190-216 Arkell Road
Guelph, Ontario

Preliminary
Stormwater Management Report

Project Location:

190 - 216 Arkell Road
Guelph, Ontario

Prepared for:

Crescent Homes
3-180 Frobisher Drive
Waterloo, ON N2V 2A2

Prepared by:

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October 10, 2018
Revised: April 7, 2020
Revised: December 3, 2021

MTE File No.: 42063-104

Engineers, Scientists, Surveyors.

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1.0 Introduction

1.1 Overview

MTE Consultants Inc. (MTE) was retained by Crescent Homes to prepare a Stormwater Management Report in support of a Draft Plan of Subdivision Application. The lands that comprise the Draft Plan of Subdivision are made up of a number of properties, including: 190, 202, 210, and 216 Arkell Road, located in the City of Guelph. These lands are herein referred to as the 'Subject Lands.'

The Subject Lands are approximately 2.58ha. Refer to **Figure 1.1** for the location of the Subject Lands. The proposed development plans for the site include a residential subdivision with 22 townhouse units fronting onto a municipal right-of-way, two stacked townhouse condominium blocks, and a stormwater management (SWM) block. The proposed right-of-way will connect the existing Dawes Avenue northeast of the Subject Lands and to Arkell Road at its intersection with Summerfield Drive. Refer to the Draft Plan of Subdivision prepared by MHBC, dated April 29, 2021, in **Appendix A** for more details. Approximately one third of the site cannot be developed due to the existing wetland and its setbacks.

This report presents stormwater quality, quantity, and erosion control measures that are proposed to be provided for the development. This report should be read in conjunction with the *190-216 Arkell Road – Functional Servicing Report*, prepared by MTE (December 3, 2021).

1.2 Background Information

The original Stormwater Management Report, prepared by MTE and dated October 10, 2018, was submitted to the City of Guelph (City) as part of Site Plan approval process. After discussions with City staff, it was determined that the proposed road connections through the site would establish a municipal right-of-way, thereby warranting a Draft Plan of Subdivision Application. As such, various departments within the City have reviewed the original submission and provided comments to be addressed prior to Draft Plan approval.

The revised Functional Servicing Report was submitted dated April 7, 2020. Comments were received from the City on January 4, 2021.

1.3 Purpose of Study

The purpose of this report is to address the most recent City comments and develop a comprehensive stormwater management strategy for the current development proposal that is acceptable to the City, the Grand River Conservation Authority (GRCA), and the Ministry of the Environment, Conservation and Parks (MECP).

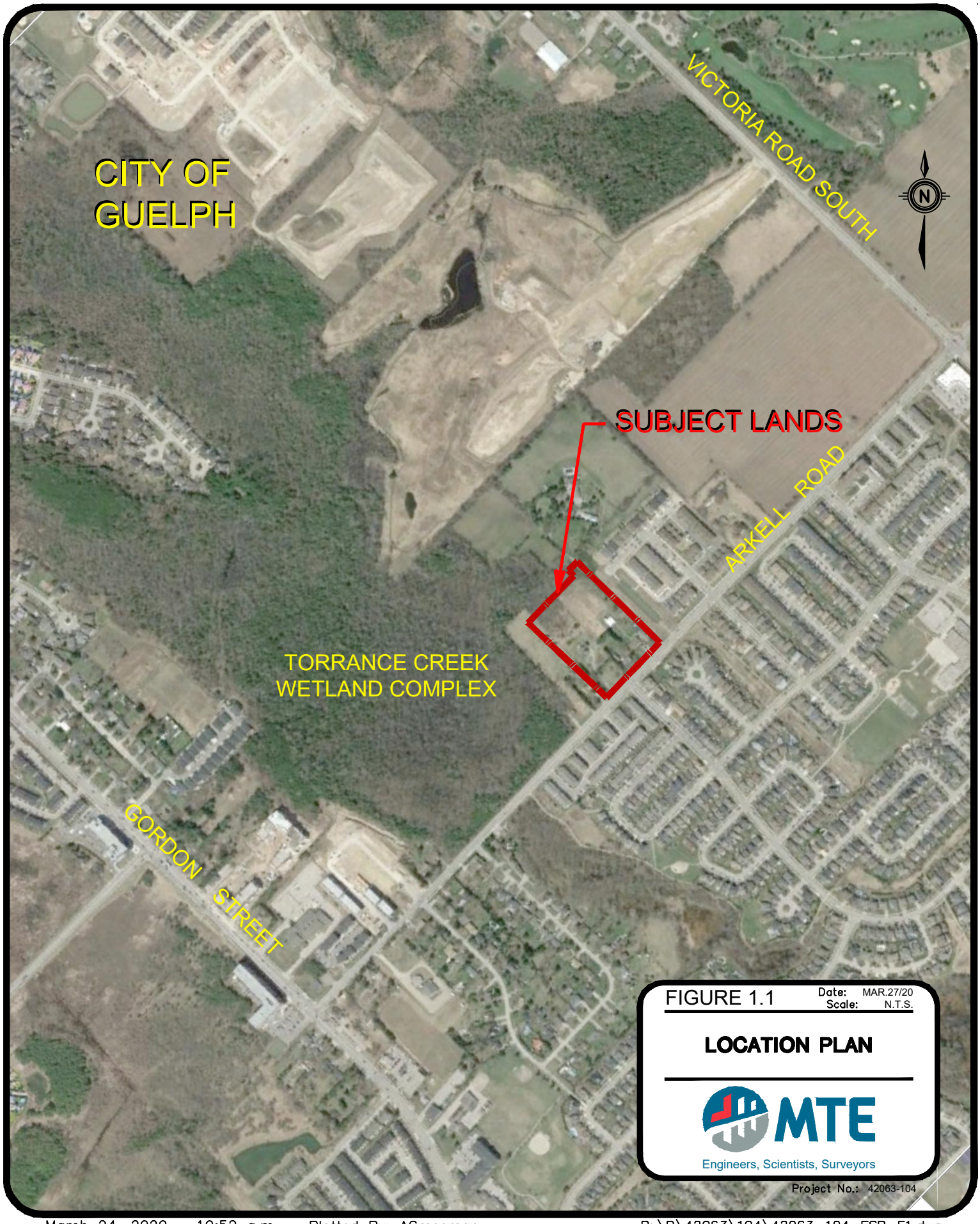

FIGURE 1.1

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LOCATION PLAN

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Project No.: 42063-104

March 24, 2020 — 10:52 a.m. — Plotted By: ACressman

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1.4 Objectives

The objective of this stormwater management plan is to ensure that the proposed development includes the necessary controls to protect the hydrology and water quality of the receiving water systems. Furthermore, this plan also ensures that the proposed Draft Plan of Subdivision provides the necessary blocks and corridors for stormwater management measures. The primary objectives of this study are as follows:

- Establish criteria for the management of stormwater runoff from the study area;
- Recommend a comprehensive plan for controlling the quality and quantity of stormwater runoff from the study area;
- Perform monthly infiltration and water balances to analyse the effect of the development on local water systems; and
- Prepare preliminary designs for the recommended stormwater management infrastructure.

2.0 Existing Conditions and Background Information

2.1 Topographical Information

The Subject Lands consist of approximately 2.58ha and are generally bounded by an existing wetland to the northwest, an existing residential development to the northeast, the Arkell Road right-of-way to the southeast, and an existing single family residential property to the southwest. The Subject Lands are legally described as Part of Lot 6, Puslinch Concession 8 in the City of Guelph. They are currently comprised of four residential properties. Municipal addresses for the individual lots are 190, 202, 210, and 216 Arkell Road. The existing homes will be vacated and demolished prior to development.

MTE conducted a detailed topographical survey of the Subject Lands in November 2016. Existing site conditions and topography for the Subject Lands are shown in **Figure 2.1**, as well as the enclosed **MTE Drawing 42063-104-EC1.1**.

The Subject Lands are relatively flat, with slopes generally ranging from 0.5% to 1.5%. Existing elevations within the lands range from 333.3m along the wetland boundary to approximately 335.0m along Arkell Road. Under pre-development conditions, surface runoff from the site flows northwesterly towards the wetland complex.

2.2 Pre-Development Conditions

The Subject Lands are located within the Torrance Creek Subwatershed. The western portion of the property is comprised of the Torrance Creek Wetland, which lies at the headwaters of a tributary to Torrance Creek. Approximately one-third of the northerly portion of the site either lies within the wetland complex or within the required 30.0m wetland setback.

As previously mentioned, the majority of the site is internally drained and surface runoff flows northwesterly from Arkell Road to the wetland feature. **Figure 2.2** provides an illustration of the pre-development catchment areas.

Based on existing conditions, the site and surrounding lands were modelled as three separate catchments using the MIDUSS hydrologic modelling program. **Table 2.1** provides a brief description of the catchments and the design parameters used in the hydrologic modelling.

Hydrologic modelling details and results are further discussed in Section 5. A detailed copy of the pre-development catchment parameters and MIDUSS modelling output logs has been included in **Appendix B**.

Table 2.1 – Pre-Development Catchment Parameters

Catchment	Description	Area (ha)	% Impervious	Flow Length (m)	Slope (%)
Within Subject Lands					
101	Existing residential properties and Arkell Road boulevard	1.714	16	150	0.5
102	Existing wetland and setbacks	0.863	0	50	0.5
Outside of Subject Lands					
103	Private laneway adjacent to subject lands	0.240	30	225	0.8
104	Existing SWM facility embankments	0.234	0	8	20
105	Driveway aprons and ditch within Arkell right-of-way	0.057	20	125	0.5
	Total	**3.108**	**11.5**	**-**	**-**

Please note that drainage area 103 is equivalent to drainage area 205 as defined within the Stantec Report *220 Arkell Road Preliminary Servicing. Grading, and Stormwater Management Report* (May 28, 2019). Drainage area 104 represents the existing SWM facility embankment within the adjacent Arkell Meadows Subdivision that is directed towards the subject lands.

DAWES AVENUE

BLOCK 20
OPEN SPACE

EX. SWM FACILITY

Ex. Asphalt Laneway

EXISTING RESIDENTIAL

SURVEYED DRIPLINE

10m DRIPLINE SETBACK

30m WETLAND SETBACK

LIMIT OF WETLAND (APPROX.)

[MP1-19] Piezometer Elev.=334.48

MW4 Piezometer Elev.=333.990 Mon Well Elev.=334.133

MW5 Piezometer Elev.=334.826 Mon Well Elev.=334.970

MW6 Mon Well Elev.=334.415 Piezometer Elev.=334.312

BH6 BH Elev.=333.996

MW2 Piezometer Elev.=335.041 Mon Well Elev.=335.160

[MW101-19] Piezometer Elev.=335.83

BH1 BH Elev.=334.559

[MW105-19] Piezometer Elev.=334.76

[MW106-19] Piezometer Elev.=336.80

Ex. MH T/O=337.80

Ex. DCB T/O=337.50

Ex. MH T/O=337.65

Ex. DCB T/O=337.47

Ex. MH T/O=337.69

Ex. MH T/O=337.39

Ex. Ph

Ex. WV

Ex. MH T/O=335.43

Ex. MH T/O=335.01

Ex. MH T/O=334.91

Ex. MH T/O=334.94

Ex. MH T/O=334.79

Ex. 300mmø SAN.

Ex. 200mmø SAN.

Ex. 400ø WM (Approx. Location)

Ex. 200ø WM

Ex. CC Road

APPROX. LOCATION OF 40.0m x 3.0m x 1.0m DEEP INFILTRATION GALLERY

LEGEND

- SITE BOUNDARY
- LIMIT OF WETLAND
- 30m WETLAND SETBACK
- SURVEYED DRIPLINE
- 10m DRIPLINE SETBACK
- 334.5 EXISTING CONTOUR
- EXISTING DIRECTION OF DRAINAGE
- EXISTING BUILDING
- EXISTING FENCE
- BOREHOLE
- MONITORING WELL

FIGURE 2.1

Date: OCT.29/21
Scale: 1:750

EXISTING CONDITIONS PLAN

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November 15, 2021 — 12:05 p.m. — Plotted By: acressman

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DAWES AVENUE

ARKELL ROAD

SUMMERFIELD DRIVE

BLOCK 20
OPEN SPACE

EX. SWM FACILITY

EXISTING RESIDENTIAL

Ex. Asphalt Laneway

103
0.240

104
0.234

105
0.057

101
1.714

102
0.863

SURVEYED DRIPLINE

10m DRIPLINE SETBACK

30m WETLAND SETBACK

LIMIT OF WETLAND (APPROX.)

LEGEND

- SITE BOUNDARY
- LIMIT OF WETLAND
- 30m WETLAND SETBACK
- SURVEYED DRIPLINE
- 10m DRIPLINE SETBACK
- EXISTING CONTOUR
- EXISTING DIRECTION OF DRAINAGE
- CATCHMENT AREA

101 — SUB-CATCHMENT NUMBER
1.715 — AREA (ha.)

FIGURE 2.2

Date: JAN.10/20
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PRE-DEVELOPMENT CATCHMENT AREAS

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Project No.: 42063-104

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2.3 Geotechnical Information

A geotechnical investigation for the property was carried out by Peto MacCallum Ltd. (Peto) in 2017. A total of six (6) boreholes were advanced to depths of approximately 6.6m - 8.1m. A final version of their report, entitled *Geotechnical Investigation Proposed Arkell Road Subdivision* dated October 1, 2018, was prepared. The assessment made recommendations pertaining to the site grading, road pavement structure, stormwater management facilities, and general house construction.

Based on the results of Peto's geotechnical investigation, the subsurface stratigraphy of the site generally consists of topsoil and some localized fill overlying native deposits of silt, sand, and gravel. A thick (~3.6m) layer of silt was encountered 2.2m below existing grades on the easterly portion of the site.

The report also provided an infiltration rate of 30mm/hr for typical soils present within the Subject Lands. For further geotechnical information, refer to Peto's geotechnical investigation in **Appendix F**.

2.4 Hydrogeological Information

A hydrogeological investigation was conducted by MTE starting in 2017. A supplemental technical memo *Update to Hydrogeological Investigation Report as per City of Guelph Comments* was completed dated January 9, 2020. Monitoring wells were installed in four of the boreholes which were previously advanced by Peto. MTE has conducted continuous groundwater monitoring since March of 2017. The highest water table was observed in May of 2017 and ranged from an elevation of 334.0m in the northern portion of the site (MW4) to 333.2m in the southern portion of the site (MW2). These elevations represent depths of 0.9m above existing grade at MW4 and 1.1m below existing grade at MW2. The measured groundwater elevations indicate that the shallow groundwater flows from the north to the south (i.e. away from the wetland in the north portion of the Site).

A revised Hydrogeological Assessment was completed dated December 3, 2021.

Please note that MTE has set the basement floor elevations above the seasonal high groundwater in order to achieve a minimum 1.0m separation.

Please refer to **Appendix G** for a figure depicting the Subject Lands' seasonal high groundwater contours.

2.4.1 In-Situ Infiltration Testing

In-situ infiltration testing was performed as part of the Hydrogeological Investigation.

MTE completed test pit and in-situ infiltration testing at the Subject Lands on November 19, 2021. Four test pits (TP101-21 through TP104-21) were advanced at the Subject Lands for infiltration testing purposes using a mini-excavator operated by Steve Neeb of Neeb Excavating Inc., which was observed by MTE. These test pits are shown on **MTE Drawing 42063-104-EC1.1**.

Infiltration tests were completed using a Soil Moisture 2800 K1 Guelph Permeameter in 0.05 m diameter x 0.16 to 0.20 m deep boreholes which were hand augered through the base of the test pit bottom in native overburden sediments in which the permeameter base tip was placed. Water levels within the combined reservoir of the Guelph Permeameter were recorded at regular time intervals to obtain time-varying infiltration rates of the sediment unit being tested.

The field saturated hydraulic conductivity (Kfs) of the tested materials was calculated using the Guelph Permeameter K-sat calculator, available for download on the soil moisture website (soilmoisture.com).

Based on the field measurements, a Kfs has been calculated for each of the tested locations, summarized in **Table 5.5** below.

Table 5.5: Field Saturation (Kfs) Summary (mm/hr)

Test Pit	Depth (mbgs)	Soil Type	Median Kfs[1] (cm/sec)	Median Kfs (mm/hr)
TP101-21	1.0	Silty SAND	$8.9x10^{-5}$	3
TP101-21	1.6	SAND, trace silt, trace gravel	$3.5x10^{-4}$	13
TP102-21	0.8	SAND and GRAVEL	$5.8x10^{-3}$	209
TP103-21	0.5	SAND and GRAVEL	$5.4x10^{-3}$	194
TP104-21	0.9	SAND and GRAVEL	$4.3x10^{-3}$	155

It should be noted that the average infiltration rate across the site (38.3mm/hr with a safety factor of 3) exceeds the 30mm/hr rate provided by Peto. For the purpose of this report, it was determined that a design infiltration rate of 30mm/hr will be utilized for a conservative design scenario. The infiltration rate used can be reevaluated at the time of detailed design if required.

3.0 Stormwater Management Criteria

New developments are required to provide stormwater management in accordance with provincial and municipal policies. Relevant documents have been referenced in the design of the stormwater management plan for the Subject Lands; including:

- GRCA Policies for the Administration of Ontario Regulation 150/06 (GRCA, 2015);
- Stormwater Management Planning and Design Manual (MOE, 2003);
- The Torrance Creek Subwatershed Study (TCSS) Management Strategy (GRCA, 1999);
- Design Principles for Stormwater Management (City of Guelph, 1996); and
- The City of Guelph's Development Engineering Manual (City of Guelph, 2019).

Based on the above policies and relevant documents, background reports, agency requirements, and site specific considerations, the following stormwater management criteria have been established for this study area:

- **Water Quality** – Provide an Enhanced (MOE, 2003) level of stormwater quality treatment prior to discharge to surface and groundwater systems.
- **Water Quantity** – Control the peak flow rates for all storms up to and including the 100-year storm event to the allowable pre-development rates; preserve hydraulic and hydrologic functions. Provide erosion control by maintaining existing flow duration characteristics.
- **Erosion Control** – Minimum 12 h extended retention of the 4h 25mm Chicago distribution rainfall event due to small overall drainage area (< 8ha) per MOE Section 4.6.2.
- **Thermal Impact** – Torrance Creek subwatershed supports cold water fish habitats, and therefore thermal impact assessment required with preventive and mitigation measures.
- **Water Balance**
  Infiltration – Maintain or exceed target groundwater volume inputs established within the TCSS through active and/or passive infiltration measures.

  Surface Water – Maintain existing surface water volume inputs into significant environmental features.

A brief discussion of each of these criteria is included in the following subsections.

3.1 Water Quality Control

The City's Engineering Design Guidelines and the TCSS state that all new developments shall provide an Enhanced (Level 1) level of quality treatment. The requirements for this level of quality control are established in Table 3.2 of the *Stormwater Management Planning and Design Manual* (MOE, 2003). The TCSS also identifies a water management objective of minimizing impacts to the receiving waterbody by establishing additional quality targets for development within the subwatershed, as follows:

- **Nutrients** – Total phosphorus should be 30ug/L or less; the use of the quality wet cell will reduce suspended solids and nutrients;
- **Dissolved Oxygen** – Dissolved oxygen (DO) concentration should not be less than 4mg/L during summer months. Reduction of temperature and nutrient concentrations will improve DO levels. Aeration of direct runoff may also be helpful; and

- **Temperature** – Temperatures within Torrance Creek should be below 25°C. New developments can mitigate temperature increases by maximizing infiltration and using underground drainage elements before discharging to surface water.

3.2 Water Quantity and Erosion Control

The primary objective of quantity control is to maintain hydraulic and hydrologic functions from existing conditions with regards to both surface and subsurface flows. As such, the Subwatershed Plan requires future development within the Torrance Creek Subwatershed to maintain post-development peak flows at existing levels for all storms up to and including the 100-year event. For the purpose of this analysis, controls for the Regional storm event will also be included. Furthermore, existing major flow paths are to be maintained to provide overland flow under major flood events.

It should be noted that the TCSS states that controls should provide at least a 24-hour drawdown period for the 25mm storm event. However, the drainage area towards the proposed SWM facility is considered small (< 8ha), so the minimum detention time required is 12 hours as described in Section 4.6.2 of the MOE SWM manual. Controls have been adjusted within the facility to maximize drawdown as much as possible. With a 50mm diameter orifice placed at permanent pool, a drawdown time of 23.0 hours is achieved.

3.3 Water Balance

3.3.1 Infiltration to Groundwater

The City requires that Low Impact Design (LID) best management practices be used to mimic pre-development recharge rates. Infiltration galleries are proposed to direct flows from roofs on-site wherever possible. The SWM facility will introduce an infiltration cell to further promote groundwater recharge. Additionally, increasing the amount of pervious landscaped areas throughout the Subject Lands will improve groundwater recharge by means of passive infiltration.

The TCSS divided the subwatershed into three stormwater management areas, with respect to groundwater recharge, and established specific infiltration targets for each. The Subject Lands fall within Area 2 (Arkell Road to Torrance Creek) and a minimum infiltration target of 150mm/year is recommended. Baseflow enhancement is encouraged on lands within this zone, especially if they are close to the creek.

An infiltration balance was performed to determine the pre-to-post development net change in infiltration, provided in **Appendix E.**

3.3.2 Surface Runoff

The City requires a monthly surface runoff water balance analysis to maintain existing surface water volume inputs into significant environmental features (ie. the wetland).

3.4 Monitoring

As per the TCSS, both the performance of the proposed SWM facility and its effect on the adjacent wetland and shallow groundwater table must be monitored.

3.4.1 Facility Monitoring

Upon completion of construction, the SWM facility is to be inspected to ensure conformance to the design. Upon confirmation from Municipal staff that the facility is acceptable, it will be monitored for a period of 2 years under the ownership of the developer to confirm the performance of the facility meets the quantity and quality targets. Upon completion of the monitoring program, a monitoring report shall be submitted to the Municipality for approval prior to the assumption of the facility.

The SWM facility will be monitored for peak flow rates and flow durations, water levels and drawdown times, pollutant removal efficiency, and the quality/toxicity of the water discharging to the wetland complex. The facility performance should be compared to the theoretical (design) performance and any aberrations should be noted. Remedial action will be required if facility performance does not meet minimum requirements.

3.4.2 Groundwater Monitoring

Groundwater levels and quality shall be monitored. MTE has completed over 2 years of continuous monitoring of the groundwater levels; which will form the basis against which post-construction levels will be compared. It is recommended that groundwater samples be collected and tested for quality to provide a basis against which post-construction quality results may be compared. Post-construction quality samples should be taken from the shallow groundwater downstream of the SWM facility.

3.4.3 Wellhead Protection

The subject property is located near the City's Burke Well. Due to its close proximity, the southwestern portion of the Subject Lands fall within the well's 100.0m capture zone. As such, this area has been assigned a Wellhead Protection Area vulnerability score of 10. The remainder of the site; located outside of the 100.0m capture zone, is assigned a vulnerability score of 6 to 8. Therefore, it can be concluded that surface runoff and infiltrated runoff generated from the Subject Lands may need to be properly managed in order to protect the surrounding surface water and groundwater quality. Any on-site infiltration measures will be outside of the 100.0m capture zone.

During the detailed design stage of development, as well as during the respective Site Plan Application processes of the two condominium blocks, adequate measures may need to be implemented to satisfy the criteria set forth by the Drinking Water Source Protection Program. An example of such measures would be to include a liner, either synthetic or clay, to protect the base of the SWM facility. This liner would serve to prevent chloride laden stormwater, present in the WET pond, from infiltrating directly to the groundwater below. Additionally, salt application and snow storage plans may need to include specific strategies to minimize adverse effects to the groundwater supply. In more severe cases, additional measures may include strict restrictions on specific land uses, construction or operational activities, or the use and storage of certain materials.

4.0 Proposed Development and SWM Strategy

4.1 Proposed Area Grading

The grading design of the site was controlled by many factors, which include: servicing constraints (both sanitary and storm), matching existing and proposed boundary grades around the perimeter of the property, ensuring major storm event overland flows are directed towards the existing road right-of-ways and to the proposed SWM facility, minimizing impacts to the adjacent environmental feature, as well as, reducing the cut/fill deficit for the development. A preliminary finished grade contour plan illustrating site grading, **MTE Drawing 42063-104-AG1.1** is enclosed.

The Draft Plan of Subdivision includes two multi-residential stacked townhome development blocks. For the purpose of this report, their current conceptual designs have been incorporated into the overall SWM strategy for the subject lands. This will allow SWM criteria to be established for the two blocks and provide flow targets to which the blocks' respective SPA processes will have to adhere.

