"          0.015 Impervious Manning 'n'"
"          98.000 Impervious SCS Curve No."
"          0.000 Impervious Runoff coefficient"
"          0.100 Impervious Ia/S coefficient"
"          0.518 Impervious Initial abstraction"

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"          0.161 0.000 0.000 0.000 c.m/sec"
"          Catchment 1001 Pervious Impervious Total Area "
"          Surface Area 2.784 0.000 2.784 hectare"
"          Time of concentration 29.212 4.281 29.212 minutes"
"          Time to Centroid 136.197 92.748 136.197 minutes"
"          Rainfall depth 71.113 71.113 71.113 mm"
"          Rainfall volume 1979.78 0.00 1979.78 c.m"
"          Rainfall losses 47.692 5.974 47.692 mm"
"          Runoff depth 23.421 65.139 23.421 mm"
"          Runoff volume 652.05 0.00 652.05 c.m"
"          Runoff coefficient 0.329 0.000 0.329 "
"          Maximum flow 0.161 0.000 0.161 c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"          4 Add Runoff "
"          0.161 0.161 0.000 0.000"
" 51          PIPE DESIGN"
"          0.161 Current peak flow c.m/sec"
"          0.013 Manning 'n'"
"          0.525 Diameter metre"
"          0.500 Gradient %"
"          Depth of flow 0.271 metre"
"          Velocity 1.424 m/sec"
"          Pipe capacity 0.304 c.m/sec"
"          Critical depth 0.268 metre"
" 53          ROUTE Pipe Route 126"
"          125.50 Pipe Route 126 Reach length ( metre)"
"          0.371 X-factor <= 0.5"
"          66.106 K-lag ( seconds)"
"          0.000 Default(0) or user spec.(1) values used"
"          0.500 X-factor <= 0.5"
"          30.000 K-lag ( seconds)"
"          0.500 Beta weighting factor"
"          75.000 Routing time step ( seconds)"
"          1 No. of sub-reaches"
"          Peak outflow 0.157 c.m/sec"
"          0.161 0.161 0.157 0.000 c.m/sec"
" 40          HYDROGRAPH Combine 1"
"          6 Combine "
"          1 Node #"
"          Road Ditch"
"          Maximum flow 0.157 c.m/sec"
"          Hydrograph volume 652.047 c.m"
"          0.161 0.161 0.157 0.157"
" 40          HYDROGRAPH Start - New Tributary"
"          2 Start - New Tributary"
"          0.161 0.000 0.157 0.157"
" 33          CATCHMENT 201"
"          1 Triangular SCS"
"          1 Equal length"
"          1 SCS method"

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"      201 Proposed Site to Pond"
" 80.000 % Impervious"
"    0.659 Total Area"
" 20.000 Flow length"
"    1.000 Overland Slope"
"    0.132 Pervious Area"
" 20.000 Pervious length"
"    1.000 Pervious slope"
"    0.527 Impervious Area"
" 20.000 Impervious length"
"    1.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
" 72.000 Pervious SCS Curve No."
"    0.329 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"
"    9.878 Pervious Initial abstraction"
"    0.015 Impervious Manning 'n'"
" 98.000 Impervious SCS Curve No."
"    0.912 Impervious Runoff coefficient"
"    0.100 Impervious Ia/S coefficient"
"    0.518 Impervious Initial abstraction"
"      0.219      0.000      0.157      0.157 c.m/sec"
"      Catchment 201      Pervious      Impervious Total Area "
"      Surface Area      0.132      0.527      0.659      hectare"
"      Time of concentration      11.698      1.714      2.540      minutes"
"      Time to Centroid      114.432      88.914      91.023      minutes"
"      Rainfall depth      71.113      71.113      71.113      mm"
"      Rainfall volume      93.73      374.91      468.63      c.m"
"      Rainfall losses      47.747      6.285      14.577      mm"
"      Runoff depth      23.366      64.828      56.536      mm"
"      Runoff volume      30.80      341.77      372.57      c.m"
"      Runoff coefficient      0.329      0.912      0.795      "
"      Maximum flow      0.012      0.216      0.219      c.m/sec"
" 40 HYDROGRAPH Add Runoff "
" 4 Add Runoff "
"      0.219      0.219      0.157      0.157"
" 54 POND DESIGN"
"    0.219 Current peak flow      c.m/sec"
"    0.074 Target outflow      c.m/sec"
"    372.6 Hydrograph volume      c.m"
"    20. Number of stages"
"    0.000 Minimum water level      metre"
"    3.000 Maximum water level      metre"
"    0.000 Starting water level      metre"
"    0 Keep Design Data: 1 = True; 0 = False"
"      Level Discharge      Volume"
"      293.930      0.000      0.000"
"      294.500      0.00400      0.2050"
"      294.550      0.00410      5.518"
"      294.600      0.00430      20.055"

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"      294.650      0.00440      39.136"
"      294.700      0.00460      59.493"
"      294.750      0.00470      81.149"
"      294.800      0.00480      104.130"
"      294.850      0.00500      128.461"
"      294.900      0.00510      154.168"
"      294.950      0.00520      181.274"
"      295.000      0.00530      209.805"
"      295.050      0.00540      239.786"
"      295.100      0.00560      271.243"
"      295.150      0.00570      304.199"
"      295.200      0.00580      338.680"
"      295.250      0.00590      374.711"
"      295.300      0.00600      412.318"
"      295.350      0.03690      451.524"
"      295.400      0.09340      492.355"
"      Peak outflow      0.006      c.m/sec"
"      Maximum level      295.172      metre"
"      Maximum storage      319.063      c.m"
"      Centroidal lag      10.232      hours"
"      0.219      0.219      0.006      0.157 c.m/sec"
" 40 HYDROGRAPH Combine 1"
" 6 Combine "
" 1 Node #"
"      Road Ditch"
"      Maximum flow      0.163      c.m/sec"
"      Hydrograph volume      1024.696      c.m"
"      0.219      0.219      0.006      0.163"
" 40 HYDROGRAPH Start - New Tributary"
" 2 Start - New Tributary"
"      0.219      0.000      0.006      0.163"
" 33 CATCHMENT 202"
" 1 Triangular SCS"
" 1 Equal length"
" 1 SCS method"
" 202 Uncontrolled Entranceway to Road"
" 20.000 % Impervious"
"    0.022 Total Area"
"    10.000 Flow length"
"    4.000 Overland Slope"
"    0.018 Pervious Area"
"    10.000 Pervious length"
"    4.000 Pervious slope"
"    0.004 Impervious Area"
"    10.000 Impervious length"
"    4.000 Impervious slope"
"    0.170 Pervious Manning 'n'"
"    72.000 Pervious SCS Curve No."
"    0.327 Pervious Runoff coefficient"
"    0.100 Pervious Ia/S coefficient"

```

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"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.877 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"          0.003      0.000      0.006      0.163 c.m/sec"
"      Catchment 202      Pervious      Impervious Total Area "
"      Surface Area      0.018      0.004      0.022      hectare"
"      Time of concentration      5.092      0.746      3.349      minutes"
"      Time to Centroid      106.258      87.927      98.907      minutes"
"      Rainfall depth      71.113      71.113      71.113      mm"
"      Rainfall volume      12.52      3.13      15.64      c.m"
"      Rainfall losses      47.830      8.757      40.016      mm"
"      Runoff depth      23.283      62.356      31.097      mm"
"      Runoff volume      4.10      2.74      6.84      c.m"
"      Runoff coefficient      0.327      0.877      0.437      "
"      Maximum flow      0.002      0.002      0.003      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.003      0.003      0.006      0.163"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"          0.003      0.003      0.003      0.163"
" 40      HYDROGRAPH Combine 1"
"      6      Combine "
"      1      Node #"
"          Road Ditch"
"          Maximum flow      0.164      c.m/sec"
"          Hydrograph volume      1031.538      c.m"
"          0.003      0.003      0.003      0.164"
" 40      HYDROGRAPH Start - New Tributary"
"      2      Start - New Tributary"
"          0.003      0.000      0.003      0.164"
" 33      CATCHMENT 203"
"      1      Triangular SCS"
"      1      Equal length"
"      1      SCS method"
"      203      Existing Site to Southeast Adjacent Lands"
"    95.000 % Impervious"
"      0.192 Total Area"
"    40.000 Flow length"
"      1.000 Overland Slope"
"      0.010 Pervious Area"
"    40.000 Pervious length"
"      1.000 Pervious slope"
"      0.182 Impervious Area"
"    40.000 Impervious length"
"      1.000 Impervious slope"
"      0.170 Pervious Manning 'n'"

```

```

"    72.000 Pervious SCS Curve No."
"      0.329 Pervious Runoff coefficient"
"      0.100 Pervious Ia/S coefficient"
"      9.878 Pervious Initial abstraction"
"      0.015 Impervious Manning 'n'"
"    98.000 Impervious SCS Curve No."
"      0.907 Impervious Runoff coefficient"
"      0.100 Impervious Ia/S coefficient"
"      0.518 Impervious Initial abstraction"
"          0.071      0.000      0.003      0.164 c.m/sec"
"      Catchment 203      Pervious      Impervious Total Area "
"      Surface Area      0.010      0.182      0.192      hectare"
"      Time of concentration      17.731      2.599      2.882      minutes"
"      Time to Centroid      121.921      90.307      90.900      minutes"
"      Rainfall depth      71.113      71.113      71.113      mm"
"      Rainfall volume      6.83      129.71      136.54      c.m"
"      Rainfall losses      47.698      6.614      8.668      mm"
"      Runoff depth      23.415      64.499      62.445      mm"
"      Runoff volume      2.25      117.65      119.89      c.m"
"      Runoff coefficient      0.329      0.907      0.878      "
"      Maximum flow      0.001      0.071      0.071      c.m/sec"
" 40      HYDROGRAPH Add Runoff "
"      4      Add Runoff "
"          0.071      0.071      0.003      0.164"
" 40      HYDROGRAPH Copy to Outflow"
"      8      Copy to Outflow"
"          0.071      0.071      0.071      0.164"
" 40      HYDROGRAPH Combine 2"
"      6      Combine "
"      2      Node #"
"          Southeast Land"
"          Maximum flow      0.071      c.m/sec"
"          Hydrograph volume      119.894      c.m"
"          0.071      0.071      0.071      0.071"
" 38      START/RE-START TOTALS 203"
"      3      Runoff Totals on EXIT"
"          Total Catchment area      3.657      hectare"
"          Total Impervious area      0.714      hectare"
"          Total % impervious      19.524"
" 19      EXIT"

```

Appendix F

MTO Design Chart 4.19 *Inlet Capacity at Road Sag*

Design Chart 4.19: Inlet Capacity at Road Sag