4.2 Post-Development Conditions

The proposed SWM plan implements a two-cell SWM facility with a wet cell and infiltration cell designed to accommodate stormwater runoff from the majority of the developed portions of the Subject Lands. The plan has been designed to meet the criteria presented in Section 3.0 of this report. An overview of the stormwater management plan is discussed below.

The proposed development lands are comprised of residential land uses, a road right-of-way and a proposed SWM facility block. Blocks 1 and 2 will be developed through respective Site Plan Application processes and will require SWM Briefs, as well as grading and servicing designs in support of SPA. This information will identify the stormwater management criteria for the block and how the stormwater control measures will adhere to the Draft Plan of Subdivision SWM criteria as established in this report.

The location of the proposed SWM facility, along with contributing drainage areas, is illustrated in **Figure 4.1**. Minor storm runoff from the controlled portions of the contributing areas will be conveyed through the proposed storm sewer system to the proposed SWM facility. Roof areas from Blocks 1 and 2 will be directed to infiltration galleries prior to any overflow being released to the SWM facility. Excess runoff from the major storms will flow overland to the SWM facility via the proposed right-of-way and designated overland flow routes. Refer to MTE's *190-216 Arkell Road Functional Servicing Report*, dated December 3, 2021, for further details of the storm sewer network.

The proposed SWM facility will utilize a wet cell and infiltration cell design. These measures will provide quality and quantity control of runoff prior to discharge into the adjacent Torrance Creek wetland. The contributing drainage area to the SWM facility (1.201ha) is separated into seven catchments, and are described below (catchments 201-1 to 201-7).

Under post-development conditions, the Subject Lands and adjacent areas were delineated into sixteen catchments. **Table 4.1** provides a brief description of each catchment area as well as the design parameters used in the hydrologic modelling. A detailed copy of the post-development catchment parameters and MIDUSS modelling output logs has been included in **Appendix C**.

Table 4.1 – Post-Development Catchment Parameters

Catchment	Description	Area (ha)	% Impervious	Flow Length (m)	Slope (%)
To SWM Facility					
201-1	Street A, front yards, driveways	0.519	60	60	0.8
201-2	Street A portion	0.066	70	15	0.5
201-3	Block 1 non-roof areas	0.234	75	15	2.0
201-4	Block 1 roofs	0.065	100	10	2.0
201-5	Block 2 non-roof areas	0.074	85	15	2.0
201-6	Block 2 roofs	0.032	100	10	2.0
201-7	SWM Facility	0.211	40	10	10
Directly to Torrance Creek (Within Subject Lands)					
202-1	Wetland and buffers	0.863	0	50	0.5
202-2	Rear yards and roofs to Torrance	0.184	24	10	2.0
To Torrance Creek through future parklands					
203-1	Future parklands trail	0.216	30	130	2.0
203-2	Grassed areas in subject lands to trail	0.113	0	10	33
203-3	Roof areas to galleries, overflow to ditch inlet	0.092	100	10	2.0
204	Ex. adjacent SWM facility embankment	0.198	0	8	20
To Arkell Road (Ultimately to Torrance Creek)					
205-1	Embankments and right-of-way north to existing infiltration gallery	0.098	25	15	2.0
205-2	Embankment and right-of-ways south to existing stone energy dissipators	0.108	40	25	5.0
To Adjacent Ex. SWM Facility					
206	To existing adjacent SWM Facility	0.035	70	20	1.3
	Total	**3.108**	**34.4**	**-**	**-**

For a majority of the developed lands, stormwater runoff will drain internally through the use of constructed drainage swales and the proposed storm sewer network. However, it should be noted that runoff from small portion of the developed Subject Lands (largely sloped pervious areas) will flow uncontrolled elsewhere.

There is an existing high point along Arkell Road near the driveway entrance to the 202 Arkell Road property. East of the high point (catchment 205-1), flows are directed towards storm sewers connected to an existing 40.0m long x 3.0m wide x 1.0m deep infiltration gallery located in the boulevard adjacent to the Arkell Meadows subdivision SWM facility.

On the western side of the high point (catchment 205-2), flow will be directed to an existing side inlet catchbasin approximately 155.0m away, through a stone energy dissipater, and eventually into the Torrance Creek wetland complex. As such, flow generated from uncontrolled portions of the Subject Lands will ultimately contribute to recharging surface water inputs to the wetland feature and subsurface water inputs to the local groundwater table.

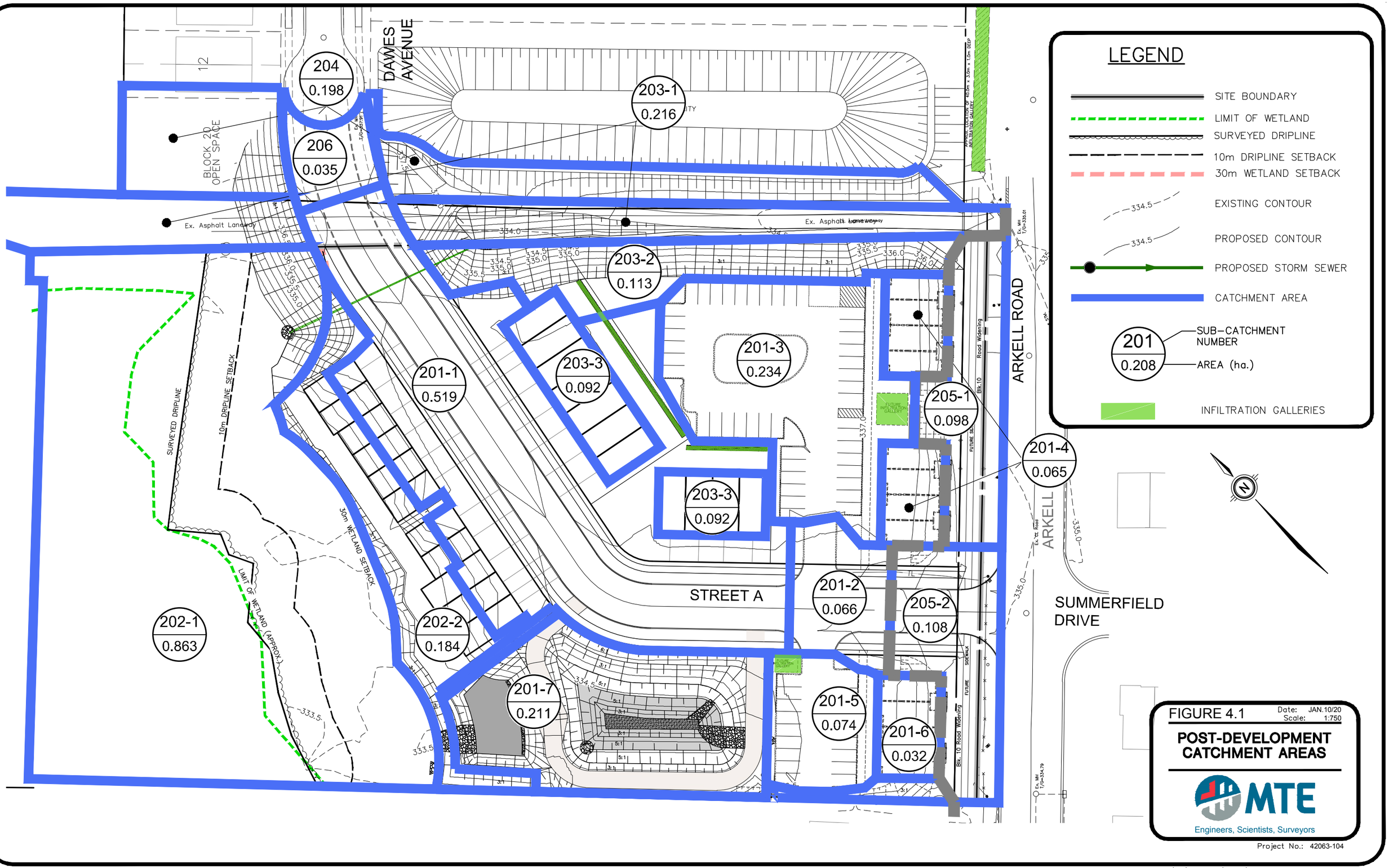

FIGURE 4.1 — POST-DEVELOPMENT CATCHMENT AREAS

Date: JAN.10/20
Scale: 1:750

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Engineers, Scientists, Surveyors

Project No.: 42063-104

November 15, 2021 — 12:44 p.m. — Plotted By: acressman

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5.0 Stormwater Management Design

5.1 Hydrologic Modelling

As previously noted, a post-development hydrologic model was constructed, using the MIDUSS modelling software, to reflect the detailed drainage conditions proposed for the Subject Lands. This allows for the quantitative estimate of flows under the proposed development conditions. The proposed development conditions were modelled for the:

- Quality storm event (25mm depth, 4-hour Chicago distribution);
- 2, 5, 10, 25, 50, and 100-year return period rainfall events (3-hour Chicago distribution derived from the City's Intensity-Duration-Frequency (IDF) parameters); and
- Regional storm event (285mm depth, 48-hour Hurricane Hazel).

The IDF parameters, hydrologic parameters, and MIDUSS model output files for each of the pre- and post-development catchment areas are provided in **Appendix B** and **Appendix C**, respectively.

5.2 Water Quality

The proposed SWM facility has been designed as a wet pond with a permanent pool of 1.2m, followed by an infiltration cell. A planting scheme will be prepared that carefully selects plant species and their location in and around the pond and swale to stabilize banks, mitigate temperature increases, deter waterfowl from nesting within the area, and provide aesthetics and safety benefits.

Since the majority of annual rainfall occurs in storms less than or equal to a 25mm event, the majority of water borne sediment is also transported to the SWM facility in these less intense events.[1] Therefore, the wet cell is designed as a forebay to target the smaller flows prior to discharging into the infiltration cell. An OGS unit is also proposed immediately upstream of the forebay to provide a 'treatment train' approach that will provide the required Enhanced (Level 1) quality treatment as required by the City of Guelph and Ministry of Environment, Conservation, and Parks.

The OGS unit is designed to treat runoff from minor events (i.e. events ≤ 25mm) before releasing flows to the SWM facility. Flows from events greater than the 25mm storm may by-pass the OGS unit. Per the City's standards, the proposed OGS (model EF8) unit has been verified by the Canadian Environmental Technology Verification Program and has been sized to provide at least 60% TSS removal. A detailed sizing report for the OGS unit is included in **Appendix D**.

The wetcell/forebay design is based on classic particle settling and flow dispersion equations, as presented in the MOE's 2003 *Stormwater Management Planning and Design Manual*. The methodology presented in that document suggests that the design flow for the forebay should be taken as the peak outflow from the facility. A forebay is typically designed to treat minor storm flows. As such, the design of the forebay should be based on the notion that the flow into the forebay equals the flow through the forebay, which equals the flow out of the forebay. In using this approach, the recommended settling velocity of 0.0003 m/s (from MOE 2003) results in extremely large and unachievable forebay lengths. Therefore, the forebay is designed to satisfy the following four conditions:

[1] From MOE-1994, Figure C.1: 62% less than 5mm, 78% less than 10mm, 90% less than 15mm, 95% less than 25mm

- A settling length based on a settling velocity of 0.0003 m/s using the main pond's peak discharge from the 25 mm storm event (as per MOE 2003);
- A settling length based on a settling velocity of 0.0055 m/s using the forebay inflow/outflow from the 25 mm storm event;
- A dispersion length such that, based on flow and depth of water, the velocity through the forebay is less than 0.5 m/s; and,
- That velocity, based on flow divided by cross-sectional area, is less than 0.15m/s to prevent scouring.

The 2003 MOE document suggests that the clean-out frequency for a SWM facility be based on the sediment loading within the entire pond, however, it is recommended that the clean-out frequency be based on the loading within the forebay only. While this typically results in more frequent clean-out, it is restricted to the forebay area only and eliminates disturbance of the main pond. The clean-out frequency for the proposed SWM Facility can be found in the forebay design calculations in **Appendix D**.

The total drainage area to the facility is 1.201ha at 64.7% imperviousness. According to Table 3.2 from MOE's 2003 stormwater management guidelines, the infiltration cell requires 32.4 m^3/ha infiltration storage; the water quality cell requires 212.6 m^3/ha of storage volume. As described in Section 3.1, 40 m^3/ha of which is extended detention and the remainder of which is permanent pool. As such, the required extended detention volume is 48.0 m^3, and a permanent pool volume of 207.3m^3. Please note that since the infiltration cell is closed for the winter, the attenuation within the main cell is designed for the full drainage area.

The drainage area towards the proposed SWM facility is considered small (< 8ha), so the minimum detention time required is 12 hours. As described in Section 4.6.2 of the MOE SWM manual, a minimum orifice size of 50mm is acceptable when the primary outlet is a perforated CSP riser. With a 50mm diameter orifice placed at permanent pool, a drawdown time of 23.0 hours is achieved.

The proposed SWM facility design characteristics are summarized in **Table 5.1**. Refer to **Appendix D** for the relevant design sheets and calculations (e.g. catchment parameters, imperviousness calculations, stage-storage discharge relationships, drawdown calculations, etc.). Refer to **Figure 5.1** to **Figure 5.3** for details of the proposed SWM facility.

Table 5.1 – Water Quality Control Details

General	Facility Characteristics
Stormwater Management Facility Type	Wet Pond/Infiltration Cell
Required MECP Water Quality Protection	Enhanced (Level 1)
Total Contributing Area	1.201ha
Imperviousness	64.7%
Bottom Elevation (Wet Cell)	333.20m
Storage	
Quantity and Erosion Control	
Drawdown Volume (based on 25mm-4hr event)	119m^3
Approximate Drawdown Time (based on 25mm-4hr event)	22.5 hours
Peak Release Rate (based on 25mm-4hr event)	0.003m^3/s
Outlet Controls	
1500mm diameter Perforated CSP Riser Manhole	
Orifice 1 Diameter	50mm Vertical
Orifice 1 Elevation	334.40m
Orifice 2 Diameter	200mm Vertical
Orifice 2 Elevation	334.70m
Overflow Weir (Bottom Length / Side Slope)	1.0m / 10:1
Overflow Weir Elevation	335.30m

LEGEND

- PROPERTY BOUNDARY
- 334.5 — FINISHED GRADE CONTOURS
- (336.00) x — PROPOSED SPOT ELEVATIONS
- MAJOR OVERLAND FLOW ROUTE
- MAINTENANCE ACCESS
- 300mm GABION MAT
- PROPOSED STORM SEWER
- 30m WETLAND SETBACK

20.6m–375mmø STM. @ 0.50%

DCMBH6

12.4m–450mmø STM. @ 0.50%

20.6m–375mmø STM. @ 0.50%

MH5

MH2

(336.63)

DCB6.1

2.0%

17.0m–525mmø STM. @ 0.50%

A

(336.78)

OGS8

FUTURE INFILTRATION GALLERY

(336.60)

STILLING BASIN AND DISCHARGE HEADER

(337.00)

(336.75)

(336.96)

(336.65)

(337.25)

6:1

(336.31)

3:1

(335.19)

(335.90)

OVERFLOW WEIR ELEV.=335.30

(335.00)

5:1

(334.20)

(335.10)

(335.60)

(334.40)

(333.80)

(333.20)

(335.30)

INFILTRATION CELL (30mm/hr)

WET CELL

HWL8.1

12.8m–525mmø STM. @ 0.50%

(336.50)

(336.00)

(335.70)

(335.60)

(334.80)

(333.48)EX.

(333.61)EX.

HW102.2

9.9m–300mmø STM. @ 1.00%

MH102

CSP RISER MH 101 (SEE FIGURE 5.3)

7.8m–250mmø STM. @ 0.50%

HW102.1

27.2m–300mmø STM. @ 1.40%

48m RETAINING WALL MAX HEIGHT 1.6m

300mm GABION MATS

(334.30)T/W

(335.70)T/W

(334.22)T/W

EX.(334.04)B/W

EX.(334.07)B/W

EX.(334.17)B/W

EX.(334.21)B/W

WINTER BYPPASS MH102 (SEE FIGURE 5.3)

FIGURE 5.1

Date: OCT.01/21

Scale: 1:250

190-216 ARKELL ROAD

SWM FACILITY PLAN

MTE

Engineers, Scientists, Surveyors

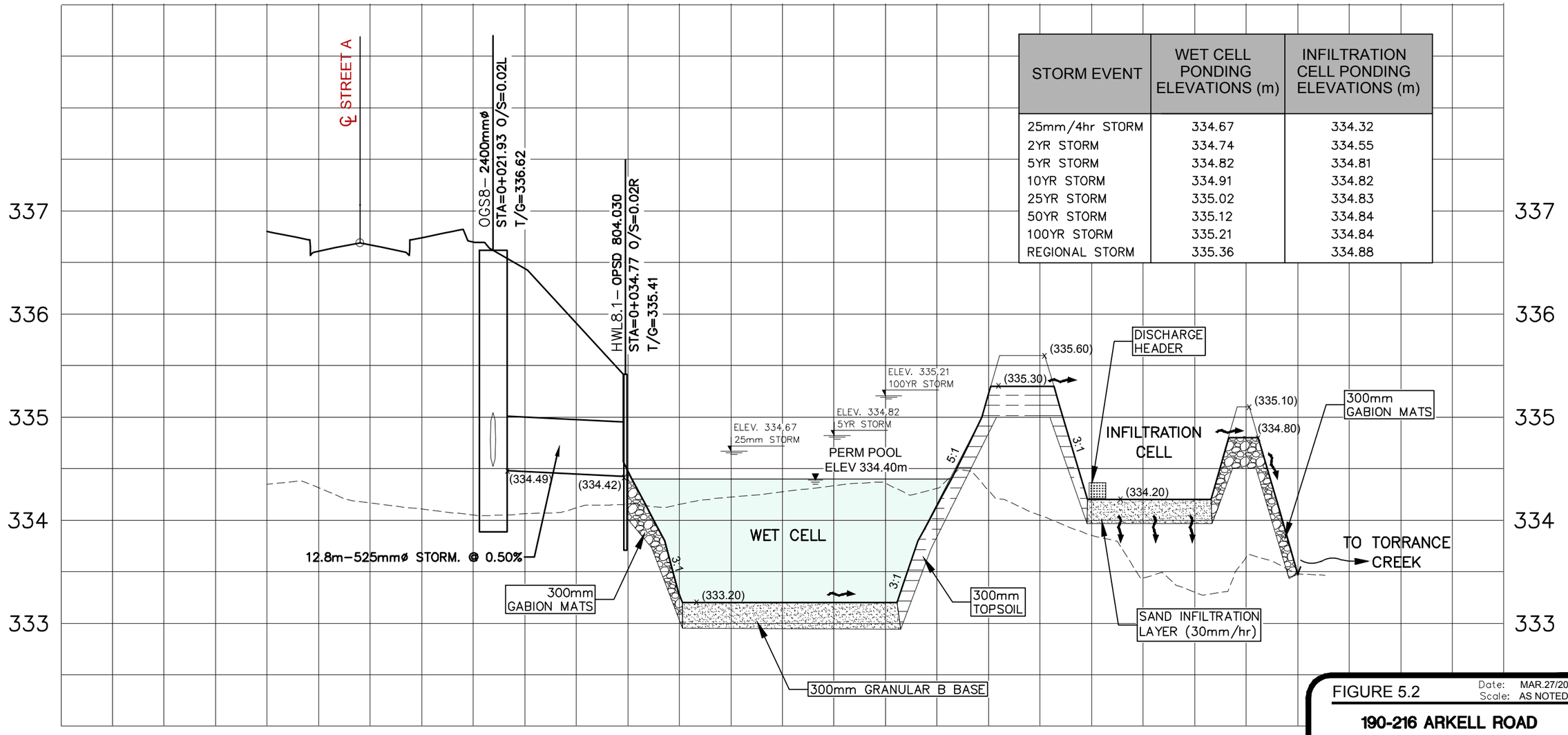
Project No.: 42063-104

SWM FACILITY - PLAN VIEW

SCALE 1:250

December 1, 2021 — 2:21 p.m. — Plotted By: acressman

P:\P\42063\104\42063-104-SWM4.dwg



STORM EVENT	WET CELL PONDING ELEVATIONS (m)	INFILTRATION CELL PONDING ELEVATIONS (m)
25mm/4hr STORM	334.67	334.32
2YR STORM	334.74	334.55
5YR STORM	334.82	334.81
10YR STORM	334.91	334.82
25YR STORM	335.02	334.83
50YR STORM	335.12	334.84
100YR STORM	335.21	334.84
REGIONAL STORM	335.36	334.88

STORM OUTLET PROFILE - SECTION A-A

SCALE H 1:400 V 1:40

FIGURE 5.2

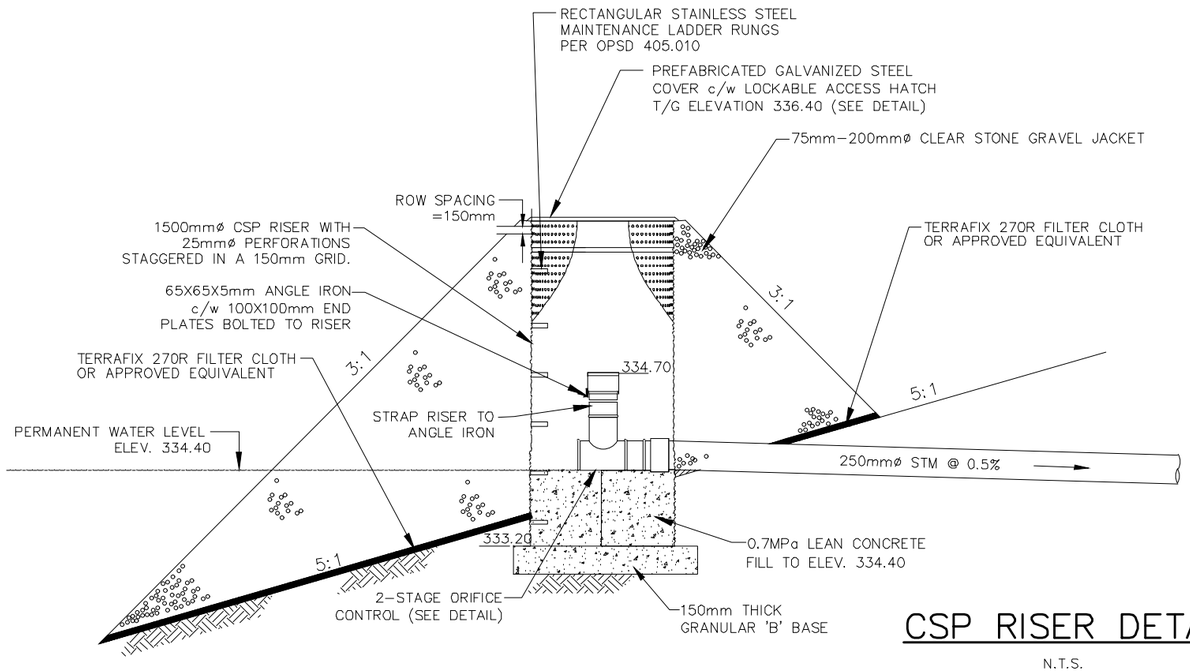
Date: MAR.27/20
Scale: AS NOTED

190-216 ARKELL ROAD

SWM FACILITY DETAILS 1

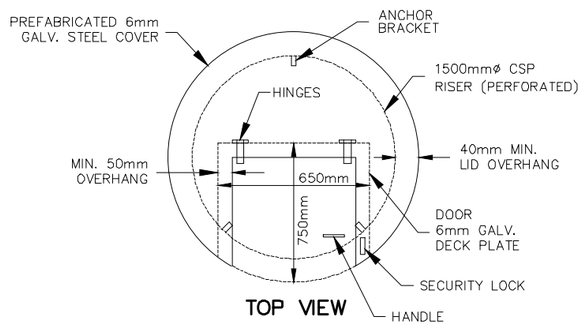
MTE
Engineers, Scientists, Surveyors

Project No.: 42063-104



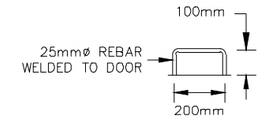
CSP RISER DETAIL

N.T.S.

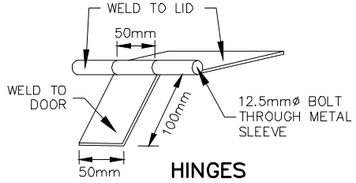


TOP VIEW

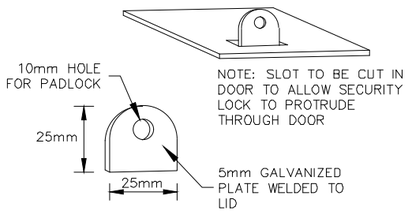
NOTE: CONTRACTOR SHALL SUPPLY A PAD LOCK ON THE STEEL COVER AND PROVIDE THE KEYS TO THE MUNICIPALITY AT THE TIME OF INSTALLATION



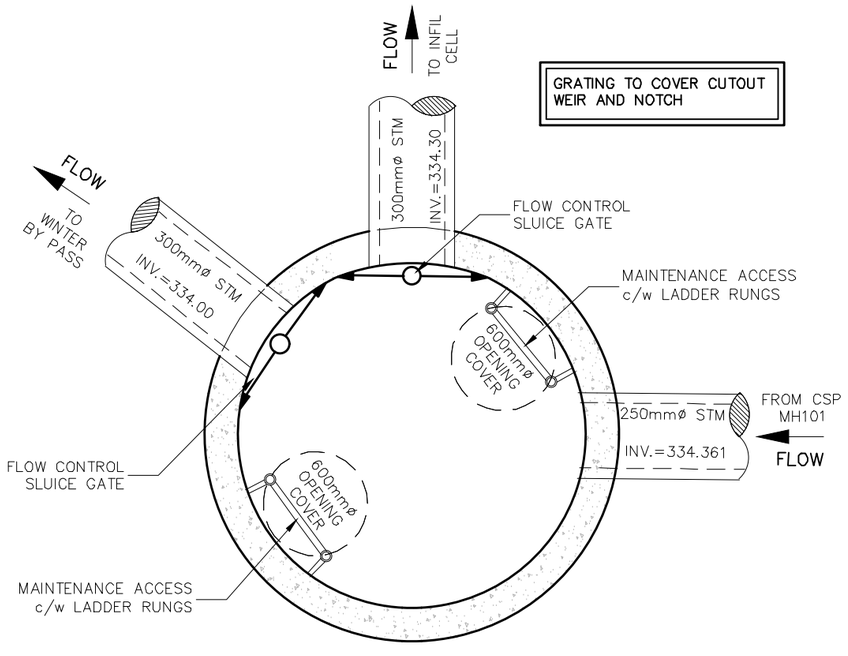
HANDLE



HINGES

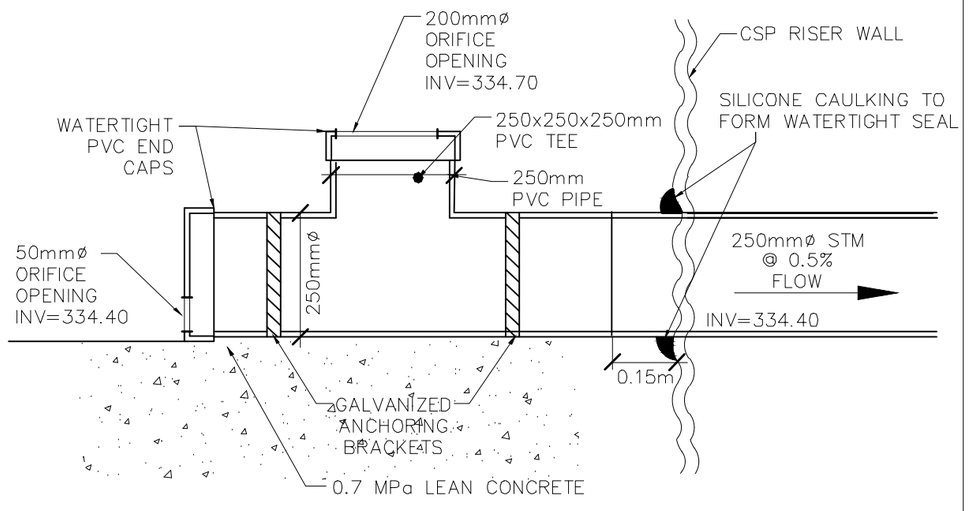


SECURITY LOCK



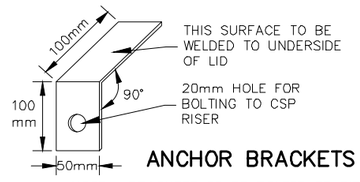
WINTER BYPASS MH102

N.T.S.



2-STAGE ORIFICE DETAIL FOR CSP RISER

N.T.S.



ANCHOR BRACKETS

NOTE : BRACKETS TO BE BOLTED TO RISER PIPE AND WELDED TO UNDERSIDE OF LID.

GALVANIZED STEEL COVER DETAIL FOR 1500mmø CSP RISER

N.T.S.

FIGURE 5.3 Date: MAR.27/20 Scale: N.T.S

190-216 ARKELL ROAD

SWM FACILITY DETAILS 3

MTE Engineers, Scientists, Surveyors

Project No.: 42063-104

5.3 Water Quantity

Flows for all storm events will be conveyed to the proposed SWM facility by a combination of storm sewers and overland flow routes (road right-of-way and SWM facility access road). The post-development MIDUSS modelling output is included in **Appendix C**.

Discharge from the facility will be controlled via a multi-staged outlet located in a 1500mm diameter perforated CSP riser manhole proposed within the wet pond cell. This structure will house a 450mm cap with multiple orifice controls attached to a 450mm diameter outlet pipe. As illustrated in **Figure 5.4**, the multi-staged outlet consists of a 450mm diameter cap/orifice plate with a 50mm diameter orifice at an elevation of 334.40m, and a 200mm diameter orifice at an elevation of 334.70m.

The infiltration cell downstream of the wet cell is sized to completely infiltrate the 25mm-4hr storm conveyed from the wet cell. Larger storms, up to and including the 100-year events, are infiltrated as much as possible up to an elevation of 334.80, where an overflow weir is provided. These flows are directed through the infiltration cell and ultimately to the Torrance Creek Wetland.

A summary of the preliminary stage-storage-discharge relationships of the proposed wet cell and infiltration cell is shown in **Table 5.2 and 5.3** below.

Table 5.2 – Wet Cell Stage-Storage-Discharge Summary

Elevation (m)	Discharge (m^3/s)	Volume (m3)	Remarks
334.40	0.0000	0	Permanent Pool Elevation / 50mm Orifice Invert
334.50	0.0015	40	Contour
334.60	0.0023	85	Contour
334.70	0.0029	135	200mm Orifice Invert
334.80	0.0311	189	Contour
334.90	0.0430	249	Contour
335.00	0.0522	314	Contour
335.10	0.0599	384	Contour
335.20	0.0668	457	Contour
335.30	0.0730	534	Emergency Overflow Weir
335.40	0.1628	614	Contour
335.50	0.4275	698	Contour
335.60	0.9140	786	Top of Pond

Table 5.3 – Infiltration Cell Stage-Storage-Discharge Summary

Elevation (m)	Discharge (m^3/s)	Volume (m3)	Remarks
334.20	0.00000	0	Bottom on Infiltration Cell
334.30	0.00191	18	Contour
334.40	0.00207	38	Contour
334.50	0.00225	60	Contour
334.60	0.00243	83	Contour
334.70	0.00261	109	Contour
334.80	0.00281	136	Overflow Weir
334.90	0.154	165	Contour
335.00	0.433	196	Contour
335.10	0.906	229	Contour

The above discharges include a constant infiltration rate of 30mm/hr across the surface area of the infiltration cell. A summary of the peak flows and associated maximum ponding elevations in the Wet Cell and Infiltration Cell under the post-development conditions is provided in **Table 5.4 and 5.5** below. As previously mentioned, enough volume has been provided to store the 100-year storm event to maximum elevation of 335.21m.

Table 5.4 – Summary of Peak Flows and Maximum Ponding Elevations in Wet Cell

Storm Event	Peak Outflow to INF Cell (m^3/s)	Maximum Ponding Volume (m^3)	Maximum Ponding Elevation (m)
25mm Storm Event	0.003	119	334.67
2-Year Storm Event	0.013	155	334.74
5-Year Storm Event	0.034	203	334.82
10-Year Storm Event	0.044	255	334.91
25-Year Storm Event	0.054	328	335.02
50-Year Storm Event	0.061	396	335.12
100-Year Storm Event	0.067	464	335.21
Regional Storm Event	0.130	585	335.36

Table 5.5 – Summary of Peak Flows and Maximum Ponding Elevations in Infiltration Cell

Storm Event	Peak Infiltration Rate (m^3/s)	Peak Outflow to Torrance (m^3/s)	Maximum Ponding Volume (m^3)	Maximum Ponding Elevation (m)
25mm Storm Event	0.002	-	26	334.34
2-Year Storm Event	0.002	-	71	334.55
5-Year Storm Event	0.003	**0.013**	138	334.81
10-Year Storm Event	0.003	**0.036**	142	334.82
25-Year Storm Event	0.003	**0.047**	145	334.83
50-Year Storm Event	0.003	**0.055**	147	334.84
100-Year Storm Event	0.003	**0.063**	148	334.84
Regional Storm Event	0.003	**0.126**	160	334.88

A summary of the peak flows for the pre- and post-development conditions is summarized in **Table 5.6**. The MIDUSS output for the quantity control can be found in **Appendix C**.

Table 5.6 – Pre and Post-Development Peak Runoff Rates (m^3/s)

Drainage Area	25mm	2-year	5-year	10-year	25-year	50-year	100-year	Regional
Pre-Development								
101	0.029	0.049	0.081	0.104	0.126	0.142	0.165	0.217
102	0.002	0.007	0.020	0.034	0.057	0.077	0.101	0.123
103	0.007	0.012	0.018	0.026	0.032	0.037	0.042	0.029
104	0.002	0.006	0.015	0.025	0.036	0.046	0.057	0.030
105	0.001	0.002	0.003	0.004	0.005	0.006	0.007	0.007
Total to Wetland	**0.038**	**0.069**	**0.122**	**0.166**	**0.213**	**0.252**	**0.302**	**0.392**
Post-Development								
SWMF Release (201-1 to 201-7)	-	-	0.013	0.036	0.047	0.055	0.063	0.126
202-1	0.002	0.007	0.020	0.034	0.057	0.077	0.101	0.123
202-2	0.007	0.011	0.016	0.021	0.029	0.037	0.046	0.026
203-1	0.009	0.014	0.019	0.024	0.029	0.033	0.038	0.031
203-2	0.001	0.003	0.007	0.012	0.017	0.022	0.027	0.015
203-3*	-	-	0.003	0.012	0.020	0.029	0.033	0.011
204	0.002	0.005	0.013	0.021	0.031	0.039	0.048	0.026
205-1	0.004	0.006	0.008	0.011	0.015	0.019	0.024	0.014
205-2	0.006	0.010	0.014	0.018	0.022	0.025	0.030	0.015
206	0.004	0.005	0.008	0.009	0.011	0.013	0.015	0.005
Total to Torrance	**0.027**	**0.046**	**0.083**	**0.119**	**0.184**	**0.237**	**0.292**	**0.362**

*Drainage Area 203-3 represent roof areas in Blocks 3 and 4 directed to infiltration galleries prior to overflow

**Note: The sums may not add up arithmetically. They are based on the timing and sum of hydrographs taken directly from MIDUSS.

In order to confirm adequate capacity within the existing receiving infrastructure on Arkell Road, Plan and Profile drawings were received by the City of Guelph. It was assumed that the receiving storm sewers were only receiving flow from within the right-of-way prior to the proposed development.

Under post-development conditions, approximately 0.22 ha is directed west towards the stone energy dissipators. At an approximate imperviousness of 68%, the first length of pipe (a 300mm sewer at 0.26%) is flowing at 93% capacity under the 5-year storm, falling within City standards.

Approximately 0.18 ha is directed towards the Arkell Road infiltration gallery. At an approximate imperviousness of 63%, the first length of pipe (a 300mm sewer at 0.61%) is flowing at 46% capacity under the 5-year storm, falling within City standards.

5.3.1 Culvert Underneath Street A

Prior to outletting to Torrance Creek, Drainage Area 203-2, and portions of Drainage Areas 203-1 and 204 are directed towards the future parklands block adjacent to the development. In order to provide a legal outlet to Torrance Creek and prevent ponding, a 450mm culvert underneath Street A is proposed. The culvert has been adequately sized to convey the Regional storm event. Under large storm events, overflow from the proposed infiltration galleries within residential blocks 3 and 4 will be directed towards this culvert.

5.4 Monthly Water Balance

A monthly water budget calculation has been conducted to assess potential hydrologic impacts the proposed development may have on the existing wetland. Refer to **Figures 2.2 & 4.1** for pre and post-development catchments used in the analyses.

Annual precipitation for the Subject Lands was estimated to be approximately 923.2mm/year, based on data gathered at the Guelph Arboretum weather station between 1971 and 2000. Evapotranspiration, runoff and infiltration/recharge rates for pre- and post-development conditions were estimated using the Thornthwaite and Mather method (1957).

5.4.1 Infiltration to Groundwater

Under pre-development conditions, infiltrated water contributes to the shallow groundwater table, which flows southwesterly towards the nearby Burke Well.

As previously mentioned, the TCSS divided the subwatershed into three stormwater management areas, with respect to groundwater recharge, and established specific infiltration targets for each area. The Subject Lands fall within Area 2 (Arkell Road to Torrance Creek); for which a minimum infiltration target of 150mm/year is required for any new development within this area.

Under pre-development conditions, the Subject Lands have a passive infiltration of 7,580m^3/year. Under post-development conditions, the development area has passive infiltration of 6,721m^3/year. Through the implementation of lot-level infiltration galleries (wherever possible) and an end-of-pipe infiltration cell operable during non-winter months, the total annual infiltration rate can be increased to 7,816m^3/year. This equates to an equivalent infiltration rate across the Subject Lands of 251.6 mm/year, exceeding the TCSS criteria and providing an annual 3% volume surplus over existing. Refer to the Water Balance Analysis in **Appendix E** for more details.

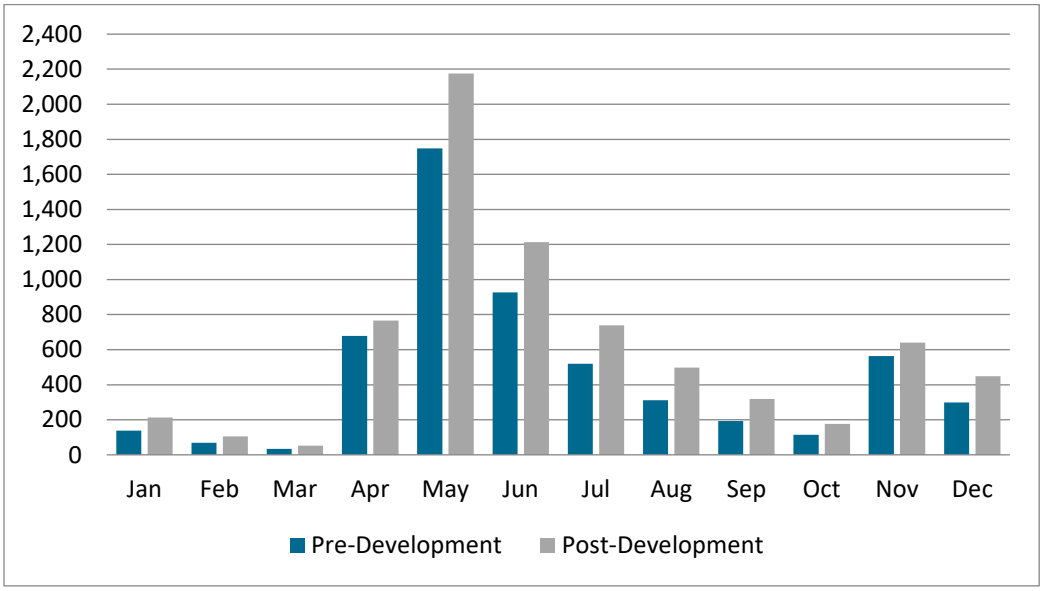
5.4.2 Surface Runoff to Wetland

Under pre-development conditions, the Subject Lands drain to the northwest and provide surface water inputs to the adjacent Torrance Creek wetland complex.

Under pre-development conditions, it was calculated that the Subject Lands (2.97ha) has imperviousness of approximately 11.5%. Approximately 5,595m^3/year of runoff is generated by the Subject Lands in the pre-development condition.

Under post-development conditions, the total Subject Lands that drain to the wetland is approximately 2.04ha. Catchments 205-1 & 205-2 (0.206ha) will drain to Arkell Road without control. The increased impervious areas under post-development conditions inevitably result in an increased annual runoff volume to the adjacent wetland. Approximately 7,347m^3/year of runoff is generated by the Subject Lands under post-development conditions, which equates to an annual surplus of 1,752m^3/year of surface runoff volume to the wetland complex. On a monthly basis, pre-development volumes are sustained and monthly distribution of excess runoff is well balanced as shown in **Figure 5.4**.

Figure 5.4 – Pre & Post-Development Monthly Runoff Volume to Wetland (m^3)



Under post-development conditions, the total Subject Lands that drain to the wetland is approximately 2.04ha. Catchments 205-1 & 205-2 (0.206ha) will drain to Arkell Road without control. The increased impervious areas under post-development conditions inevitably result in an increased annual runoff volume to the adjacent wetland. Approximately 7,347m^3/year of runoff is generated by the Subject Lands under post-development conditions, which equates to a surplus of 1,752m^3/year (31% increase) of surface runoff volume to the wetland complex. On a monthly basis, pre-development volumes are sustained and monthly distribution of excess runoff is well balanced as shown in **Figure 5.4**.

5.5 Erosion Assessment

The TCSS recommended that any newly proposed development throughout the watershed should implement a SWM solution that provides at least a 24-hour drawdown for the volume generated during the 25mm storm event; to ensure that threshold flow durations do not exceed pre-development levels. However, due to the small catchment size of the SWM facility, this drawdown time cannot be achieved. Using the smallest possible orifice size (50mm) per MECP standards, the proposed SWM facility has been designed to provide approximately 23-hour drawdown time on the 25mm storm event volume. A majority of the outflows from the wet cell are directed towards the infiltration cell prior to be discharged into Torrance Creek, so MTE does not believe this will cause any adverse effect to the downstream watercourse. The drawdown calculations are provided in **Appendix D.**

5.6 Landscape Design

A landscape design for the proposed SWM facility will be completed during the final design stage of the development. The reasons for landscaping these types of facilities are aesthetics, erosion protection and long term bank stability, temperature increase mitigation, deterring waterfowl from nesting along their banks, and to limit pedestrian access into the permanent pool components. To that end, the facility will be designed in accordance to the City's stormwater management policies and guidelines for aesthetics, landscaping, and safety of stormwater management facilities.

5.7 Temperature Mitigation

The TCSS requires that the monitored temperature of the creek not exceed 25^{o}C.

Detailed temperature mitigation calculations will be performed at the detailed design phase to determine if the current stormwater management design is satisfactory to achieve the required temperatures. If temperature monitoring of the Torrance Creek Wetland indicate that observed temperatures exceed 25^{o}C, additional temperature mitigation measures may be explored and implemented if required (ex. enhanced grass swales, cooling trenches, etc.).

6.0 Monitoring Program

A monitoring program will be implemented, which will serve to ensure that the stormwater management plan proposed within this report is implemented and performing at an acceptable level.

6.1 During Development Monitoring Program

This stage will begin at the commencement of area grading of the subdivision and will continue until 100% full buildout of the subdivision (i.e. road is urbanized, buildings are constructed, lots are sodded/landscaped, and open spaces are stabilized) of the subdivision. Monitoring of the SWM facility will include:

- Standard inspection of vegetation, structures, and general operation of hydraulic controls (observations of drawdown) within the SWM facility once installed. These inspections are to occur seasonally and typically after a significant rainfall event.
- Regular inspection and maintenance of erosion and sediment control measures around and within the SWM facility.

Standard inspection and maintenance of the SWM facility will be provided throughout the "During Development" period.

6.2 Post-Development Monitoring Program

This period of the monitoring will begin following 100% full buildout of the subdivision. The purpose of this stage of the monitoring is to ensure that the SWM facility continues to operate as designed. Monitoring during this stage will include:

- Standard inspection of vegetation, structures, and general operation of hydraulic controls (observations of drawdown) within the SWM facility. These inspections are to occur seasonally and typically after a significant rainfall event; until assumption of the facility by the City.

It is recommended that, following completion of the developer's portion of the post-development monitoring program and assumption of the SWM facility by the City, the City continues with a post-development inspection and maintenance program to ensure the long term effectiveness of the proposed SWM facility.

A monitoring program will be established within the SWM facility according to the requirements outlined within the *City of Guelph Stormwater Management Master Plan* prepared by AMEC Environment & Infrastructure (February 13, 2012).

7.0 Erosion and Sediment Control Measures

Precautions will be taken during construction to limit erosion and sedimentation. Erosion and Sediment Control Plans will be prepared and provided during the detailed design stage. The plans will illustrate the erosion and sediment control measures to be implemented during construction, which will limit impacts associated with site development.

Typically, the recommended construction sequence for erosion and sediment control measures are as follows:

- Placement of all sediment control fencing where required,
- Stripping and strategic placement of topsoil stockpiles. Placement of sediment control fencing around all stockpile areas.

- Construction of temporary sediment control ponds, which will serve as sedimentation basins for the site during construction.
- Construction of temporary swales to direct runoff to sedimentation basins, with rock check dams as required to control velocities.
- Re-vegetation of completed areas as soon as possible after construction, including those areas not slated for construction within 60 days.

Where rock check dams are proposed to promote sedimentation and reduce velocities, clean aggregate is to be placed perpendicular to the direction of flow in the swale, with a small volume of excavation on the upstream side to provide storage for accumulated sediment.

Sediment control fencing shall consist of filter fabric attached to page wire fencing and sealed at ground level. It will be installed at the perimeter of the work areas and intermittently on sloped areas where required. Sediment control fencing will be placed around all topsoil stockpiles.

Storage consistent with the GRCA's requirement of 125m^3/ha of live and dead storage respectively (total 250m^3/ha), will be provided. This storage will be provided to ensure that suspended material will have ample time to settle out. In addition, the sediment basin will be sized with sufficient capacity to allow flows to pass without breaching. Once the active construction and grading activities have been completed, the sedimentation basins can be cleaned out.

Access to topsoil or fill storage areas will be located on the upstream side of storage piles. This practice will ensure continuity of the sediment control fencing in the downslope direction; which is most vulnerable to erosion and sediment deposition. Further, topsoil and hydroseed will be placed on all exposed areas following the completion of grading activities.

It is recommended that during construction, monitoring and inspection of the erosion and sediment controls be conducted to ensure the satisfactory performance of these measures. Reporting of the inspection and monitoring results should be distributed to the City and GRCA. If it is found that the erosion and sediment control measures are not working adequately, they shall be augmented to the satisfaction of the City and the GRCA, based on field decisions.

8.0 Conclusions and Recommendations

Based on the foregoing analysis, it is concluded that:

- The stormwater management strategy herein outlined will provide the Subject Lands with appropriate levels of quality, quantity, and erosion controls to meet the criteria set out by the *Torrance Creek Subwatershed Study Management Strategy*, the City of Guelph, and the Grand River Conservation Authority;
- Enhanced quality control of stormwater runoff can be provided by the proposed stormwater management strategy; which includes: an OGS, a wet pond cell, and an infiltration cell;
- Quantity control targets for post-development peak flows rates to the adjacent wetland can be achieved in the proposed SWM facility for all storm events up to and including the Regional storm event;
- Infiltration targets defined within the TCSS can be satisfactorily met through the use of passive and active infiltration measures;
- Monthly surface water contributions to the wetland will be maintained or exceeded; and
- Post-development erosion will be mitigated by the use of extended detention of the 25mm storm event.

The findings of this report and the above conclusions lead to the following recommendations:

- Upon completion of detailed design, a quality/quantity control SWM facility be constructed to provide control of stormwater as described in Sections 4.0 and 5.0 of this report; and
- That sediment and erosion controls during construction will be implemented as described in Section 7.0 of this report.

All of which is respectfully submitted,

MTE Consultants Inc.

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Designer
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acressman@mte85.com

Valentina Lazic, P.Eng.
Design Engineer
519-743-6500 ext. 1233
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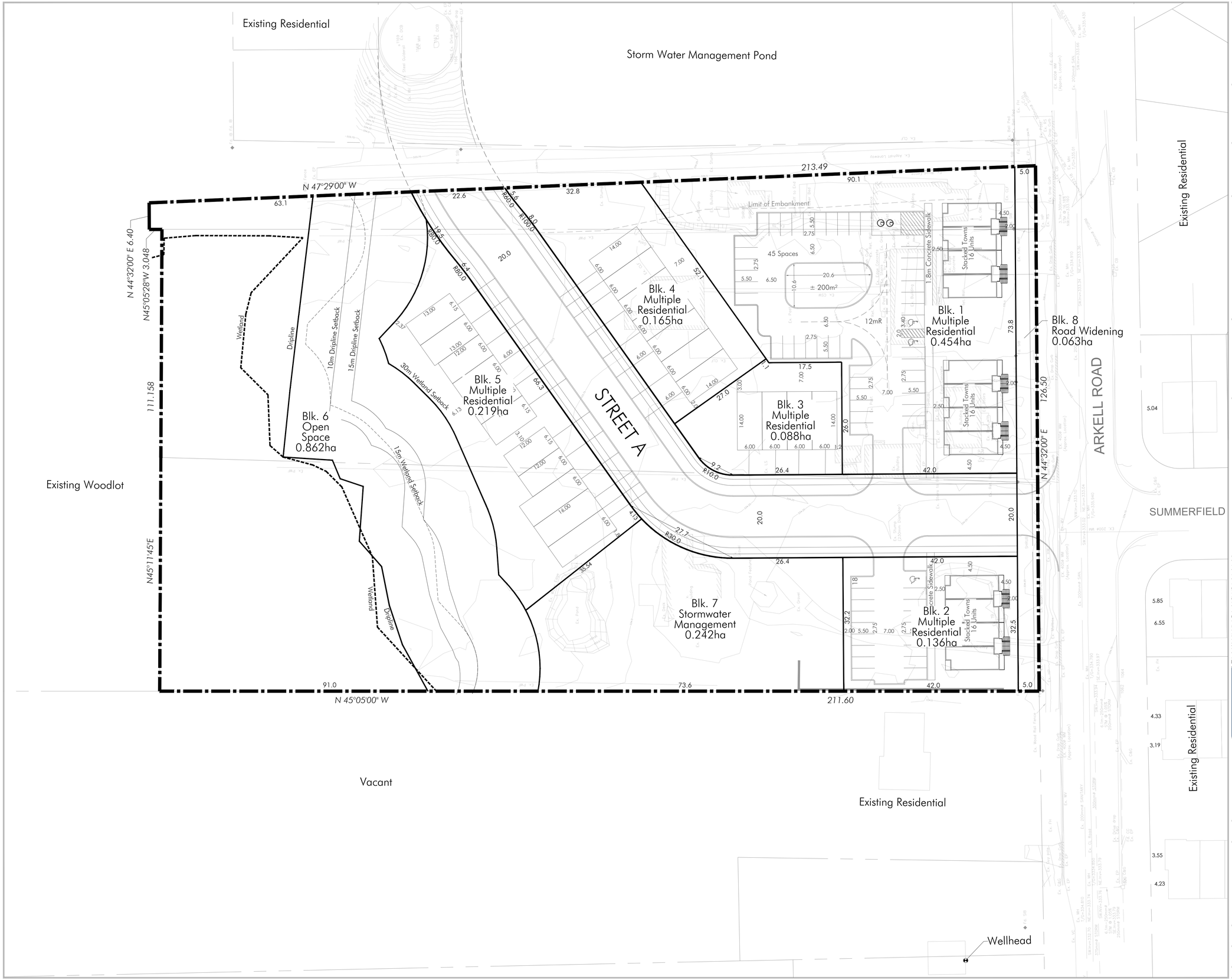
AJC:tmd
M:\42063\104\02 - Reports\MTE Reports\SWM\November 2021\42063-104_rpt_2021-12-03_Preliminary SWM Report.docx

Appendix A

Draft Plan of Subdivision (Reduced)



CONCEPT PLAN A

Legal Description

PART OF LOT 6, CONCESSION 8, GEOGRAPHICAL TOWNSHIP OF PUSLINCH.
CITY OF GUELPH

Owner's Certificate

I HEREBY AUTHORIZE MACNAUGHTON HERMSEN BRITTON CLARKSON PLANNING LIMITED TO SUBMIT THIS PLAN FOR APPROVAL.

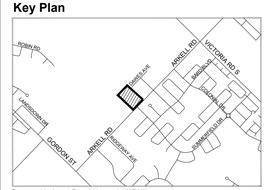
DATE:_____

Surveyor's Certificate

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

DATE:_____

Key Plan



Additional Information Required Under Section 51(17) of the Planning Act R.S.O. 1990, c.P.13 as Amended

A. AS SHOWN	B. AS SHOWN	C. AS SHOWN
D. MULTIPLE RESIDENTIAL, OPEN SPACE		
E. AS SHOWN	F. AS SHOWN	G. AS SHOWN
H. MUNICIPAL WATER SUPPLY	I. LOAM	J. AS SHOWN
K. ALL SERVICES AS REQUIRED	L. AS SHOWN	

Area Schedule **61T_____**

Description	Lots/Blocks	Units	Area (ha)
Multiple Residential	1-5	70	1.062
Open Space	6		0.862
Stormwater Management	7		0.242
Road Widening	8		0.063
Roads			0.348
Total	**8**	**70**	**2.577**

Notes
1. All dimensions are in metres unless otherwise shown
2. Dripline Limits - Natural Resource Solutions Inc. (NRSI) June, 2016
3. Wetland Limits - Natural Resource Solutions Inc. (NRSI) August, 2016
4. Property boundary is approximate, based on MTE Existing Conditions Plan and Wellington County Survey plans 61R-773, 61R-2819
5. Surrounding parcel boundaries are approximate/ taken from Vumap (First Base Solutions) aerial imagery
6. Unit yield based on Conceptual Site Plan prepared by MHBC Planning
7. Building footprints outside of subject lands gathered from City of Guelph open data

Revision No.	Date	Issued / Revision	By
12.	April 28, 2021	Adjust Stormwater, Residential Blocks;	G.C.
11.	January 28, 2021	Stacked Townhouse Orientation;	G.C.
10.	March 18, 2020	SWM revision;	G.C.
9.	January 6, 2020	Update/ Issued for Review;	G.C.
8.	December 11, 2019	Update/ Issued for Review;	G.C.
7.	October 9, 2019	Update/ Issued for Review;	G.C.
6.	July 8, 2019	Update/ Issued for Review;	G.C.
5.	December 6, 2018	Update/ Issued for Review;	G.C.
3.	September 12, 2018	Update/ Issued for Review;	G.C.
2.	July 4, 2017	Update/ Issued for Review;	G.C.
1.	March 13, 2017	Issued for Review;	G.C.

MHBC PLANNING URBAN DESIGN & LANDSCAPE ARCHITECTURE
200-540 BINGEMANS CENTRE DR. KITCHENER, ON. N2B 3X9 | P: 519.576.3650 F: 519.576.0121 | WWW.MHBCPLAN.COM

Approval Stamp

Date April 28, 2021

File No. 15246A

Plan Scale 1:400 (36x24)

Drawn By G.C.

Project Arkell Road - Guelph

Checked By D.A.

Applicant
Crescent Homes
151 Curzon Crescent
Guelph, ON. N1K OB3
P: 647.523.6487

Other

File Name CONCEPT PLAN

Dwg No. 1 of 1

Scale Bar
2.5 0 5 10 25m

K:\15246A-Crescent Homes-Arkell Road-Guelph\Concept\Concept A April 29 2021.dwg

Appendix B

Existing Conditions Catchment Parameters and MIDUSS Modelling

Arkell Road
STORMWATER MANAGEMENT
Guelph, Ontario

Project Number: 42063-104
Date: October 8, 2021
Design By: AJC
File: Q:\42063\104\SWM\September 2021\42063-104 Master SWM Facility Design Sheet.xlsx

HYDROLOGIC PARAMETERS
Pre-Development Conditions

Sub-Catchment Number	Area	Overland Slope	Overland Length	SCS Curve Number			Percent Impervious	Land Use	Comment
				Pervious (AMC II)	Pervious (AMC III)	Impervious			
	(ha)	*(%)*	*(m)*				*(%)*		
Within Subject Lands									
101	1.714	0.5	150	74	87	98	16%	Residential	Ex. Residential and Yards
102	0.863	0.5	50	74	87	98	0%	Wetland	Wetland/Forested Area/Torrance Creek
	2.577						10.6%		
Outside of Subject Lands									
103	0.240	0.8	225	74	87	98	30%	Residential	Private laneway
104	0.234	20	8	74	87	98	0%	SWMF	Ex. SWMF + Embnakments
105	0.057	0.5	125	74	87	98	20%	Residential	Driveways + Ditch within Right-of-way
	0.531						15.7%		
Total	**3.108**						**11.5%**		

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"               Company                                            Microsoft"
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"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
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"            1   Chicago storm"
"      509.000   Coefficient A"
"        6.000   Constant B"
"        0.799   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity           71.966    mm/hr"
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"            5   25hyd   Hydrograph extension used in this file"
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"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Catchment 101"
"       16.000   % Impervious"
"        1.714   Total Area"
"      150.000   Flow length"
"        0.500   Overland Slope"
"        1.440   Pervious Area"
"      150.000   Pervious length"
"        0.500   Pervious slope"
"        0.274   Impervious Area"
"      150.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.098   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.806   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.029     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           1.440      0.274      1.714      hectare"
"             Time of concentration  174.896    10.539     74.717     minutes"
"             Time to Centroid       347.290    133.825    217.179    minutes"
"             Rainfall depth         25.028     25.028     25.028     mm"
"             Rainfall volume        360.34     68.64      428.97     c.m"
"             Rainfall losses        22.566     4.855      19.732     mm"
"             Runoff depth           2.462      20.172     5.295      mm"
"             Runoff volume          35.44      55.32      90.76      c.m"
"             Runoff coefficient     0.098      0.806      0.212      "
"             Maximum flow           0.002      0.029      0.029      c.m/sec"
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"            6   Combine "
"          900   Node #"
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" 33          CATCHMENT 102"
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"            1   Equal length"
"            1   SCS method"
"          102   Catchment 102"
"        0.000   % Impervious"
"        0.863   Total Area"
"       50.000   Flow length"
"        0.500   Overland Slope"
"        0.863   Pervious Area"
"       50.000   Pervious length"
"        0.500   Pervious slope"
"        0.000   Impervious Area"
"       50.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.098   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                    0.002     0.000     0.029     0.029 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area "
"             Surface Area           0.863      0.000      0.863      hectare"
"             Time of concentration  90.470     5.452      90.469     minutes"
"             Time to Centroid       248.117    125.802    248.116    minutes"
"             Rainfall depth         25.028     25.028     25.028     mm"
"             Rainfall volume        215.99     0.00       215.99     c.m"
"             Rainfall losses        22.566     4.865      22.566     mm"
"             Runoff depth           2.461      20.162     2.461      mm"
"             Runoff volume          21.24      0.00       21.24      c.m"
"             Runoff coefficient     0.098      0.000      0.098      "
"             Maximum flow           0.002      0.000      0.002      c.m/sec"
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"            4   Add Runoff "
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"              Hydrograph volume           112.003    c.m"
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"            2   Start - New Tributary"
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"                   0.002     0.000     0.002     0.029"
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"           1   Equal length"
"           1   SCS method"
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"      30.000   % Impervious"
"       0.240   Total Area"
"     225.000   Flow length"
"       0.800   Overland Slope"
"       0.168   Pervious Area"
"     225.000   Pervious length"
"       0.800   Pervious slope"
"       0.072   Impervious Area"
"     225.000   Impervious length"
"       0.800   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.807   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.007     0.000     0.002     0.029 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.168      0.072      0.240      hectare"
"             Time of concentration  193.730    11.674     51.980     minutes"
"             Time to Centroid       369.414    135.621    187.381    minutes"
"             Rainfall depth         25.028     25.028     25.028     mm"
"             Rainfall volume        42.05      18.02      60.07      c.m"
"             Rainfall losses        22.566     4.828      17.245     mm"
"             Runoff depth           2.462      20.200     7.783      mm"
"             Runoff volume          4.14       14.54      18.68      c.m"
"             Runoff coefficient     0.098      0.807      0.311      "
"             Maximum flow           0.000      0.007      0.007      c.m/sec"
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"           1   Equal length"
"           1   SCS method"
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"       0.000   % Impervious"
"       0.234   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.234   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       8.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.002     0.000     0.007     0.007 c.m/sec"
"             Catchment 104          Pervious   Impervious Total Area "
"             Surface Area           0.234      0.000      0.234      hectare"
"             Time of concentration  9.962      0.600      9.962      minutes"
"             Time to Centroid       153.643    118.857    153.642    minutes"
"             Rainfall depth         25.028     25.028     25.028     mm"
"             Rainfall volume        58.56      0.00       58.56      c.m"
"             Rainfall losses        22.580     6.253      22.580     mm"
"             Runoff depth           2.447      18.775     2.447      mm"
"             Runoff volume          5.73       0.00       5.73       c.m"
"             Runoff coefficient     0.098      0.000      0.098      "
"             Maximum flow           0.002      0.000      0.002      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
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"                   0.002     0.002     0.007     0.007"
" 40          HYDROGRAPH Copy to Outflow"
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"               External"
"             Maximum flow                  0.009    c.m/sec"
"             Hydrograph volume            24.406    c.m"
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" 33          CATCHMENT 105"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         105   Catchment 105 - Driveways + Ditch Within RoW"
"      20.000   % Impervious"
"       0.057   Total Area"
"     125.000   Flow length"
"       0.500   Overland Slope"
"       0.046   Pervious Area"
"     125.000   Pervious length"
"       0.500   Pervious slope"
"       0.011   Impervious Area"
"     125.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.804   Impervious Runoff coefficient"
```

```
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.001     0.000     0.002     0.009 c.m/sec"
"             Catchment 105          Pervious   Impervious Total Area "
"             Surface Area           0.046      0.011      0.057      hectare"
"             Time of concentration  156.772    9.447      57.847     minutes"
"             Time to Centroid       326.000    132.108    195.806    minutes"
"             Rainfall depth         25.028     25.028     25.028     mm"
"             Rainfall volume        11.41      2.85       14.27      c.m"
"             Rainfall losses        22.566     4.903      19.034     mm"
"             Runoff depth           2.461      20.125     5.994      mm"
"             Runoff volume          1.12       2.29       3.42       c.m"
"             Runoff coefficient     0.098      0.804      0.239      "
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"                   External"
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"                   External"
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" 40          HYDROGRAPH Copy to Outflow"
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"                     0.001     0.010     0.010     0.000"
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"               6   Combine "
"             900   Node #"
"                   Torrence Creek"
"             Maximum flow                  0.038    c.m/sec"
"             Hydrograph volume           139.825    c.m"
"                     0.001     0.010     0.010     0.038"
" 40          HYDROGRAPH   Confluence    900"
"               7   Confluence "
"             900   Node #"
"                   Torrence Creek"
"             Maximum flow                  0.038    c.m/sec"
"             Hydrograph volume           139.825    c.m"
"                     0.001     0.038     0.010     0.000"
" 38          START/RE-START TOTALS 900"
"               3   Runoff Totals on EXIT"
"              Total Catchment area                    3.108    hectare"
"              Total Impervious area                   0.358    hectare"
"              Total % impervious                     11.507"
" 19          EXIT"
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"                Company                                           Microsoft"
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"         5.000   Time Step"
"       180.000   Max. Storm length"
"      1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"             1   Chicago storm"
"       743.000   Coefficient A"
"         6.000   Constant B"
"         0.799   Exponent C"
"         0.400   Fraction R"
"       180.000   Duration"
"         1.000   Time step multiplier"
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"             1   Equal length"
"             1   SCS method"
"           101   Catchment 101"
"        16.000   % Impervious"
"         1.714   Total Area"
"       150.000   Flow length"
"         0.500   Overland Slope"
"         1.440   Pervious Area"
"       150.000   Pervious length"
"         0.500   Pervious slope"
"         0.274   Impervious Area"
"       150.000   Impervious length"
"         0.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.163   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.852   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                   0.049     0.000     0.000     0.000 c.m/sec"
"              Catchment 101          Pervious   Impervious Total Area "
"              Surface Area           1.440      0.274      1.714      hectare"
"              Time of concentration  109.757    8.796      59.477     minutes"
"              Time to Centroid       235.201    101.169    168.451    minutes"
"              Rainfall depth         34.259     34.259     34.259     mm"
"              Rainfall volume        493.24     93.95      587.19     c.m"
"              Rainfall losses        28.657     5.085      24.886     mm"
"              Runoff depth           5.601      29.174     9.373      mm"
"              Runoff volume          80.64      80.01      160.65     c.m"
"              Runoff coefficient     0.163      0.852      0.274      "
"              Maximum flow           0.007      0.048      0.049      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                   0.049     0.049     0.000     0.000"
```

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" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.049     0.049     0.049     0.000"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                Torrence Creek"
"               Maximum flow                  0.049    c.m/sec"
"               Hydrograph volume           160.650    c.m"
"                    0.049     0.049     0.049     0.049"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.049     0.000     0.049     0.049"
" 33          CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          102   Catchment 102"
"        0.000   % Impervious"
"        0.863   Total Area"
"       50.000   Flow length"
"        0.500   Overland Slope"
"        0.863   Pervious Area"
"       50.000   Pervious length"
"        0.500   Pervious slope"
"        0.000   Impervious Area"
"       50.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.163   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                    0.007     0.000     0.049     0.049 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area "
"             Surface Area           0.863      0.000      0.863      hectare"
"             Time of concentration  56.775     4.550      56.775     minutes"
"             Time to Centroid       171.819    94.883     171.819    minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        295.65     0.00       295.65     c.m"
"             Rainfall losses        28.658     5.281      28.658     mm"
"             Runoff depth           5.600      28.978     5.600      mm"
"             Runoff volume          48.33      0.00       48.33      c.m"
"             Runoff coefficient     0.163      0.000      0.163      "
"             Maximum flow           0.007      0.000      0.007      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.007     0.007     0.049     0.049"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.007     0.007     0.007     0.049"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                Torrence Creek"
"               Maximum flow                  0.050    c.m/sec"
"               Hydrograph volume           208.979    c.m"
"                    0.007     0.007     0.007     0.050"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.007     0.000     0.007     0.050"
" 33          CATCHMENT 103"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          103   Catchment 103 - Laneway"
"       30.000   % Impervious"
"        0.240   Total Area"
"      225.000   Flow length"
"        0.800   Overland Slope"
"        0.168   Pervious Area"
"      225.000   Pervious length"
"        0.800   Pervious slope"
"        0.072   Impervious Area"
"      225.000   Impervious length"
"        0.800   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.164   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.849   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.012     0.000     0.007     0.050 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.168      0.072      0.240      hectare"
"             Time of concentration  121.577    9.744      44.428     minutes"
"             Time to Centroid       249.343    102.633    148.134    minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        57.55      24.67      82.22      c.m"
"             Rainfall losses        28.657     5.187      21.616     mm"
"             Runoff depth           5.601      29.072     12.643     mm"
"             Runoff volume          9.41       20.93      30.34      c.m"
"             Runoff coefficient     0.164      0.849      0.369      "
"             Maximum flow           0.001      0.012      0.012      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.012     0.012     0.007     0.050"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.012     0.012     0.012     0.050"
" 40          HYDROGRAPH   Combine    800"
"            6   Combine "
"          800   Node #"
"                External"
"               Maximum flow                  0.012    c.m/sec"
"               Hydrograph volume            30.342    c.m"
"                    0.012     0.012     0.012     0.012"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.012     0.000     0.012     0.012"
" 33          CATCHMENT 104"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          104   Catchment 104 - Ex. SWMF+Embankment"
"        0.000   % Impervious"
"        0.234   Total Area"
"        8.000   Flow length"
"       20.000   Overland Slope"
"        0.234   Pervious Area"
"        8.000   Pervious length"
```

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"       20.000   Pervious slope"
"        0.000   Impervious Area"
"        8.000   Impervious length"
"       20.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.162   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                  0.006     0.000     0.012     0.012 c.m/sec"
"             Catchment 104          Pervious   Impervious Total Area "
"             Surface Area           0.234      0.000      0.234      hectare"
"             Time of concentration  6.252      0.501      6.252      minutes"
"             Time to Centroid       111.541    89.345     111.541    minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        80.16      0.00       80.17      c.m"
"             Rainfall losses        28.719     7.755      28.719     mm"
"             Runoff depth           5.540      26.504     5.540      mm"
"             Runoff volume          12.96      0.00       12.96      c.m"
"             Runoff coefficient     0.162      0.000      0.162      "
"             Maximum flow           0.006      0.000      0.006      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.006     0.006     0.012     0.012"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.006     0.006     0.006     0.012"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                 0.017    c.m/sec"
"             Hydrograph volume           43.306    c.m"
"                  0.006     0.006     0.006     0.017"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.006     0.000     0.006     0.017"
" 33          CATCHMENT 105"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         105   Catchment 105 - Driveways + Ditch Within RoW"
"       20.000   % Impervious"
"        0.057   Total Area"
"      125.000   Flow length"
"        0.500   Overland Slope"
"        0.046   Pervious Area"
"      125.000   Pervious length"
"        0.500   Pervious slope"
"        0.011   Impervious Area"
"      125.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.164   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.852   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.002     0.000     0.006     0.017 c.m/sec"
"             Catchment 105          Pervious   Impervious Total Area "
"             Surface Area           0.046      0.011      0.057      hectare"
"             Time of concentration  98.384     7.885      47.187     minutes"
"             Time to Centroid       221.598    99.893     152.747    minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        15.62      3.91       19.53      c.m"
"             Rainfall losses        28.657     5.072      23.940     mm"
"             Runoff depth           5.601      29.187     10.318     mm"
"             Runoff volume          2.55       3.33       5.88       c.m"
"             Runoff coefficient     0.164      0.852      0.301      "
"             Maximum flow           0.000      0.002      0.002      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.002     0.002     0.006     0.017"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.002     0.002     0.002     0.017"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                 0.020    c.m/sec"
"             Hydrograph volume           49.187    c.m"
"                  0.002     0.002     0.002     0.020"
" 40          HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               External"
"             Maximum flow                 0.020    c.m/sec"
"             Hydrograph volume           49.187    c.m"
"                  0.002     0.020     0.002     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.002     0.020     0.020     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                 0.069    c.m/sec"
"             Hydrograph volume          258.166    c.m"
"                  0.002     0.020     0.020     0.069"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                 0.069    c.m/sec"
"             Hydrograph volume          258.166    c.m"
"                  0.002     0.069     0.020     0.000"
" 38          START/RE-START TOTALS 900"
"           3   Runoff Totals on EXIT"
"             Total Catchment area                   3.108    hectare"
"             Total Impervious area                  0.358    hectare"
"             Total % impervious                    11.507"
" 19          EXIT"
```

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"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                      Sunday, February 7, 2010"
"          10   Units used:                                        ie METRIC"
"               Job folder:           Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                       PRE"
"               Output filename:                                  5yrPRE.in"
"               Licensee name:                                            A"
"               Company                                           Microsoft"
"               Date & Time last used:              9/24/2021 at 2:05:29 PM"
" 31          TIME PARAMETERS"
"       5.000   Time Step"
"     180.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"    1593.000   Coefficient A"
"      11.000   Constant B"
"       0.879   Exponent C"
"       0.400   Fraction R"
"     180.000   Duration"
"       1.000   Time step multiplier"
"             Maximum intensity          139.250    mm/hr"
"             Total depth                 47.240    mm"
"           6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         101   Catchment 101"
"      16.000   % Impervious"
"       1.714   Total Area"
"     150.000   Flow length"
"       0.500   Overland Slope"
"       1.440   Pervious Area"
"     150.000   Pervious length"
"       0.500   Pervious slope"
"       0.274   Impervious Area"
"     150.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.244   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.887   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.081     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           1.440      0.274      1.714      hectare"
"             Time of concentration  78.588     7.885      49.638     minutes"
"             Time to Centroid       194.743    97.376     154.875    minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        680.14     129.55     809.69     c.m"
"             Rainfall losses        35.733     5.352      30.872     mm"
"             Runoff depth           11.507     41.888     16.368     mm"
"             Runoff volume          165.67     114.87     280.55     c.m"
"             Runoff coefficient     0.244      0.887      0.346      "
"             Maximum flow           0.020      0.079      0.081      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.081     0.081     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.081     0.081     0.081     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.081    c.m/sec"
"             Hydrograph volume           280.548    c.m"
"                   0.081     0.081     0.081     0.081"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.081     0.000     0.081     0.081"
" 33          CATCHMENT 102"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         102   Catchment 102"
"       0.000   % Impervious"
"       0.863   Total Area"
"      50.000   Flow length"
"       0.500   Overland Slope"
"       0.863   Pervious Area"
"      50.000   Pervious length"
"       0.500   Pervious slope"
"       0.000   Impervious Area"
"      50.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.243   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.020     0.000     0.081     0.081 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area "
"             Surface Area           0.863      0.000      0.863      hectare"
"             Time of concentration  40.652     4.079      40.652     minutes"
"             Time to Centroid       148.337    91.940     148.336    minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        407.68     0.00       407.68     c.m"
"             Rainfall losses        35.737     5.719      35.737     mm"
"             Runoff depth           11.503     41.521     11.503     mm"
"             Runoff volume          99.27      0.00       99.27      c.m"
"             Runoff coefficient     0.243      0.000      0.243      "
"             Maximum flow           0.020      0.000      0.020      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.020     0.020     0.081     0.081"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.020     0.020     0.020     0.081"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.084    c.m/sec"
"             Hydrograph volume           379.819    c.m"
"                   0.020     0.020     0.020     0.084"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
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"                   0.020     0.000     0.020     0.084"
" 33          CATCHMENT 103"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         103   Catchment 103 - Laneway"
"      30.000   % Impervious"
"       0.240   Total Area"
"     225.000   Flow length"
"       0.800   Overland Slope"
"       0.168   Pervious Area"
"     225.000   Pervious length"
"       0.800   Pervious slope"
"       0.072   Impervious Area"
"     225.000   Impervious length"
"       0.800   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.244   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.889   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.018     0.000     0.020     0.084 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.168      0.072      0.240      hectare"
"             Time of concentration  87.051     8.734      39.283     minutes"
"             Time to Centroid       205.095    98.522     140.093    minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        79.36      34.01      113.38     c.m"
"             Rainfall losses        35.732     5.255      26.589     mm"
"             Runoff depth           11.508     41.985     20.651     mm"
"             Runoff volume          19.33      30.23      49.56      c.m"
"             Runoff coefficient     0.244      0.889      0.437      "
"             Maximum flow           0.002      0.018      0.018      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.018     0.018     0.020     0.084"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.018     0.018     0.018     0.084"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                 0.018    c.m/sec"
"             Hydrograph volume           49.562    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 104"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         104   Catchment 104 - Ex. SWMF+Embankment"
"       0.000   % Impervious"
"       0.234   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.234   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       8.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.242   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.015     0.000     0.018     0.018 c.m/sec"
"             Catchment 104          Pervious   Impervious Total Area "
"             Surface Area           0.234      0.000      0.234      hectare"
"             Time of concentration  4.476      0.449      4.476      minutes"
"             Time to Centroid       104.105    87.097     104.105    minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        110.54     0.00       110.54     c.m"
"             Rainfall losses        35.825     9.778      35.825     mm"
"             Runoff depth           11.415     37.462     11.415     mm"
"             Runoff volume          26.71      0.00       26.71      c.m"
"             Runoff coefficient     0.242      0.000      0.242      "
"             Maximum flow           0.015      0.000      0.015      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.015     0.015     0.018     0.018"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.015     0.015     0.015     0.018"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                 0.034    c.m/sec"
"             Hydrograph volume           76.272    c.m"
"                   0.015     0.015     0.015     0.034"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.015     0.000     0.015     0.034"
" 33          CATCHMENT 105"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         105   Catchment 105 - Driveways + Ditch Within RoW"
"      20.000   % Impervious"
"       0.057   Total Area"
"     125.000   Flow length"
"       0.500   Overland Slope"
"       0.046   Pervious Area"
"     125.000   Pervious length"
"       0.500   Pervious slope"
"       0.011   Impervious Area"
"     125.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.244   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                  0.003     0.000     0.015     0.034 c.m/sec"
"             Catchment 105          Pervious   Impervious Total Area "
"             Surface Area           0.046      0.011      0.057      hectare"
"             Time of concentration  70.444     7.068      40.326     minutes"
"             Time to Centroid       184.778    96.234     142.700    minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        21.54      5.39       26.93      c.m"
"             Rainfall losses        35.732     5.553      29.696     mm"
"             Runoff depth           11.508     41.687     17.544     mm"
"             Runoff volume          5.25       4.75       10.00      c.m"
"             Runoff coefficient     0.244      0.882      0.371      "
"             Maximum flow           0.001      0.003      0.003      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.003     0.003     0.015     0.034"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.003     0.003     0.003     0.034"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                  0.037    c.m/sec"
"             Hydrograph volume            86.272    c.m"
"                  0.003     0.003     0.003     0.037"
" 40          HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               External"
"             Maximum flow                  0.037    c.m/sec"
"             Hydrograph volume            86.272    c.m"
"                  0.003     0.037     0.003     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.003     0.037     0.037     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.122    c.m/sec"
"             Hydrograph volume           466.091    c.m"
"                  0.003     0.037     0.037     0.122"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.122    c.m/sec"
"             Hydrograph volume           466.091    c.m"
"                  0.003     0.122     0.037     0.000"
" 38          START/RE-START TOTALS 900"
"           3   Runoff Totals on EXIT"
"             Total Catchment area                    3.108    hectare"
"             Total Impervious area                   0.358    hectare"
"             Total % impervious                     11.507"
" 19          EXIT"
```

```
"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                        Sunday, February 7, 2010"
"            10  Units used:                                        ie METRIC"
"                Job folder:          Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                        PRE"
"                Output filename:                                  10yrPRE.in"
"                Licensee name:                                             A"
"                Company                                           Microsoft"
"                Date & Time last used:              9/24/2021 at 2:06:02 PM"
" 31          TIME PARAMETERS"
"         5.000   Time Step"
"       180.000   Max. Storm length"
"      1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"             1   Chicago storm"
"      2221.000   Coefficient A"
"        12.000   Constant B"
"         0.908   Exponent C"
"         0.400   Fraction R"
"       180.000   Duration"
"         1.000   Time step multiplier"
"               Maximum intensity          169.551    mm/hr"
"               Total depth                 56.290    mm"
"             6   010hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           101   Catchment 101"
"        16.000   % Impervious"
"         1.714   Total Area"
"       150.000   Flow length"
"         0.500   Overland Slope"
"         1.440   Pervious Area"
"       150.000   Pervious length"
"         0.500   Pervious slope"
"         0.274   Impervious Area"
"       150.000   Impervious length"
"         0.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.292   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   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"
"                   0.104     0.000     0.000     0.000 c.m/sec"
"               Catchment 101          Pervious   Impervious Total Area "
"               Surface Area           1.440      0.274      1.714      hectare"
"               Time of concentration  65.907     7.253      44.199     minutes"
"               Time to Centroid       178.477    95.467     147.755    minutes"
"               Rainfall depth         56.290     56.290     56.290     mm"
"               Rainfall volume        810.44     154.37     964.81     c.m"
"               Rainfall losses        39.871     5.643      34.395     mm"
"               Runoff depth           16.419     50.647     21.896     mm"
"               Runoff volume          236.40     138.89     375.29     c.m"
"               Runoff coefficient     0.292      0.900      0.389      "
"               Maximum flow           0.035      0.100      0.104      c.m/sec"
" 40            HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                   0.104     0.104     0.000     0.000"
```

```
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.104     0.104     0.104     0.000"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                Torrence Creek"
"               Maximum flow                  0.104    c.m/sec"
"               Hydrograph volume           375.289    c.m"
"                    0.104     0.104     0.104     0.104"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.104     0.000     0.104     0.104"
" 33          CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          102   Catchment 102"
"        0.000   % Impervious"
"        0.863   Total Area"
"       50.000   Flow length"
"        0.500   Overland Slope"
"        0.863   Pervious Area"
"       50.000   Pervious length"
"        0.500   Pervious slope"
"        0.000   Impervious Area"
"       50.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.292   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                    0.034     0.000     0.104     0.104 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area "
"             Surface Area           0.863      0.000      0.863      hectare"
"             Time of concentration  34.093     3.752      34.093     minutes"
"             Time to Centroid       138.712    90.510     138.712    minutes"
"             Rainfall depth         56.290     56.290     56.290     mm"
"             Rainfall volume        485.78     0.00       485.78     c.m"
"             Rainfall losses        39.876     6.201      39.876     mm"
"             Runoff depth           16.415     50.089     16.415     mm"
"             Runoff volume          141.66     0.00       141.66     c.m"
"             Runoff coefficient     0.292      0.000      0.292      "
"             Maximum flow           0.034      0.000      0.034      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.034     0.034     0.104     0.104"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.034     0.034     0.034     0.104"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                Torrence Creek"
"               Maximum flow                  0.111    c.m/sec"
"               Hydrograph volume           516.947    c.m"
"                    0.034     0.034     0.034     0.111"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.034     0.000     0.034     0.111"
" 33          CATCHMENT 103"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          103   Catchment 103 - Laneway"
"       30.000   % Impervious"
"        0.240   Total Area"
"      225.000   Flow length"
"        0.800   Overland Slope"
"        0.168   Pervious Area"
"      225.000   Pervious length"
"        0.800   Pervious slope"
"        0.072   Impervious Area"
"      225.000   Impervious length"
"        0.800   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.292   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.904   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.026     0.000     0.034     0.111 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.168      0.072      0.240      hectare"
"             Time of concentration  73.005     8.034      35.946     minutes"
"             Time to Centroid       187.348    96.576     135.573    minutes"
"             Rainfall depth         56.290     56.290     56.290     mm"
"             Rainfall volume        94.57      40.53      135.10     c.m"
"             Rainfall losses        39.869     5.420      29.535     mm"
"             Runoff depth           16.421     50.870     26.755     mm"
"             Runoff volume          27.59      36.63      64.21      c.m"
"             Runoff coefficient     0.292      0.904      0.475      "
"             Maximum flow           0.004      0.026      0.026      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.026     0.026     0.034     0.111"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.026     0.026     0.026     0.111"
" 40          HYDROGRAPH   Combine    800"
"            6   Combine "
"          800   Node #"
"                External"
"               Maximum flow                  0.026    c.m/sec"
"               Hydrograph volume            64.213    c.m"
"                    0.026     0.026     0.026     0.026"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.026     0.000     0.026     0.026"
" 33          CATCHMENT 104"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          104   Catchment 104 - Ex. SWMF+Embankment"
"        0.000   % Impervious"
"        0.234   Total Area"
"        8.000   Flow length"
"       20.000   Overland Slope"
"        0.234   Pervious Area"
"        8.000   Pervious length"
```

```
"       20.000   Pervious slope"
"        0.000   Impervious Area"
"        8.000   Impervious length"
"       20.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.286   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                  0.025     0.000     0.026     0.026 c.m/sec"
"            Catchment 104          Pervious   Impervious Total Area "
"            Surface Area           0.234      0.000      0.234      hectare"
"            Time of concentration  3.754      0.413      3.754      minutes"
"            Time to Centroid       101.003    85.977     101.003    minutes"
"            Rainfall depth         56.290     56.290     56.290     mm"
"            Rainfall volume        131.72     0.00       131.72     c.m"
"            Rainfall losses        40.210     11.286     40.210     mm"
"            Runoff depth           16.080     45.004     16.080     mm"
"            Runoff volume          37.63      0.00       37.63      c.m"
"            Runoff coefficient     0.286      0.000      0.286      "
"            Maximum flow           0.025      0.000      0.025      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.025     0.025     0.026     0.026"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.025     0.025     0.025     0.026"
" 40         HYDROGRAPH   Combine    800"
"          6   Combine "
"        800   Node #"
"              External"
"            Maximum flow                 0.051    c.m/sec"
"            Hydrograph volume          101.840    c.m"
"                  0.025     0.025     0.025     0.051"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  0.025     0.000     0.025     0.051"
" 33         CATCHMENT 105"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        105   Catchment 105 - Driveways + Ditch Within RoW"
"       20.000   % Impervious"
"        0.057   Total Area"
"      125.000   Flow length"
"        0.500   Overland Slope"
"        0.046   Pervious Area"
"      125.000   Pervious length"
"        0.500   Pervious slope"
"        0.011   Impervious Area"
"      125.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.292   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.898   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.004     0.000     0.025     0.051 c.m/sec"
"            Catchment 105          Pervious   Impervious Total Area "
"            Surface Area           0.046      0.011      0.057      hectare"
"            Time of concentration  59.078     6.501      36.207     minutes"
"            Time to Centroid       169.938    94.384     137.072    minutes"
"            Rainfall depth         56.290     56.290     56.290     mm"
"            Rainfall volume        25.67      6.42       32.09      c.m"
"            Rainfall losses        39.871     5.725      33.042     mm"
"            Runoff depth           16.419     50.565     23.248     mm"
"            Runoff volume          7.49       5.76       13.25      c.m"
"            Runoff coefficient     0.292      0.898      0.413      "
"            Maximum flow           0.001      0.004      0.004      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.004     0.004     0.025     0.051"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.004     0.004     0.004     0.051"
" 40         HYDROGRAPH   Combine    800"
"          6   Combine "
"        800   Node #"
"              External"
"            Maximum flow                 0.055    c.m/sec"
"            Hydrograph volume          115.092    c.m"
"                  0.004     0.004     0.004     0.055"
" 40         HYDROGRAPH   Confluence    800"
"          7   Confluence "
"        800   Node #"
"              External"
"            Maximum flow                 0.055    c.m/sec"
"            Hydrograph volume          115.092    c.m"
"                  0.004     0.055     0.004     0.000"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.004     0.055     0.055     0.000"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              Torrence Creek"
"            Maximum flow                 0.166    c.m/sec"
"            Hydrograph volume          632.039    c.m"
"                  0.004     0.055     0.055     0.166"
" 40         HYDROGRAPH   Confluence    900"
"          7   Confluence "
"        900   Node #"
"              Torrence Creek"
"            Maximum flow                 0.166    c.m/sec"
"            Hydrograph volume          632.039    c.m"
"                  0.004     0.166     0.055     0.000"
" 38         START/RE-START TOTALS 900"
"          3   Runoff Totals on EXIT"
"            Total Catchment area                    3.108    hectare"
"            Total Impervious area                   0.358    hectare"
"            Total % impervious                     11.507"
" 19         EXIT"
```

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                      Sunday, February 7, 2010"
"          10   Units used:                                        ie METRIC"
"               Job folder:           Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                        PRE"
"               Output filename:                                 25yrPRE.in"
"               Licensee name:                                            A"
"               Company                                           Microsoft"
"               Date & Time last used:              9/24/2021 at 2:06:44 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      180.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     3158.000   Coefficient A"
"       15.000   Constant B"
"        0.936   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity          191.271    mm/hr"
"             Total depth                 68.087    mm"
"           6   025hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         101   Catchment 101"
"       16.000   % Impervious"
"        1.714   Total Area"
"      150.000   Flow length"
"        0.500   Overland Slope"
"        1.440   Pervious Area"
"      150.000   Pervious length"
"        0.500   Pervious slope"
"        0.274   Impervious Area"
"      150.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.346   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                    0.126     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           1.440      0.274      1.714      hectare"
"             Time of concentration  57.570     6.884      40.635     minutes"
"             Time to Centroid       166.282    94.277     142.223    minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        980.28     186.72     1167.00    c.m"
"             Rainfall losses        44.506     5.967      38.340     mm"
"             Runoff depth           23.580     62.119     29.746     mm"
"             Runoff volume          339.50     170.36     509.85     c.m"
"             Runoff coefficient     0.346      0.912      0.437      "
"             Maximum flow           0.056      0.119      0.126      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.126     0.126     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.126     0.126     0.126     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.126    c.m/sec"
"             Hydrograph volume           509.854    c.m"
"                    0.126     0.126     0.126     0.126"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.126     0.000     0.126     0.126"
" 33          CATCHMENT 102"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         102   Catchment 102"
"       0.000   % Impervious"
"       0.863   Total Area"
"      50.000   Flow length"
"       0.500   Overland Slope"
"       0.863   Pervious Area"
"      50.000   Pervious length"
"       0.500   Pervious slope"
"       0.000   Impervious Area"
"      50.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.346   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.057     0.000     0.126     0.126 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area "
"             Surface Area           0.863      0.000      0.863      hectare"
"             Time of concentration  29.780     3.561      29.780     minutes"
"             Time to Centroid       131.824    89.674     131.824    minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        587.59     0.00       587.59     c.m"
"             Rainfall losses        44.508     6.651      44.508     mm"
"             Runoff depth           23.579     61.435     23.579     mm"
"             Runoff volume          203.48     0.00       203.48     c.m"
"             Runoff coefficient     0.346      0.000      0.346      "
"             Maximum flow           0.057      0.000      0.057      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.057     0.057     0.126     0.126"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.057     0.057     0.057     0.126"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.140    c.m/sec"
"             Hydrograph volume           713.339    c.m"
"                    0.057     0.057     0.057     0.140"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
```

```
"                   0.057     0.000     0.057     0.140"
" 33          CATCHMENT 103"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         103   Catchment 103 - Laneway"
"      30.000   % Impervious"
"       0.240   Total Area"
"     225.000   Flow length"
"       0.800   Overland Slope"
"       0.168   Pervious Area"
"     225.000   Pervious length"
"       0.800   Pervious slope"
"       0.072   Impervious Area"
"     225.000   Impervious length"
"       0.800   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.346   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.917   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.032     0.000     0.057     0.140 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.168      0.072      0.240      hectare"
"             Time of concentration  63.770     7.625      33.932     minutes"
"             Time to Centroid       173.965    95.304     132.161    minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        114.39     49.02      163.41     c.m"
"             Rainfall losses        44.504     5.673      32.855     mm"
"             Runoff depth           23.582     62.414     35.232     mm"
"             Runoff volume          39.62      44.94      84.56      c.m"
"             Runoff coefficient     0.346      0.917      0.517      "
"             Maximum flow           0.006      0.031      0.032      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.032     0.032     0.057     0.140"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.032     0.032     0.032     0.140"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                 0.032    c.m/sec"
"             Hydrograph volume           84.556    c.m"
"                   0.032     0.032     0.032     0.032"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.032     0.000     0.032     0.032"
" 33          CATCHMENT 104"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         104   Catchment 104 - Ex. SWMF+Embankment"
"       0.000   % Impervious"
"       0.234   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.234   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       8.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.337   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.036     0.000     0.032     0.032 c.m/sec"
"             Catchment 104          Pervious   Impervious Total Area "
"             Surface Area           0.234      0.000      0.234      hectare"
"             Time of concentration  3.279      0.392      3.279      minutes"
"             Time to Centroid       99.107     85.405     99.107     minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        159.32     0.00       159.32     c.m"
"             Rainfall losses        45.109     13.152     45.109     mm"
"             Runoff depth           22.977     54.935     22.977     mm"
"             Runoff volume          53.77      0.00       53.77      c.m"
"             Runoff coefficient     0.337      0.000      0.337      "
"             Maximum flow           0.036      0.000      0.036      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.036     0.036     0.032     0.032"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.036     0.036     0.036     0.032"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                 0.068    c.m/sec"
"             Hydrograph volume          138.323    c.m"
"                   0.036     0.036     0.036     0.068"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.036     0.000     0.036     0.068"
" 33          CATCHMENT 105"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         105   Catchment 105 - Driveways + Ditch Within RoW"
"      20.000   % Impervious"
"       0.057   Total Area"
"     125.000   Flow length"
"       0.500   Overland Slope"
"       0.046   Pervious Area"
"     125.000   Pervious length"
"       0.500   Pervious slope"
"       0.011   Impervious Area"
"     125.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.346   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.916   Impervious Runoff coefficient"
```

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"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.005     0.000     0.036     0.068 c.m/sec"
"             Catchment 105          Pervious   Impervious Total Area "
"             Surface Area           0.046      0.011      0.057      hectare"
"             Time of concentration  51.604     6.171      33.519     minutes"
"             Time to Centroid       158.885    93.272     132.767    minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        31.05      7.76       38.81      c.m"
"             Rainfall losses        44.507     5.714      36.748     mm"
"             Runoff depth           23.579     62.373     31.338     mm"
"             Runoff volume          10.75      7.11       17.86      c.m"
"             Runoff coefficient     0.346      0.916      0.460      "
"             Maximum flow           0.002      0.005      0.005      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.005     0.005     0.036     0.068"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.005     0.005     0.005     0.068"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                  0.073    c.m/sec"
"             Hydrograph volume           156.187    c.m"
"                  0.005     0.005     0.005     0.073"
" 40          HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               External"
"             Maximum flow                  0.073    c.m/sec"
"             Hydrograph volume           156.187    c.m"
"                  0.005     0.073     0.005     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.005     0.073     0.073     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.213    c.m/sec"
"             Hydrograph volume           869.525    c.m"
"                  0.005     0.073     0.073     0.213"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.213    c.m/sec"
"             Hydrograph volume           869.525    c.m"
"                  0.005     0.213     0.073     0.000"
" 38          START/RE-START TOTALS 900"
"           3   Runoff Totals on EXIT"
"             Total Catchment area                    3.108    hectare"
"             Total Impervious area                   0.358    hectare"
"             Total % impervious                     11.507"
" 19          EXIT"
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"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                        Sunday, February 7, 2010"
"            10  Units used:                                        ie METRIC"
"                Job folder:          Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                        PRE"
"                Output filename:                                  50yrPRE.in"
"                Licensee name:                                             A"
"                Company                                           Microsoft"
"                Date & Time last used:              9/24/2021 at 2:07:27 PM"
" 31          TIME PARAMETERS"
"         5.000   Time Step"
"       180.000   Max. Storm length"
"      1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"             1   Chicago storm"
"      3886.000   Coefficient A"
"        16.000   Constant B"
"         0.950   Exponent C"
"         0.400   Fraction R"
"       180.000   Duration"
"         1.000   Time step multiplier"
"               Maximum intensity          215.474    mm/hr"
"               Total depth                 77.443    mm"
"             6   050hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"           101   Catchment 101"
"        16.000   % Impervious"
"         1.714   Total Area"
"       150.000   Flow length"
"         0.500   Overland Slope"
"         1.440   Pervious Area"
"       150.000   Pervious length"
"         0.500   Pervious slope"
"         0.274   Impervious Area"
"       150.000   Impervious length"
"         0.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.384   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.923   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                   0.142     0.000     0.000     0.000 c.m/sec"
"               Catchment 101          Pervious   Impervious Total Area "
"               Surface Area           1.440      0.274      1.714      hectare"
"               Time of concentration  52.113     6.550      37.809     minutes"
"               Time to Centroid       158.861    93.407     138.312    minutes"
"               Rainfall depth         77.443     77.443     77.443     mm"
"               Rainfall volume        1114.99    212.38     1327.37    c.m"
"               Rainfall losses        47.687     5.956      41.010     mm"
"               Runoff depth           29.756     71.486     36.433     mm"
"               Runoff volume          428.41     196.04     624.46     c.m"
"               Runoff coefficient     0.384      0.923      0.470      "
"               Maximum flow           0.079      0.131      0.142      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                   0.142     0.142     0.000     0.000"
```

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" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.142     0.142     0.142     0.000"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                Torrence Creek"
"              Maximum flow                  0.142    c.m/sec"
"              Hydrograph volume           624.456    c.m"
"                    0.142     0.142     0.142     0.142"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.142     0.000     0.142     0.142"
" 33          CATCHMENT 102"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          102   Catchment 102"
"        0.000   % Impervious"
"        0.863   Total Area"
"       50.000   Flow length"
"        0.500   Overland Slope"
"        0.863   Pervious Area"
"       50.000   Pervious length"
"        0.500   Pervious slope"
"        0.000   Impervious Area"
"       50.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.384   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                    0.077     0.000     0.142     0.142 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area "
"             Surface Area           0.863      0.000      0.863      hectare"
"             Time of concentration  26.957     3.388      26.957     minutes"
"             Time to Centroid       127.483    89.006     127.483    minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        668.33     0.00       668.33     c.m"
"             Rainfall losses        47.692     6.765      47.692     mm"
"             Runoff depth           29.750     70.677     29.750     mm"
"             Runoff volume          256.74     0.00       256.75     c.m"
"             Runoff coefficient     0.384      0.000      0.384      "
"             Maximum flow           0.077      0.000      0.077      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.077     0.077     0.142     0.142"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.077     0.077     0.077     0.142"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                Torrence Creek"
"              Maximum flow                  0.170    c.m/sec"
"              Hydrograph volume           881.201    c.m"
"                    0.077     0.077     0.077     0.170"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.077     0.000     0.077     0.170"
" 33          CATCHMENT 103"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          103   Catchment 103 - Laneway"
"       30.000   % Impervious"
"        0.240   Total Area"
"      225.000   Flow length"
"        0.800   Overland Slope"
"        0.168   Pervious Area"
"      225.000   Pervious length"
"        0.800   Pervious slope"
"        0.072   Impervious Area"
"      225.000   Impervious length"
"        0.800   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.384   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.924   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.037     0.000     0.077     0.170 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.168      0.072      0.240      hectare"
"             Time of concentration  57.725     7.255      32.116     minutes"
"             Time to Centroid       165.863    94.365     129.585    minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        130.10     55.76      185.86     c.m"
"             Rainfall losses        47.687     5.924      35.158     mm"
"             Runoff depth           29.756     71.519     42.285     mm"
"             Runoff volume          49.99      51.49      101.48     c.m"
"             Runoff coefficient     0.384      0.924      0.546      "
"             Maximum flow           0.008      0.036      0.037      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.037     0.037     0.077     0.170"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.037     0.037     0.037     0.170"
" 40          HYDROGRAPH   Combine    800"
"            6   Combine "
"          800   Node #"
"                External"
"              Maximum flow                  0.037    c.m/sec"
"              Hydrograph volume           101.483    c.m"
"                    0.037     0.037     0.037     0.037"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.037     0.000     0.037     0.037"
" 33          CATCHMENT 104"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          104   Catchment 104 - Ex. SWMF+Embankment"
"        0.000   % Impervious"
"        0.234   Total Area"
"        8.000   Flow length"
"       20.000   Overland Slope"
"        0.234   Pervious Area"
"        8.000   Pervious length"
```

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"       20.000   Pervious slope"
"        0.000   Impervious Area"
"        8.000   Impervious length"
"       20.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.376   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                  0.046     0.000     0.037     0.037 c.m/sec"
"            Catchment 104          Pervious   Impervious Total Area "
"            Surface Area           0.234      0.000      0.234      hectare"
"            Time of concentration  2.968      0.373      2.968      minutes"
"            Time to Centroid       97.626     84.920     97.626     minutes"
"            Rainfall depth         77.443     77.443     77.443     mm"
"            Rainfall volume        181.22     0.00       181.22     c.m"
"            Rainfall losses        48.309     14.568     48.309     mm"
"            Runoff depth           29.134     62.875     29.134     mm"
"            Runoff volume          68.17      0.00       68.17      c.m"
"            Runoff coefficient     0.376      0.000      0.376      "
"            Maximum flow           0.046      0.000      0.046      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.046     0.046     0.037     0.037"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.046     0.046     0.046     0.037"
" 40         HYDROGRAPH   Combine    800"
"          6   Combine "
"        800   Node #"
"              External"
"            Maximum flow                 0.083    c.m/sec"
"            Hydrograph volume          169.657    c.m"
"                  0.046     0.046     0.046     0.083"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  0.046     0.000     0.046     0.083"
" 33         CATCHMENT 105"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"        105   Catchment 105 - Driveways + Ditch Within RoW"
"       20.000   % Impervious"
"        0.057   Total Area"
"      125.000   Flow length"
"        0.500   Overland Slope"
"        0.046   Pervious Area"
"      125.000   Pervious length"
"        0.500   Pervious slope"
"        0.011   Impervious Area"
"      125.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.384   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.925   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.006     0.000     0.046     0.083 c.m/sec"
"            Catchment 105          Pervious   Impervious Total Area "
"            Surface Area           0.046      0.011      0.057      hectare"
"            Time of concentration  46.713     5.871      31.363     minutes"
"            Time to Centroid       152.126    92.469     129.704    minutes"
"            Rainfall depth         77.443     77.443     77.443     mm"
"            Rainfall volume        35.31      8.83       44.14      c.m"
"            Rainfall losses        47.689     5.779      39.307     mm"
"            Runoff depth           29.754     71.664     38.136     mm"
"            Runoff volume          13.57      8.17       21.74      c.m"
"            Runoff coefficient     0.384      0.925      0.492      "
"            Maximum flow           0.003      0.006      0.006      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.006     0.006     0.046     0.083"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.006     0.006     0.006     0.083"
" 40         HYDROGRAPH   Combine    800"
"          6   Combine "
"        800   Node #"
"              External"
"            Maximum flow                 0.089    c.m/sec"
"            Hydrograph volume          191.394    c.m"
"                  0.006     0.006     0.006     0.089"
" 40         HYDROGRAPH   Confluence    800"
"          7   Confluence "
"        800   Node #"
"              External"
"            Maximum flow                 0.089    c.m/sec"
"            Hydrograph volume          191.394    c.m"
"                  0.006     0.089     0.006     0.000"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.006     0.089     0.089     0.000"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              Torrence Creek"
"            Maximum flow                 0.252    c.m/sec"
"            Hydrograph volume         1072.595    c.m"
"                  0.006     0.089     0.089     0.252"
" 40         HYDROGRAPH   Confluence    900"
"          7   Confluence "
"        900   Node #"
"              Torrence Creek"
"            Maximum flow                 0.252    c.m/sec"
"            Hydrograph volume         1072.595    c.m"
"                  0.006     0.252     0.089     0.000"
" 38         START/RE-START TOTALS 900"
"          3   Runoff Totals on EXIT"
"            Total Catchment area                    3.108    hectare"
"            Total Impervious area                   0.358    hectare"
"            Total % impervious                     11.507"
" 19         EXIT"
```

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"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                        Sunday, February 7, 2010"
"          10   Units used:                                          ie METRIC"
"               Job folder:           Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                        PRE"
"               Output filename:                                  100yrPRE.in"
"               Licensee name:                                              A"
"               Company                                             Microsoft"
"               Date & Time last used:                9/24/2021 at 2:08:03 PM"
" 31          TIME PARAMETERS"
"       5.000   Time Step"
"     180.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"    4688.000   Coefficient A"
"      17.000   Constant B"
"       0.962   Exponent C"
"       0.400   Fraction R"
"     180.000   Duration"
"       1.000   Time step multiplier"
"             Maximum intensity           239.650    mm/hr"
"             Total depth                  87.263    mm"
"           6   100hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         101   Catchment 101"
"      16.000   % Impervious"
"       1.714   Total Area"
"     150.000   Flow length"
"       0.500   Overland Slope"
"       1.440   Pervious Area"
"     150.000   Pervious length"
"       0.500   Pervious slope"
"       0.274   Impervious Area"
"     150.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.419   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.932   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.165     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           1.440      0.274      1.714      hectare"
"             Time of concentration  47.820     6.267      35.467     minutes"
"             Time to Centroid       152.839    92.686     134.956    minutes"
"             Rainfall depth         87.263     87.263     87.263     mm"
"             Rainfall volume        1256.38    239.31     1495.70    c.m"
"             Rainfall losses        50.658     5.957      43.506     mm"
"             Runoff depth           36.606     81.307     43.758     mm"
"             Runoff volume          527.04     222.98     750.01     c.m"
"             Runoff coefficient     0.419      0.932      0.501      "
"             Maximum flow           0.104      0.148      0.165      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.165     0.165     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.165     0.165     0.165     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.165    c.m/sec"
"             Hydrograph volume           750.010    c.m"
"                   0.165     0.165     0.165     0.165"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.165     0.000     0.165     0.165"
" 33          CATCHMENT 102"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         102   Catchment 102"
"       0.000   % Impervious"
"       0.863   Total Area"
"      50.000   Flow length"
"       0.500   Overland Slope"
"       0.863   Pervious Area"
"      50.000   Pervious length"
"       0.500   Pervious slope"
"       0.000   Impervious Area"
"      50.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.419   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.101     0.000     0.165     0.165 c.m/sec"
"             Catchment 102          Pervious   Impervious Total Area "
"             Surface Area           0.863      0.000      0.863      hectare"
"             Time of concentration  24.737     3.242      24.736     minutes"
"             Time to Centroid       124.000    88.466     124.000    minutes"
"             Rainfall depth         87.263     87.263     87.263     mm"
"             Rainfall volume        753.08     0.00       753.08     c.m"
"             Rainfall losses        50.668     7.034      50.668     mm"
"             Runoff depth           36.595     80.229     36.595     mm"
"             Runoff volume          315.82     0.00       315.82     c.m"
"             Runoff coefficient     0.419      0.000      0.419      "
"             Maximum flow           0.101      0.000      0.101      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.101     0.101     0.165     0.165"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.101     0.101     0.101     0.165"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.211    c.m/sec"
"             Hydrograph volume          1065.829    c.m"
"                   0.101     0.101     0.101     0.211"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
```

```
"                   0.101     0.000     0.101     0.211"
" 33          CATCHMENT 103"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         103   Catchment 103 - Laneway"
"      30.000   % Impervious"
"       0.240   Total Area"
"     225.000   Flow length"
"       0.800   Overland Slope"
"       0.168   Pervious Area"
"     225.000   Pervious length"
"       0.800   Pervious slope"
"       0.072   Impervious Area"
"     225.000   Impervious length"
"       0.800   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.420   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.930   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.042     0.000     0.101     0.211 c.m/sec"
"             Catchment 103          Pervious   Impervious Total Area "
"             Surface Area           0.168      0.072      0.240      hectare"
"             Time of concentration  52.970     6.942      30.550     minutes"
"             Time to Centroid       159.276    93.571     127.271    minutes"
"             Rainfall depth         87.263     87.263     87.263     mm"
"             Rainfall volume        146.60     62.83      209.43     c.m"
"             Rainfall losses        50.650     6.128      37.293     mm"
"             Runoff depth           36.614     81.136     49.971     mm"
"             Runoff volume          61.51      58.42      119.93     c.m"
"             Runoff coefficient     0.420      0.930      0.573      "
"             Maximum flow           0.011      0.040      0.042      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.042     0.042     0.101     0.211"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.042     0.042     0.042     0.211"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                 0.042    c.m/sec"
"             Hydrograph volume          119.929    c.m"
"                   0.042     0.042     0.042     0.042"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.042     0.000     0.042     0.042"
" 33          CATCHMENT 104"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         104   Catchment 104 - Ex. SWMF+Embankment"
"       0.000   % Impervious"
"       0.234   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.234   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       8.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.411   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.057     0.000     0.042     0.042 c.m/sec"
"             Catchment 104          Pervious   Impervious Total Area "
"             Surface Area           0.234      0.000      0.234      hectare"
"             Time of concentration  2.724      0.357      2.724      minutes"
"             Time to Centroid       96.470     84.532     96.470     minutes"
"             Rainfall depth         87.263     87.263     87.263     mm"
"             Rainfall volume        204.20     0.00       204.20     c.m"
"             Rainfall losses        51.380     16.052     51.380     mm"
"             Runoff depth           35.883     71.212     35.883     mm"
"             Runoff volume          83.97      0.00       83.97      c.m"
"             Runoff coefficient     0.411      0.000      0.411      "
"             Maximum flow           0.057      0.000      0.057      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.057     0.057     0.042     0.042"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.057     0.057     0.057     0.042"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                 0.098    c.m/sec"
"             Hydrograph volume          203.896    c.m"
"                   0.057     0.057     0.057     0.098"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.057     0.000     0.057     0.098"
" 33          CATCHMENT 105"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         105   Catchment 105 - Driveways + Ditch Within RoW"
"      20.000   % Impervious"
"       0.057   Total Area"
"     125.000   Flow length"
"       0.500   Overland Slope"
"       0.046   Pervious Area"
"     125.000   Pervious length"
"       0.500   Pervious slope"
"       0.011   Impervious Area"
"     125.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.420   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.931   Impervious Runoff coefficient"
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"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.007     0.000     0.057     0.098 c.m/sec"
"             Catchment 105          Pervious   Impervious Total Area "
"             Surface Area           0.046      0.011      0.057      hectare"
"             Time of concentration  42.865     5.618      29.576     minutes"
"             Time to Centroid       146.645    91.757     127.062    minutes"
"             Rainfall depth         87.263     87.263     87.263     mm"
"             Rainfall volume        39.79      9.95       49.74      c.m"
"             Rainfall losses        50.653     6.034      41.729     mm"
"             Runoff depth           36.611     81.229     45.535     mm"
"             Runoff volume          16.69      9.26       25.95      c.m"
"             Runoff coefficient     0.420      0.931      0.522      "
"             Maximum flow           0.004      0.006      0.007      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.007     0.007     0.057     0.098"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.007     0.007     0.007     0.098"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                  0.105    c.m/sec"
"             Hydrograph volume           229.851    c.m"
"                  0.007     0.007     0.007     0.105"
" 40          HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               External"
"             Maximum flow                  0.105    c.m/sec"
"             Hydrograph volume           229.851    c.m"
"                  0.007     0.105     0.007     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.007     0.105     0.105     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.302    c.m/sec"
"             Hydrograph volume          1295.680    c.m"
"                  0.007     0.105     0.105     0.302"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                  0.302    c.m/sec"
"             Hydrograph volume          1295.680    c.m"
"                  0.007     0.302     0.105     0.000"
" 38          START/RE-START TOTALS 900"
"           3   Runoff Totals on EXIT"
"             Total Catchment area                    3.108    hectare"
"             Total Impervious area                   0.358    hectare"
"             Total % impervious                     11.507"
" 19          EXIT"
```

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"                MIDUSS Output ----------------------------------------------->"
"                MIDUSS version                          Version 2.25  rev. 473"
"                MIDUSS created                        Sunday, February 7, 2010"
"           10   Units used:                                        ie METRIC"
"                Job folder:          Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                          PRE"
"                Output filename:                                   RegPRE.in"
"                Licensee name:                                             A"
"                Company                                           Microsoft"
"                Date & Time last used:              9/29/2021 at 11:13:53 AM"
" 31          TIME PARAMETERS"
"         5.000   Time Step"
"      2880.000   Max. Storm length"
"      9000.000   Max. Hydrograph"
" 32          STORM Mass Curve"
"            3   Mass Curve"
"       285.000   Rainfall depth"
"      2880.000   Duration"
"           69   Q:\42063\104\SWM\September 2021\MIDUSS\POST\Hazel entire 48 hours.mrd   Hurricane
Hazel (entire 48 h)"
"             Maximum intensity            53.012    mm/hr"
"             Total depth                 285.000    mm"
"            8   99999hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 101"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          101   Catchment 101"
"       16.000   % Impervious"
"        1.714   Total Area"
"      150.000   Flow length"
"        0.500   Overland Slope"
"        1.440   Pervious Area"
"      150.000   Pervious length"
"        0.500   Pervious slope"
"        0.274   Impervious Area"
"      150.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.732   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.977   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.217     0.000     0.000     0.000 c.m/sec"
"             Catchment 101          Pervious   Impervious Total Area "
"             Surface Area           1.440      0.274      1.714      hectare"
"             Time of concentration  63.712     11.386     53.101     minutes"
"             Time to Centroid       2575.587   2281.703   2515.991   minutes"
"             Rainfall depth         285.000    285.000    285.000    mm"
"             Rainfall volume        4103.32    781.58     4884.90    c.m"
"             Rainfall losses        76.397     6.423      65.202     mm"
"             Runoff depth           208.603    278.577    219.798    mm"
"             Runoff volume          3003.38    763.97     3767.35    c.m"
"             Runoff coefficient     0.732      0.977      0.771      "
"             Maximum flow           0.188      0.042      0.217      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.217     0.217     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
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"                  0.217     0.217     0.217     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                 0.217    c.m/sec"
"             Hydrograph volume         3767.346    c.m"
"                  0.217     0.217     0.217     0.217"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.217     0.000     0.217     0.217"
" 33          CATCHMENT 102"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         102   Catchment 102"
"       0.000   % Impervious"
"       0.863   Total Area"
"      50.000   Flow length"
"       0.500   Overland Slope"
"       0.863   Pervious Area"
"      50.000   Pervious length"
"       0.500   Pervious slope"
"       0.000   Impervious Area"
"      50.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.732   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                  0.123     0.000     0.217     0.217 c.m/sec"
"            Catchment 102          Pervious   Impervious Total Area "
"            Surface Area           0.863      0.000      0.863      hectare"
"            Time of concentration  32.957     5.890      32.957     minutes"
"            Time to Centroid       2532.306   2271.773   2532.307   minutes"
"            Rainfall depth         285.000    285.000    285.000    mm"
"            Rainfall volume        2459.55    0.00       2459.55    c.m"
"            Rainfall losses        76.445     8.151      76.445     mm"
"            Runoff depth           208.555    276.849    208.555    mm"
"            Runoff volume          1799.83    0.00       1799.83    c.m"
"            Runoff coefficient     0.732      0.000      0.732      "
"            Maximum flow           0.123      0.000      0.123      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.123     0.123     0.217     0.217"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.123     0.123     0.123     0.217"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"             Maximum flow                 0.331    c.m/sec"
"             Hydrograph volume         5567.176    c.m"
"                  0.123     0.123     0.123     0.331"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.123     0.000     0.123     0.331"
" 33          CATCHMENT 103"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         103   Catchment 103 - Laneway"
"       30.000  % Impervious"
"        0.240  Total Area"
"      225.000  Flow length"
"        0.800  Overland Slope"
"        0.168  Pervious Area"
"      225.000  Pervious length"
"        0.800  Pervious slope"
"        0.072  Impervious Area"
"      225.000  Impervious length"
"        0.800  Impervious slope"
"        0.250  Pervious Manning 'n'"
"       74.000  Pervious SCS Curve No."
"        0.732  Pervious Runoff coefficient"
"        0.100  Pervious Ia/S coefficient"
"        8.924  Pervious Initial abstraction"
"        0.015  Impervious Manning 'n'"
"       98.000  Impervious SCS Curve No."
"        0.978  Impervious Runoff coefficient"
"        0.100  Impervious Ia/S coefficient"
"        0.518  Impervious Initial abstraction"
"                  0.029     0.000     0.123     0.331 c.m/sec"
"            Catchment 103          Pervious   Impervious Total Area "
"            Surface Area           0.168      0.072      0.240      hectare"
"            Time of concentration  70.573     12.612     49.473     minutes"
"            Time to Centroid       2585.268   2283.863   2475.546   minutes"
"            Rainfall depth         285.000    285.000    285.000    mm"
"            Rainfall volume        478.80     205.20     684.00     c.m"
"            Rainfall losses        76.375     6.354      55.369     mm"
"            Runoff depth           208.625    278.646    229.631    mm"
"            Runoff volume          350.49     200.62     551.12     c.m"
"            Runoff coefficient     0.732      0.978      0.806      "
"            Maximum flow           0.021      0.011      0.029      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.029     0.029     0.123     0.331"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.029     0.029     0.029     0.331"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"             Maximum flow                 0.029    c.m/sec"
"             Hydrograph volume          551.115    c.m"
"                  0.029     0.029     0.029     0.029"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.029     0.000     0.029     0.029"
" 33          CATCHMENT 104"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         104   Catchment 104 - Ex. SWMF+Embankment"
"       0.000   % Impervious"
"       0.234   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.234   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
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"        8.000   Impervious length"
"       20.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.712   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                  0.030     0.000     0.029     0.029 c.m/sec"
"            Catchment 104          Pervious   Impervious Total Area "
"            Surface Area           0.234      0.000      0.234      hectare"
"            Time of concentration  3.629      0.649      3.629      minutes"
"            Time to Centroid       2485.855   2238.670   2485.855   minutes"
"            Rainfall depth         285.000    285.000    285.000    mm"
"            Rainfall volume        666.90     0.00       666.90     c.m"
"            Rainfall losses        82.021     24.612     82.021     mm"
"            Runoff depth           202.979    260.388    202.979    mm"
"            Runoff volume          474.97     0.00       474.97     c.m"
"            Runoff coefficient     0.712      0.000      0.712      "
"            Maximum flow           0.030      0.000      0.030      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.030     0.030     0.029     0.029"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.030     0.030     0.030     0.029"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"            Maximum flow                 0.057    c.m/sec"
"            Hydrograph volume          1026.085    c.m"
"                  0.030     0.030     0.030     0.057"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.030     0.000     0.030     0.057"
" 33         CATCHMENT 105"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         105   Catchment 105 - Driveways + Ditch Within RoW"
"       20.000   % Impervious"
"        0.057   Total Area"
"      125.000   Flow length"
"        0.500   Overland Slope"
"        0.046   Pervious Area"
"      125.000   Pervious length"
"        0.500   Pervious slope"
"        0.011   Impervious Area"
"      125.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.732   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.977   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.007     0.000     0.030     0.057 c.m/sec"
"            Catchment 105          Pervious   Impervious Total Area "
"            Surface Area           0.046      0.011      0.057      hectare"
"            Time of concentration  57.110     10.206     45.374     minutes"
"            Time to Centroid       2566.321   2280.284   2494.753   minutes"
"            Rainfall depth         285.000    285.000    285.000    mm"
"            Rainfall volume        129.96     32.49      162.45     c.m"
"            Rainfall losses        76.391     6.548      62.422     mm"
"            Runoff depth           208.609    278.452    222.578    mm"
"            Runoff volume          95.13      31.74      126.87     c.m"
"            Runoff coefficient     0.732      0.977      0.781      "
"            Maximum flow           0.006      0.002      0.007      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.007     0.007     0.030     0.057"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.007     0.007     0.007     0.057"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               External"
"            Maximum flow                 0.065    c.m/sec"
"            Hydrograph volume          1152.954    c.m"
"                  0.007     0.007     0.007     0.065"
" 40         HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               External"
"            Maximum flow                 0.065    c.m/sec"
"            Hydrograph volume          1152.954    c.m"
"                  0.007     0.065     0.007     0.000"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.007     0.065     0.065     0.000"
" 40         HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               Torrence Creek"
"            Maximum flow                 0.392    c.m/sec"
"            Hydrograph volume          6720.128    c.m"
"                  0.007     0.065     0.065     0.392"
" 40         HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               Torrence Creek"
"            Maximum flow                 0.392    c.m/sec"
"            Hydrograph volume          6720.128    c.m"
"                  0.007     0.392     0.065     0.000"
" 38         START/RE-START TOTALS 900"
"           3   Runoff Totals on EXIT"
"            Total Catchment area                      3.108    hectare"
"            Total Impervious area                     0.358    hectare"
"            Total % impervious                       11.507"
" 19         EXIT"
```

Appendix C

Proposed Conditions Catchment Parameters and MIDUSS Modelling

Arkell Road
STORMWATER MANAGEMENT
Guelph, Ontario

Project Number: 42063-104
Date: October 8, 2021
Design By: AJC
File: Q:\42063\104\SWM\September 2021\42063-104 Master SWM Facility Design Sheet.xlsx

HYDROLOGIC PARAMETERS
Post-Development Conditions

Sub-Catchment Number	Area	Overland Slope	Overland Length	SCS Curve Number			Percent Impervious	Land Use	Comment
				Pervious (AMC II)	Pervious (AMC III)	Impervious			
	(ha)	*(%)*	*(m)*				*(%)*		
To SWMF									
201-1	0.519	0.75	60	74	87	98	60%	Residential/RoW	Street A, Front Yards, Driveways, Roofs to SWMF
201-2	0.066	0.5	15	74	87	98	70%	RoW	Minor to SWMF, Emergency to Arkell Rd
201-3	0.234	2.0	15	74	87	98	75%	Multi-Residential	Block 1 to SWMF
201-4	0.065	2.0	10	74	87	98	100%	Multi-Residential	Block 1 Roofs to Gallery
201-5	0.074	2.0	15	74	87	98	85%	Multi-Residential	Block 2 to SWMF
201-6	0.032	2.0	10	74	87	98	100%	Multi-Residential	Block 2 Roofs to Gallery
201-7	0.211	10	10	74	87	98	40%	SWMF	Proposed SWMF
	1.201						64.7%		
Directly to Torrance Creek									
202-1	0.863	0.5	50	74	87	98	0%	Wetland	Wetland/Forested Area/Torrance Creek
202-2	0.184	2.0	10	74	87	98	24%	Residential	Rear Yards/Roofs to Torrance Creek
	1.047						4.2%		
Directed to Future Parklands/Torrance									
203-1	0.216	2	130	74	87	98	30%	Park	Future Park Trail
203-2	0.113	33	10	74	87	98	0%	Residential	Embankments to Trail
203-3	0.092	2	10	74	87	98	100%	Residential	Roofs Areas to Galleries prior to Torrance
204	0.198	20	8	74	87	98	0%	SWMF	Ex. SWMF + Embankments
	0.619						25.3%		
To Arkell Road									
205-1	0.098	2	15	74	87	98	25%	Residential/RoW	Flows to Arkell Road Infil Gallery
205-2	0.108	5	25	74	87	98	40%	Residential/RoW	Flows to Arkell Road Stone Energy Dissipators
	0.206						32.9%		
To Adjacent Ex. SWMF									
206	0.035	1.25	20	74	87	98	70.0%	Residential/RoW	Dawes Avenue to adjacent SWMF
Total	**3.108**						**34.4%**		

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                  Sunday, February 7, 2010"
"          10   Units used:                                    ie METRIC"
"               Job folder:           Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                    POST"
"               Output filename:                          25mm4hrPOSTREV.in"
"               Licensee name:                                          A"
"               Company                                        Microsoft"
"               Date & Time last used:             10/5/2021 at 1:30:54 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      240.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"      509.000   Coefficient A"
"        6.000   Constant B"
"        0.799   Exponent C"
"        0.400   Fraction R"
"      240.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity           71.966    mm/hr"
"             Total depth                 25.028    mm"
"           6   025hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 2011"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2011   Catchment 201-1"
"       60.000   % Impervious"
"        0.519   Total Area"
"       60.000   Flow length"
"        0.750   Overland Slope"
"        0.208   Pervious Area"
"       60.000   Pervious length"
"        0.750   Pervious slope"
"        0.311   Impervious Area"
"       60.000   Impervious length"
"        0.750   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.098   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.806   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.042     0.000     0.000     0.000 c.m/sec"
"             Catchment 2011         Pervious   Impervious Total Area "
"             Surface Area           0.208      0.311      0.519      hectare"
"             Time of concentration  89.369     5.385      11.707     minutes"
"             Time to Centroid       246.824    125.697    134.814    minutes"
"             Rainfall depth         25.028     25.028     25.028     mm"
"             Rainfall volume        51.96      77.94      129.89     c.m"
"             Rainfall losses        22.566     4.867      11.947     mm"
"             Runoff depth           2.461      20.161     13.081     mm"
"             Runoff volume          5.11       62.78      67.89      c.m"
"             Runoff coefficient     0.098      0.806      0.523      "
"             Maximum flow           0.000      0.042      0.042      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.042     0.042     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.042     0.042     0.042     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                 0.042    c.m/sec"
"             Hydrograph volume           67.891    c.m"
"                    0.042     0.042     0.042     0.042"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.042     0.000     0.042     0.042"
" 33          CATCHMENT 2012"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2012   Catchment 201-2"
"       70.000   % Impervious"
"        0.066   Total Area"
"       15.000   Flow length"
"        0.500   Overland Slope"
"        0.020   Pervious Area"
"       15.000   Pervious length"
"        0.500   Pervious slope"
"        0.046   Impervious Area"
"       15.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.098   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.793   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.007     0.000     0.042     0.042 c.m/sec"
"             Catchment 2012         Pervious   Impervious Total Area "
"             Surface Area           0.020      0.046      0.066      hectare"
"             Time of concentration  43.932     2.647      4.729      minutes"
"             Time to Centroid       193.449    121.411    125.044    minutes"
"             Rainfall depth         25.028     25.028     25.028     mm"
"             Rainfall volume        4.96       11.56      16.52      c.m"
"             Rainfall losses        22.567     5.170      10.389     mm"
"             Runoff depth           2.461      19.858     14.639     mm"
"             Runoff volume          0.49       9.17       9.66       c.m"
"             Runoff coefficient     0.098      0.793      0.585      "
"             Maximum flow           0.000      0.007      0.007      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.007     0.007     0.042     0.042"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.007     0.007     0.007     0.042"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                 0.047    c.m/sec"
"             Hydrograph volume           77.552    c.m"
"                    0.007     0.007     0.007     0.047"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
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"                  0.007     0.000     0.007     0.047"
" 33          CATCHMENT 2013"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2013   Catchment 201-3"
"      75.000   % Impervious"
"       0.234   Total Area"
"      15.000   Flow length"
"       2.000   Overland Slope"
"       0.058   Pervious Area"
"      15.000   Pervious length"
"       2.000   Pervious slope"
"       0.176   Impervious Area"
"      15.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.797   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.026     0.000     0.007     0.047 c.m/sec"
"            Catchment 2013         Pervious   Impervious Total Area "
"            Surface Area           0.058      0.176      0.234      hectare"
"            Time of concentration  28.984     1.747      2.822      minutes"
"            Time to Centroid       175.889    119.783    121.998    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        14.64      43.92      58.56      c.m"
"            Rainfall losses        22.568     5.082      9.454      mm"
"            Runoff depth           2.460      19.946     15.574     mm"
"            Runoff volume          1.44       35.00      36.44      c.m"
"            Runoff coefficient     0.098      0.797      0.622      "
"            Maximum flow           0.000      0.026      0.026      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.026     0.026     0.007     0.047"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.026     0.026     0.026     0.047"
" 40         HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"            Maximum flow                 0.066    c.m/sec"
"            Hydrograph volume          113.995    c.m"
"                  0.026     0.026     0.026     0.066"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.026     0.000     0.026     0.066"
" 33          CATCHMENT 2014"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2014   Catchment 201-4"
"     100.000   % Impervious"
"       0.065   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.065   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.794   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.010     0.000     0.026     0.066 c.m/sec"
"            Catchment 2014         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.065      0.065      hectare"
"            Time of concentration  22.725     1.369      1.369      minutes"
"            Time to Centroid       168.546    119.217    119.217    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        0.00       16.27      16.27      c.m"
"            Rainfall losses        22.568     5.156      5.156      mm"
"            Runoff depth           2.459      19.872     19.872     mm"
"            Runoff volume          0.00       12.92      12.92      c.m"
"            Runoff coefficient     0.000      0.794      0.794      "
"            Maximum flow           0.000      0.010      0.010      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.010     0.010     0.026     0.066"
" 57          TRENCH Design d/s of 2014"
"       0.010   Peak inflow"
"      12.917   Hydrograph volume"
"     337.000   Ground elevation"
"     334.200   Downstream trench invert"
"       1.000   Trench height"
"     333.200   Water table elevation"
"       5.000   Trench top width"
"       5.000   Trench bottom width"
"      40.000   Voids ratio (%)"
"      30.000   Hydraulic conductivity"
"       0.000   Trench gradient (%)"
"      10.000   Trench length"
"       1.000   Include base width"
"         29.   Number of stages"
"                 Level Discharge    Volume"
"               334.200     0.000       0.0"
"               334.300     0.000       2.0"
"               334.400     0.000       4.0"
"               334.500     0.000       6.0"
"               334.600     0.000       8.0"
"               334.700     0.000      10.0"
"               334.800     0.000      12.0"
"               334.900     0.000      14.0"
"               335.000     0.000      16.0"
"               335.100     0.000      18.0"
"               335.200     0.000      20.0"
"               335.300     0.004      20.1"
"               335.400     0.006      20.2"
"               335.500     0.008      20.3"
"               335.600     0.010      20.5"
"               335.700     0.011      20.6"
"               335.800     0.013      20.7"
"               335.900     0.014      20.8"
"               336.000     0.015      20.9"
"               336.100     0.016      21.0"
```

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"               336.200     0.017      21.1"
"               336.300     0.018      21.2"
"               336.400     0.019      21.4"
"               336.500     0.020      21.5"
"               336.600     0.020      21.6"
"               336.700     0.021      21.7"
"               336.800     0.022      21.8"
"               336.900     0.023      21.9"
"               337.000     0.023      22.0"
"          1.   TRENCH PIPES"
"            Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                Invert    length     diam.    grade%     0=Yes  distance"
"               335.200    20.000     0.000     1.000     1.000     0.000"
"          1.   MANHOLE"
"               Access"
"              diameter"
"                 1.200"
"          1.   OUTFLOW PIPE"
"          0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                invert    invert    Length  Diameter       'n'   loss Ke"
"               335.200   335.000    20.000     0.100     0.013     0.500"
"            Peak outflow                  0.000    c.m/sec"
"            Outflow volume                0.002    c.m"
"            Peak exfiltration             0.001    c.m/sec"
"            Exfiltration volume          12.913    c.m"
"            Maximum level               334.633    metre"
"            Maximum storage               8.658    c.m"
"            Centroidal lag                4.967   hours"
"            Infiltration area 2 sides     8.658   sq.metre"
"            Infiltration Base area       50.000   sq.metre"
"                 0.010     0.010     0.000     0.001 c.m/sec"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              SWMF"
"            Maximum flow                  0.066    c.m/sec"
"            Hydrograph volume           113.998    c.m"
"                    0.010     0.010     0.000     0.066"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                    0.010     0.000     0.000     0.066"
" 33         CATCHMENT 2015"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2015   Catchment 201-5"
"       85.000   % Impervious"
"        0.074   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.011   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.063   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.098   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.797   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.009     0.000     0.000     0.066 c.m/sec"
"            Catchment 2015         Pervious   Impervious Total Area "
"            Surface Area           0.011      0.063      0.074      hectare"
"            Time of concentration  28.984     1.747      2.327      minutes"
"            Time to Centroid       175.889    119.783    120.977    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        2.78       15.74      18.52      c.m"
"            Rainfall losses        22.568     5.082      7.705      mm"
"            Runoff depth           2.460      19.946     17.323     mm"
"            Runoff volume          0.27       12.55      12.82      c.m"
"            Runoff coefficient     0.098      0.797      0.692      "
"            Maximum flow           0.000      0.009      0.009      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                    0.009     0.009     0.000     0.066"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                    0.009     0.009     0.009     0.066"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              SWMF"
"            Maximum flow                  0.075    c.m/sec"
"            Hydrograph volume           126.817    c.m"
"                    0.009     0.009     0.009     0.075"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                    0.009     0.000     0.009     0.075"
" 33         CATCHMENT 2016"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2016   Catchment 201-6"
"      100.000   % Impervious"
"        0.032   Total Area"
"       10.000   Flow length"
"        2.000   Overland Slope"
"        0.000   Pervious Area"
"       10.000   Pervious length"
"        2.000   Pervious slope"
"        0.032   Impervious Area"
"       10.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.794   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.005     0.000     0.009     0.075 c.m/sec"
"            Catchment 2016         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.032      0.032      hectare"
"            Time of concentration  22.725     1.369      1.369      minutes"
"            Time to Centroid       168.546    119.217    119.217    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        0.00       8.01       8.01       c.m"
"            Rainfall losses        22.568     5.156      5.156      mm"
"            Runoff depth           2.459      19.872     19.872     mm"
"            Runoff volume          0.00       6.36       6.36       c.m"
```

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"             Runoff coefficient     0.000      0.794      0.794      "
"             Maximum flow           0.000      0.005      0.005      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.005     0.005     0.009     0.075"
" 57          TRENCH Design d/s of 2016"
"         0.005   Peak inflow"
"         6.359   Hydrograph volume"
"       337.000   Ground elevation"
"       334.200   Downstream trench invert"
"         1.000   Trench height"
"       333.200   Water table elevation"
"         5.000   Trench top width"
"         5.000   Trench bottom width"
"        40.000   Voids ratio (%)"
"        30.000   Hydraulic conductivity"
"         0.000   Trench gradient (%)"
"         5.000   Trench length"
"         1.000   Include base width"
"           29.   Number of stages"
"                   Level Discharge    Volume"
"                 334.200     0.000       0.0"
"                 334.300     0.000       1.0"
"                 334.400     0.000       2.0"
"                 334.500     0.000       3.0"
"                 334.600     0.000       4.0"
"                 334.700     0.000       5.0"
"                 334.800     0.000       6.0"
"                 334.900     0.000       7.0"
"                 335.000     0.000       8.0"
"                 335.100     0.000       9.0"
"                 335.200     0.000      10.0"
"                 335.300     0.002      10.1"
"                 335.400     0.006      10.2"
"                 335.500     0.008      10.3"
"                 335.600     0.010      10.5"
"                 335.700     0.011      10.6"
"                 335.800     0.013      10.7"
"                 335.900     0.014      10.8"
"                 336.000     0.015      10.9"
"                 336.100     0.016      11.0"
"                 336.200     0.017      11.1"
"                 336.300     0.018      11.2"
"                 336.400     0.019      11.4"
"                 336.500     0.020      11.5"
"                 336.600     0.020      11.6"
"                 336.700     0.021      11.7"
"                 336.800     0.022      11.8"
"                 336.900     0.023      11.9"
"                 337.000     0.023      12.0"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"                 335.200   10.000     0.000     2.000     1.000     0.000"
"           1.   MANHOLE"
"                 Access"
"               diameter"
"                  1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"               Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                 invert    invert    Length  Diameter       'n'   loss Ke"
"                 335.200   335.000    10.000     0.100     0.013     0.500"
"             Peak outflow                 0.000    c.m/sec"
"             Outflow volume               0.002    c.m"
"             Peak exfiltration            0.000    c.m/sec"
"             Exfiltration volume          6.356    c.m"
"             Maximum level              334.625    metre"
"             Maximum storage              4.252    c.m"
"             Centroidal lag               4.929   hours"
"             Infiltration area 2 sides    4.252   sq.metre"
"             Infiltration Base area      25.000   sq.metre"
"                  0.005     0.005     0.000     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
"             Maximum flow                 0.075    c.m/sec"
"             Hydrograph volume          126.819    c.m"
"                    0.005     0.005     0.000     0.075"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.005     0.000     0.000     0.075"
" 33          CATCHMENT 2017"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2017   Catchment 201-7 - SWMF"
"        40.000   % Impervious"
"         0.211   Total Area"
"        10.000   Flow length"
"        10.000   Overland Slope"
"         0.127   Pervious Area"
"        10.000   Pervious length"
"        10.000   Pervious slope"
"         0.084   Impervious Area"
"        10.000   Impervious length"
"        10.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.098   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.772   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.013     0.000     0.000     0.075 c.m/sec"
"             Catchment 2017         Pervious   Impervious Total Area "
"             Surface Area           0.127      0.084      0.211      hectare"
"             Time of concentration  14.022     0.845      2.956      minutes"
"             Time to Centroid       158.323    118.369    124.770    minutes"
"             Rainfall depth         25.028     25.028     25.028     mm"
"             Rainfall volume        31.69      21.12      52.81      c.m"
"             Rainfall losses        22.570     5.703      15.823     mm"
"             Runoff depth           2.458      19.325     9.205      mm"
"             Runoff volume          3.11       16.31      19.42      c.m"
"             Runoff coefficient     0.098      0.772      0.368      "
"             Maximum flow           0.001      0.013      0.013      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.013     0.013     0.000     0.075"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.013     0.013     0.013     0.075"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
```

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"             Maximum flow                  0.088    c.m/sec"
"             Hydrograph volume           146.241    c.m"
"                    0.013     0.013     0.013     0.088"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.088    c.m/sec"
"             Hydrograph volume           146.241    c.m"
"                    0.013     0.088     0.013     0.000"
" 54          POND DESIGN"
"       0.088   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       146.2   Hydrograph volume    c.m"
"         13.   Number of stages"
"     334.400   Minimum water level    metre"
"     335.600   Maximum water level    metre"
"     334.400   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.400     0.000     0.000"
"               334.500   0.00150    40.000"
"               334.600   0.00230    85.000"
"               334.700   0.00290   135.000"
"               334.800   0.03110   189.000"
"               334.900   0.04300   249.000"
"               335.000   0.05220   314.000"
"               335.100   0.05990   384.000"
"               335.200   0.06680   457.000"
"               335.300   0.07300   534.000"
"               335.400    0.1628   614.000"
"               335.500    0.4275   698.000"
"               335.600    0.9140   786.000"
"             Peak outflow                  0.003    c.m/sec"
"             Maximum level               334.669    metre"
"             Maximum storage             119.302    c.m"
"             Centroidal lag               11.547   hours"
"                  0.013     0.088     0.003     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                    0.013     0.003     0.003     0.000"
" 54          POND DESIGN"
"       0.003   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       135.9   Hydrograph volume    c.m"
"         10.   Number of stages"
"     334.200   Minimum water level    metre"
"     335.100   Maximum water level    metre"
"     334.200   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.200     0.000     0.000"
"               334.300   0.00191    18.000"
"               334.400   0.00207    38.000"
"               334.500   0.00225    60.000"
"               334.600   0.00243    83.000"
"               334.700   0.00261   109.000"
"               334.800   0.00281   136.000"
"               334.900    0.1543   165.000"
"               335.000    0.4628   196.000"
"               335.100    0.9060   229.000"
"             Peak outflow                  0.002    c.m/sec"
"             Maximum level               334.339    metre"
"             Maximum storage              25.757    c.m"
"             Centroidal lag               13.146   hours"
"                  0.013     0.003     0.002     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.002    c.m/sec"
"             Hydrograph volume           130.201    c.m"
"                    0.013     0.003     0.002     0.002"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.013     0.000     0.002     0.002"
" 33          CATCHMENT 2021"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2021   Catchment 202-1"
"       0.000   % Impervious"
"       0.863   Total Area"
"      50.000   Flow length"
"       0.500   Overland Slope"
"       0.863   Pervious Area"
"      50.000   Pervious length"
"       0.500   Pervious slope"
"       0.000   Impervious Area"
"      50.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.002     0.000     0.002     0.002 c.m/sec"
"            Catchment 2021         Pervious   Impervious Total Area "
"            Surface Area           0.863      0.000      0.863      hectare"
"            Time of concentration  90.470     5.452      90.469     minutes"
"            Time to Centroid       248.117    125.802    248.116    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        215.99     0.00       215.99     c.m"
"            Rainfall losses        22.566     4.865      22.566     mm"
"            Runoff depth           2.461      20.162     2.461      mm"
"            Runoff volume          21.24      0.00       21.24      c.m"
"            Runoff coefficient     0.098      0.000      0.098      "
"            Maximum flow           0.002      0.000      0.002      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.002     0.002     0.002     0.002"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.002     0.002     0.002     0.002"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.003    c.m/sec"
"             Hydrograph volume           151.443    c.m"
"                    0.002     0.002     0.002     0.003"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.002     0.000     0.002     0.003"
" 33          CATCHMENT 2022"
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"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2022   Catchment 202-2"
"      24.000   % Impervious"
"       0.184   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.140   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.044   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.794   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.007     0.000     0.002     0.003 c.m/sec"
"            Catchment 2022         Pervious   Impervious Total Area "
"            Surface Area           0.140      0.044      0.184      hectare"
"            Time of concentration  22.725     1.369      7.382      minutes"
"            Time to Centroid       168.546    119.217    133.106    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        35.00      11.05      46.05      c.m"
"            Rainfall losses        22.568     5.156      18.389     mm"
"            Runoff depth           2.459      19.872     6.638      mm"
"            Runoff volume          3.44       8.78       12.21      c.m"
"            Runoff coefficient     0.098      0.794      0.265      "
"            Maximum flow           0.001      0.007      0.007      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.007     0.007     0.002     0.003"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.007     0.007     0.007     0.003"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                  0.007    c.m/sec"
"            Hydrograph volume           163.658    c.m"
"                   0.007     0.007     0.007     0.007"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.007     0.000     0.007     0.007"
" 33         CATCHMENT 2031"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2031   Catchment 203-1"
"      30.000   % Impervious"
"       0.216   Total Area"
"     130.000   Flow length"
"       2.000   Overland Slope"
"       0.151   Pervious Area"
"     130.000   Pervious length"
"       2.000   Pervious slope"
"       0.065   Impervious Area"
"     130.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.802   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.009     0.000     0.007     0.007 c.m/sec"
"            Catchment 2031         Pervious   Impervious Total Area "
"            Surface Area           0.151      0.065      0.216      hectare"
"            Time of concentration  105.894    6.381      28.521     minutes"
"            Time to Centroid       266.233    127.297    158.207    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        37.84      16.22      54.06      c.m"
"            Rainfall losses        22.566     4.956      17.283     mm"
"            Runoff depth           2.461      20.072     7.745      mm"
"            Runoff volume          3.72       13.01      16.73      c.m"
"            Runoff coefficient     0.098      0.802      0.309      "
"            Maximum flow           0.000      0.009      0.009      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.009     0.009     0.007     0.007"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.009     0.009     0.009     0.007"
" 40         HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"            Maximum flow                  0.009    c.m/sec"
"            Hydrograph volume            16.728    c.m"
"                   0.009     0.009     0.009     0.009"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.009     0.000     0.009     0.009"
" 33         CATCHMENT 2032"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2032   Catchment 203-2"
"       0.000   % Impervious"
"       0.113   Total Area"
"      10.000   Flow length"
"      33.000   Overland Slope"
"       0.113   Pervious Area"
"      10.000   Pervious length"
"      33.000   Pervious slope"
"       0.000   Impervious Area"
"      10.000   Impervious length"
"      33.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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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"                   0.001     0.000     0.009     0.009 c.m/sec"
"            Catchment 2032         Pervious   Impervious Total Area "
"            Surface Area           0.113      0.000      0.113      hectare"
"            Time of concentration  9.801      0.591      9.801      minutes"
"            Time to Centroid       153.463    118.873    153.462    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        28.28      0.00       28.28      c.m"
"            Rainfall losses        22.581     6.287      22.581     mm"
"            Runoff depth           2.446      18.741     2.446      mm"
"            Runoff volume          2.76       0.00       2.76       c.m"
"            Runoff coefficient     0.098      0.000      0.098      "
"            Maximum flow           0.001      0.000      0.001      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.001     0.001     0.009     0.009"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.001     0.001     0.001     0.009"
" 40         HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"            Maximum flow                  0.010    c.m/sec"
"            Hydrograph volume            19.493    c.m"
"                   0.001     0.001     0.001     0.010"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.001     0.000     0.001     0.010"
" 33         CATCHMENT 2033"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2033   Catchment 203-3"
"     100.000   % Impervious"
"       0.092   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.092   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.794   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.014     0.000     0.001     0.010 c.m/sec"
"            Catchment 2033         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.092      0.092      hectare"
"            Time of concentration  22.725     1.369      1.369      minutes"
"            Time to Centroid       168.546    119.217    119.217    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        0.00       23.03      23.03      c.m"
"            Rainfall losses        22.568     5.156      5.156      mm"
"            Runoff depth           2.459      19.872     19.872     mm"
"            Runoff volume          0.00       18.28      18.28      c.m"
"            Runoff coefficient     0.000      0.794      0.794      "
"            Maximum flow           0.000      0.014      0.014      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.014     0.014     0.001     0.010"
" 57         TRENCH Design d/s of 2033"
"         0.014   Peak inflow"
"        18.282   Hydrograph volume"
"       337.000   Ground elevation"
"       334.500   Downstream trench invert"
"         1.000   Trench height"
"       333.500   Water table elevation"
"         1.000   Trench top width"
"         1.000   Trench bottom width"
"        40.000   Voids ratio (%)"
"        30.000   Hydraulic conductivity"
"         0.000   Trench gradient (%)"
"        60.000   Trench length"
"         1.000   Include base width"
"           26.   Number of stages"
"                   Level Discharge    Volume"
"                 334.500     0.000       0.0"
"                 334.600     0.000       2.4"
"                 334.700     0.000       4.8"
"                 334.800     0.000       7.2"
"                 334.900     0.000       9.6"
"                 335.000     0.000      12.0"
"                 335.100     0.000      14.4"
"                 335.200     0.000      16.8"
"                 335.300     0.000      19.2"
"                 335.400     0.000      21.6"
"                 335.500     0.000      24.0"
"                 335.600     0.004      24.1"
"                 335.700     0.006      24.2"
"                 335.800     0.008      24.3"
"                 335.900     0.010      24.5"
"                 336.000     0.011      24.6"
"                 336.100     0.013      24.7"
"                 336.200     0.014      24.8"
"                 336.300     0.015      24.9"
"                 336.400     0.016      25.0"
"                 336.500     0.017      25.1"
"                 336.600     0.018      25.2"
"                 336.700     0.019      25.4"
"                 336.800     0.020      25.5"
"                 336.900     0.020      25.6"
"                 337.000     0.021      25.7"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"                335.500    20.000     0.000     1.000     1.000     0.000"
"           1.   MANHOLE"
"                 Access"
"               diameter"
"                   1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                 invert    invert    Length  Diameter       'n'   loss Ke"
"                335.500   335.300    20.000     0.100     0.013     0.500"
"             Peak outflow                  0.000    c.m/sec"
"             Outflow volume                0.002    c.m"
"             Peak exfiltration             0.001    c.m/sec"
"             Exfiltration volume          18.286    c.m"
"             Maximum level               334.975    metre"
"             Maximum storage              11.388    c.m"
"             Centroidal lag                4.361   hours"
```

```
"             Infiltration area 2 sides   56.942   sq.metre"
"             Infiltration Base area      60.000   sq.metre"
"                  0.014     0.014     0.000     0.001 c.m/sec"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.010    c.m/sec"
"             Hydrograph volume            19.495    c.m"
"                    0.014     0.014     0.000     0.010"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.014     0.000     0.000     0.010"
" 33          CATCHMENT 204"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         204   Catchment 204"
"       0.000   % Impervious"
"       0.198   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.198   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       8.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.002     0.000     0.000     0.010 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area "
"             Surface Area           0.198      0.000      0.198      hectare"
"             Time of concentration  9.962      0.600      9.962      minutes"
"             Time to Centroid       153.643    118.857    153.643    minutes"
"             Rainfall depth         25.028     25.028     25.028     mm"
"             Rainfall volume        49.55      0.00       49.55      c.m"
"             Rainfall losses        22.580     6.253      22.580     mm"
"             Runoff depth           2.447      18.775     2.447      mm"
"             Runoff volume          4.85       0.00       4.85       c.m"
"             Runoff coefficient     0.098      0.000      0.098      "
"             Maximum flow           0.002      0.000      0.002      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.002     0.002     0.000     0.010"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.002     0.002     0.002     0.010"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.011    c.m/sec"
"             Hydrograph volume            24.341    c.m"
"                    0.002     0.002     0.002     0.011"
" 40          HYDROGRAPH   Confluence    700"
"           7   Confluence "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.011    c.m/sec"
"             Hydrograph volume            24.341    c.m"
"                    0.002     0.011     0.002     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.002     0.011     0.011     0.000"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.015    c.m/sec"
"             Hydrograph volume           187.998    c.m"
"                    0.002     0.011     0.011     0.015"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.002     0.000     0.011     0.015"
" 33          CATCHMENT 2051"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2051   Catchment 205-1"
"      25.000   % Impervious"
"       0.098   Total Area"
"      15.000   Flow length"
"       2.000   Overland Slope"
"       0.073   Pervious Area"
"      15.000   Pervious length"
"       2.000   Pervious slope"
"       0.024   Impervious Area"
"      15.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.797   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.004     0.000     0.011     0.015 c.m/sec"
"             Catchment 2051         Pervious   Impervious Total Area "
"             Surface Area           0.073      0.024      0.098      hectare"
"             Time of concentration  28.984     1.747      9.102      minutes"
"             Time to Centroid       175.889    119.783    134.933    minutes"
"             Rainfall depth         25.028     25.028     25.028     mm"
"             Rainfall volume        18.40      6.13       24.53      c.m"
"             Rainfall losses        22.568     5.082      18.197     mm"
"             Runoff depth           2.460      19.946     6.831      mm"
"             Runoff volume          1.81       4.89       6.69       c.m"
"             Runoff coefficient     0.098      0.797      0.273      "
"             Maximum flow           0.000      0.004      0.004      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.004     0.004     0.011     0.015"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.004     0.004     0.004     0.015"
" 40          HYDROGRAPH   Combine    600"
"           6   Combine "
"         600   Node #"
"               Arkell Rd"
```

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"            Maximum flow                0.004    c.m/sec"
"            Hydrograph volume           6.694    c.m"
"                   0.004     0.004     0.004     0.004"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.004     0.000     0.004     0.004"
" 33         CATCHMENT 2052"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2052   Catchment 205-2"
"      40.000   % Impervious"
"       0.108   Total Area"
"      25.000   Flow length"
"       5.000   Overland Slope"
"       0.065   Pervious Area"
"      25.000   Pervious length"
"       5.000   Pervious slope"
"       0.043   Impervious Area"
"      25.000   Impervious length"
"       5.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.798   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.006     0.000     0.004     0.004 c.m/sec"
"            Catchment 2052         Pervious   Impervious Total Area "
"            Surface Area           0.065      0.043      0.108      hectare"
"            Time of concentration  29.915     1.803      6.189      minutes"
"            Time to Centroid       176.981    119.890    128.798    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        16.22      10.81      27.03      c.m"
"            Rainfall losses        22.567     5.063      15.565     mm"
"            Runoff depth           2.461      19.965     9.462      mm"
"            Runoff volume          1.59       8.62       10.22      c.m"
"            Runoff coefficient     0.098      0.798      0.378      "
"            Maximum flow           0.000      0.006      0.006      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.006     0.006     0.004     0.004"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.006     0.006     0.006     0.004"
" 40         HYDROGRAPH   Combine    600"
"           6   Combine "
"         600   Node #"
"               Arkell Rd"
"            Maximum flow                0.010    c.m/sec"
"            Hydrograph volume          16.914    c.m"
"                   0.006     0.006     0.006     0.010"
" 40         HYDROGRAPH   Confluence    600"
"           7   Confluence "
"         600   Node #"
"               Arkell Rd"
"            Maximum flow                0.010    c.m/sec"
"            Hydrograph volume          16.914    c.m"
"                   0.006     0.010     0.006     0.000"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.006     0.010     0.010     0.000"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                0.023    c.m/sec"
"            Hydrograph volume         204.912    c.m"
"                   0.006     0.010     0.010     0.023"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.006     0.000     0.010     0.023"
" 33         CATCHMENT 206"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         206   Catchment 206"
"      70.000   % Impervious"
"       0.035   Total Area"
"      20.000   Flow length"
"       1.250   Overland Slope"
"       0.011   Pervious Area"
"      20.000   Pervious length"
"       1.250   Pervious slope"
"       0.024   Impervious Area"
"      20.000   Impervious length"
"       1.250   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.098   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.795   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.004     0.000     0.010     0.023 c.m/sec"
"            Catchment 206          Pervious   Impervious Total Area "
"            Surface Area           0.011      0.024      0.035      hectare"
"            Time of concentration  39.661     2.390      4.265      minutes"
"            Time to Centroid       188.432    120.907    124.304    minutes"
"            Rainfall depth         25.028     25.028     25.028     mm"
"            Rainfall volume        2.63       6.13       8.76       c.m"
"            Rainfall losses        22.567     5.124      10.357     mm"
"            Runoff depth           2.461      19.904     14.671     mm"
"            Runoff volume          0.26       4.88       5.13       c.m"
"            Runoff coefficient     0.098      0.795      0.586      "
"            Maximum flow           0.000      0.004      0.004      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.004     0.004     0.010     0.023"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.004     0.004     0.004     0.023"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                0.027    c.m/sec"
"            Hydrograph volume         210.047    c.m"
"                   0.004     0.004     0.004     0.027"
" 40         HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               TORRANCE CREEK"
```

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"            Maximum flow                  0.027    c.m/sec"
"            Hydrograph volume           210.047    c.m"
"                    0.004     0.027     0.004     0.000"
" 38         START/RE-START TOTALS 800"
"           3   Runoff Totals on EXIT"
"            Total Catchment area                    3.108    hectare"
"            Total Impervious area                   1.071    hectare"
"            Total % impervious                     34.445"
" 19         EXIT"
```

```
"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                        Sunday, February 7, 2010"
"           10  Units used:                                          ie METRIC"
"               Job folder:           Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                        POST"
"               Output filename:                                    2yrPOST.in"
"               Licensee name:                                               A"
"               Company                                             Microsoft"
"               Date & Time last used:               10/5/2021 at 1:38:32 PM"
" 31         TIME PARAMETERS"
"       5.000   Time Step"
"     180.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 32         STORM Chicago storm"
"           1   Chicago storm"
"     743.000   Coefficient A"
"       6.000   Constant B"
"       0.799   Exponent C"
"       0.400   Fraction R"
"     180.000   Duration"
"       1.000   Time step multiplier"
"            Maximum intensity          109.374    mm/hr"
"            Total depth                 34.259    mm"
"           6   002hyd   Hydrograph extension used in this file"
" 33         CATCHMENT 2011"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2011   Catchment 201-1"
"      60.000   % Impervious"
"       0.519   Total Area"
"      60.000   Flow length"
"       0.750   Overland Slope"
"       0.208   Pervious Area"
"      60.000   Pervious length"
"       0.750   Pervious slope"
"       0.311   Impervious Area"
"      60.000   Impervious length"
"       0.750   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.163   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"               0.065     0.000     0.000     0.000 c.m/sec"
"            Catchment 2011         Pervious   Impervious Total Area "
"            Surface Area           0.208      0.311      0.519      hectare"
"            Time of concentration  56.084     4.495      10.387     minutes"
"            Time to Centroid       170.993    94.804     103.505    minutes"
"            Rainfall depth         34.259     34.259     34.259     mm"
"            Rainfall volume        71.12      106.68     177.80     c.m"
"            Rainfall losses        28.658     5.300      14.643     mm"
"            Runoff depth           5.600      28.959     19.615     mm"
"            Runoff volume          11.63      90.18      101.80     c.m"
"            Runoff coefficient     0.163      0.845      0.573      "
"            Maximum flow           0.002      0.065      0.065      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"               0.065     0.065     0.000     0.000"
```

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" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.065     0.065     0.065     0.000"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
"              Maximum flow                  0.065    c.m/sec"
"              Hydrograph volume           101.803    c.m"
"                    0.065     0.065     0.065     0.065"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.065     0.000     0.065     0.065"
" 33          CATCHMENT 2012"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2012   Catchment 201-2"
"       70.000   % Impervious"
"        0.066   Total Area"
"       15.000   Flow length"
"        0.500   Overland Slope"
"        0.020   Pervious Area"
"       15.000   Pervious length"
"        0.500   Pervious slope"
"        0.046   Impervious Area"
"       15.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.163   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.841   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.010     0.000     0.065     0.065 c.m/sec"
"             Catchment 2012         Pervious   Impervious Total Area "
"             Surface Area           0.020      0.046      0.066      hectare"
"             Time of concentration  27.570     2.210      4.159      minutes"
"             Time to Centroid       136.872    91.264     94.770     minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        6.78       15.83      22.61      c.m"
"             Rainfall losses        28.660     5.447      12.411     mm"
"             Runoff depth           5.599      28.811     21.848     mm"
"             Runoff volume          1.11       13.31      14.42      c.m"
"             Runoff coefficient     0.163      0.841      0.638      "
"             Maximum flow           0.000      0.010      0.010      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.010     0.010     0.065     0.065"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.010     0.010     0.010     0.065"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
"              Maximum flow                  0.073    c.m/sec"
"              Hydrograph volume           116.223    c.m"
"                    0.010     0.010     0.010     0.073"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.010     0.000     0.010     0.073"
" 33          CATCHMENT 2013"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2013   Catchment 201-3"
"       75.000   % Impervious"
"        0.234   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.176   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.163   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.840   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.041     0.000     0.010     0.073 c.m/sec"
"             Catchment 2013         Pervious   Impervious Total Area "
"             Surface Area           0.058      0.176      0.234      hectare"
"             Time of concentration  18.189     1.458      2.476      minutes"
"             Time to Centroid       125.657    90.077     92.242     minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        20.04      60.12      80.17      c.m"
"             Rainfall losses        28.664     5.483      11.278     mm"
"             Runoff depth           5.594      28.775     22.980     mm"
"             Runoff volume          3.27       50.50      53.77      c.m"
"             Runoff coefficient     0.163      0.840      0.671      "
"             Maximum flow           0.001      0.041      0.041      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.041     0.041     0.010     0.073"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.041     0.041     0.041     0.073"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
"              Maximum flow                  0.102    c.m/sec"
"              Hydrograph volume           169.997    c.m"
"                    0.041     0.041     0.041     0.102"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.041     0.000     0.041     0.102"
" 33          CATCHMENT 2014"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2014   Catchment 201-4"
"      100.000   % Impervious"
"        0.065   Total Area"
"       10.000   Flow length"
"        2.000   Overland Slope"
"        0.000   Pervious Area"
"       10.000   Pervious length"
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"        2.000   Pervious slope"
"        0.065   Impervious Area"
"       10.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.831   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.015     0.000     0.041     0.102 c.m/sec"
"             Catchment 2014         Pervious   Impervious Total Area "
"             Surface Area           0.000      0.065      0.065      hectare"
"             Time of concentration  14.261     1.143      1.143      minutes"
"             Time to Centroid       120.965    89.575     89.575     minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        0.00       22.27      22.27      c.m"
"             Rainfall losses        28.664     5.776      5.776      mm"
"             Runoff depth           5.594      28.482     28.482     mm"
"             Runoff volume          0.00       18.51      18.51      c.m"
"             Runoff coefficient     0.000      0.831      0.831      "
"             Maximum flow           0.000      0.015      0.015      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.015     0.015     0.041     0.102"
" 57          TRENCH Design d/s of 2014"
"        0.015   Peak inflow"
"       18.513   Hydrograph volume"
"      337.000   Ground elevation"
"      334.200   Downstream trench invert"
"        1.000   Trench height"
"      333.200   Water table elevation"
"        5.000   Trench top width"
"        5.000   Trench bottom width"
"       40.000   Voids ratio (%)"
"       30.000   Hydraulic conductivity"
"        0.000   Trench gradient (%)"
"       10.000   Trench length"
"        1.000   Include base width"
"          29.   Number of stages"
"                  Level Discharge    Volume"
"                334.200     0.000       0.0"
"                334.300     0.000       2.0"
"                334.400     0.000       4.0"
"                334.500     0.000       6.0"
"                334.600     0.000       8.0"
"                334.700     0.000      10.0"
"                334.800     0.000      12.0"
"                334.900     0.000      14.0"
"                335.000     0.000      16.0"
"                335.100     0.000      18.0"
"                335.200     0.000      20.0"
"                335.300     0.004      20.1"
"                335.400     0.006      20.2"
"                335.500     0.008      20.3"
"                335.600     0.010      20.5"
"                335.700     0.011      20.6"
"                335.800     0.013      20.7"
"                335.900     0.014      20.8"
"                336.000     0.015      20.9"
"                336.100     0.016      21.0"
"                336.200     0.017      21.1"
"                336.300     0.018      21.2"
"                336.400     0.019      21.4"
"                336.500     0.020      21.5"
"                336.600     0.020      21.6"
"                336.700     0.021      21.7"
"                336.800     0.022      21.8"
"                336.900     0.023      21.9"
"                337.000     0.023      22.0"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"                335.200    20.000     0.000     1.000     1.000     0.000"
"           1.   MANHOLE"
"                 Access"
"              diameter"
"                  1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                 invert    invert    Length  Diameter       'n'   loss Ke"
"                335.200   335.000    20.000     0.100     0.013     0.500"
"             Peak outflow                  0.000    c.m/sec"
"             Outflow volume                0.003    c.m"
"             Peak exfiltration             0.001    c.m/sec"
"             Exfiltration volume          18.511    c.m"
"             Maximum level               334.890    metre"
"             Maximum storage              13.804    c.m"
"             Centroidal lag                5.524   hours"
"             Infiltration area 2 sides    13.804   sq.metre"
"             Infiltration Base area       50.000   sq.metre"
"                  0.015     0.015     0.000     0.001 c.m/sec"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.102    c.m/sec"
"             Hydrograph volume           170.000    c.m"
"                    0.015     0.015     0.000     0.102"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.015     0.000     0.000     0.102"
" 33          CATCHMENT 2015"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2015   Catchment 201-5"
"        85.000   % Impervious"
"         0.074   Total Area"
"        15.000   Flow length"
"         2.000   Overland Slope"
"         0.011   Pervious Area"
"        15.000   Pervious length"
"         2.000   Pervious slope"
"         0.063   Impervious Area"
"        15.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.163   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.840   Impervious Runoff coefficient"
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"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.015     0.000     0.000     0.102 c.m/sec"
"             Catchment 2015         Pervious   Impervious Total Area "
"             Surface Area           0.011      0.063      0.074      hectare"
"             Time of concentration  18.189     1.458      2.013      minutes"
"             Time to Centroid       125.657    90.077     91.257     minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        3.80       21.55      25.35      c.m"
"             Rainfall losses        28.664     5.483      8.960      mm"
"             Runoff depth           5.594      28.775     25.298     mm"
"             Runoff volume          0.62       18.10      18.72      c.m"
"             Runoff coefficient     0.163      0.840      0.738      "
"             Maximum flow           0.000      0.015      0.015      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.015     0.015     0.000     0.102"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.015     0.015     0.015     0.102"
" 40          HYDROGRAPH   Combine    900"
"             6   Combine "
"           900   Node #"
"                 SWMM"
"             Maximum flow                  0.117    c.m/sec"
"             Hydrograph volume           188.721    c.m"
"                    0.015     0.015     0.015     0.117"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    0.015     0.000     0.015     0.117"
" 33          CATCHMENT 2016"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2016   Catchment 201-6"
"       100.000   % Impervious"
"         0.032   Total Area"
"        10.000   Flow length"
"         2.000   Overland Slope"
"         0.000   Pervious Area"
"        10.000   Pervious length"
"         2.000   Pervious slope"
"         0.032   Impervious Area"
"        10.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.000   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.831   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.008     0.000     0.015     0.117 c.m/sec"
"             Catchment 2016         Pervious   Impervious Total Area "
"             Surface Area           0.000      0.032      0.032      hectare"
"             Time of concentration  14.261     1.143      1.143      minutes"
"             Time to Centroid       120.965    89.575     89.575     minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        0.00       10.96      10.96      c.m"
"             Rainfall losses        28.664     5.776      5.776      mm"
"             Runoff depth           5.594      28.482     28.482     mm"
"             Runoff volume          0.00       9.11       9.11       c.m"
"             Runoff coefficient     0.000      0.831      0.831      "
"             Maximum flow           0.000      0.008      0.008      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.008     0.008     0.015     0.117"
" 57          TRENCH Design d/s of 2016"
"         0.008   Peak inflow"
"         9.114   Hydrograph volume"
"       337.000   Ground elevation"
"       334.200   Downstream trench invert"
"         1.000   Trench height"
"       333.200   Water table elevation"
"         5.000   Trench top width"
"         5.000   Trench bottom width"
"        40.000   Voids ratio (%)"
"        30.000   Hydraulic conductivity"
"         0.000   Trench gradient (%)"
"         5.000   Trench length"
"         1.000   Include base width"
"           29.   Number of stages"
"                   Level Discharge    Volume"
"                 334.200     0.000       0.0"
"                 334.300     0.000       1.0"
"                 334.400     0.000       2.0"
"                 334.500     0.000       3.0"
"                 334.600     0.000       4.0"
"                 334.700     0.000       5.0"
"                 334.800     0.000       6.0"
"                 334.900     0.000       7.0"
"                 335.000     0.000       8.0"
"                 335.100     0.000       9.0"
"                 335.200     0.000      10.0"
"                 335.300     0.002      10.1"
"                 335.400     0.006      10.2"
"                 335.500     0.008      10.3"
"                 335.600     0.010      10.5"
"                 335.700     0.011      10.6"
"                 335.800     0.013      10.7"
"                 335.900     0.014      10.8"
"                 336.000     0.015      10.9"
"                 336.100     0.016      11.0"
"                 336.200     0.017      11.1"
"                 336.300     0.018      11.2"
"                 336.400     0.019      11.4"
"                 336.500     0.020      11.5"
"                 336.600     0.020      11.6"
"                 336.700     0.021      11.7"
"                 336.800     0.022      11.8"
"                 336.900     0.023      11.9"
"                 337.000     0.023      12.0"
"             1.   TRENCH PIPES"
"               Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                   Invert    length     diam.    grade%     0=Yes  distance"
"                 335.200    10.000     0.000     2.000     1.000     0.000"
"             1.   MANHOLE"
"                   Access"
"                diameter"
"                   1.200"
"             1.   OUTFLOW PIPE"
"             0.   Inflow at upstream end of trench: 1=True; 0=False"
"                Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                  invert    invert    Length  Diameter       'n'   loss Ke"
"                 335.200   335.000    10.000     0.100     0.013     0.500"
"               Peak outflow                 0.000    c.m/sec"
"               Outflow volume               0.003    c.m"
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"             Peak exfiltration             0.000    c.m/sec"
"             Exfiltration volume           9.112    c.m"
"             Maximum level               334.878    metre"
"             Maximum storage               6.784    c.m"
"             Centroidal lag                5.477   hours"
"             Infiltration area 2 sides     6.783   sq.metre"
"             Infiltration Base area       25.000   sq.metre"
"                  0.008     0.008     0.000     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.117    c.m/sec"
"             Hydrograph volume           188.724    c.m"
"                    0.008     0.008     0.000     0.117"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.008     0.000     0.000     0.117"
" 33          CATCHMENT 2017"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2017   Catchment 201-7 - SWMF"
"      40.000   % Impervious"
"       0.211   Total Area"
"      10.000   Flow length"
"      10.000   Overland Slope"
"       0.127   Pervious Area"
"      10.000   Pervious length"
"      10.000   Pervious slope"
"       0.084   Impervious Area"
"      10.000   Impervious length"
"      10.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.163   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.804   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.021     0.000     0.000     0.117 c.m/sec"
"             Catchment 2017         Pervious   Impervious Total Area "
"             Surface Area           0.127      0.084      0.211      hectare"
"             Time of concentration  8.800      0.705      2.591      minutes"
"             Time to Centroid       114.422    89.351     95.193     minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        43.37      28.91      72.29      c.m"
"             Rainfall losses        28.680     6.715      19.894     mm"
"             Runoff depth           5.579      27.543     14.364     mm"
"             Runoff volume          7.06       23.25      30.31      c.m"
"             Runoff coefficient     0.163      0.804      0.419      "
"             Maximum flow           0.003      0.020      0.021      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.021     0.021     0.000     0.117"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.021     0.021     0.021     0.117"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.138    c.m/sec"
"             Hydrograph volume           219.033    c.m"
"                    0.021     0.021     0.021     0.138"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.138    c.m/sec"
"             Hydrograph volume           219.033    c.m"
"                    0.021     0.138     0.021     0.000"
" 54          POND DESIGN"
"       0.138   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       219.0   Hydrograph volume    c.m"
"         13.   Number of stages"
"     334.400   Minimum water level    metre"
"     335.600   Maximum water level    metre"
"     334.400   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.400     0.000     0.000"
"               334.500   0.00150    40.000"
"               334.600   0.00230    85.000"
"               334.700   0.00290   135.000"
"               334.800   0.03110   189.000"
"               334.900   0.04300   249.000"
"               335.000   0.05220   314.000"
"               335.100   0.05990   384.000"
"               335.200   0.06680   457.000"
"               335.300   0.07300   534.000"
"               335.400    0.1628   614.000"
"               335.500    0.4275   698.000"
"               335.600    0.9140   786.000"
"             Peak outflow                  0.013    c.m/sec"
"             Maximum level               334.737    metre"
"             Maximum storage             154.946    c.m"
"             Centroidal lag                9.226   hours"
"                  0.021     0.138     0.013     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                    0.021     0.013     0.013     0.000"
" 54          POND DESIGN"
"       0.013   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       207.1   Hydrograph volume    c.m"
"         10.   Number of stages"
"     334.200   Minimum water level    metre"
"     335.100   Maximum water level    metre"
"     334.200   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.200     0.000     0.000"
"               334.300   0.00191    18.000"
"               334.400   0.00207    38.000"
"               334.500   0.00225    60.000"
"               334.600   0.00243    83.000"
"               334.700   0.00261   109.000"
"               334.800   0.00281   136.000"
"               334.900    0.1543   165.000"
"               335.000    0.4628   196.000"
"               335.100    0.9060   229.000"
"             Peak outflow                  0.002    c.m/sec"
"             Maximum level               334.547    metre"
"             Maximum storage              70.889    c.m"
"             Centroidal lag               14.554   hours"
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"                0.021     0.013     0.002     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                 0.002    c.m/sec"
"             Hydrograph volume          186.196    c.m"
"                      0.021     0.013     0.002     0.002"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.021     0.000     0.002     0.002"
" 33          CATCHMENT 2021"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2021   Catchment 202-1"
"        0.000   % Impervious"
"        0.863   Total Area"
"       50.000   Flow length"
"        0.500   Overland Slope"
"        0.863   Pervious Area"
"       50.000   Pervious length"
"        0.500   Pervious slope"
"        0.000   Impervious Area"
"       50.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.163   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                      0.007     0.000     0.002     0.002 c.m/sec"
"             Catchment 2021          Pervious   Impervious Total Area "
"             Surface Area            0.863      0.000      0.863      hectare"
"             Time of concentration   56.775     4.550      56.775     minutes"
"             Time to Centroid        171.819    94.883     171.819    minutes"
"             Rainfall depth          34.259     34.259     34.259     mm"
"             Rainfall volume         295.65     0.00       295.65     c.m"
"             Rainfall losses         28.658     5.281      28.658     mm"
"             Runoff depth            5.600      28.978     5.600      mm"
"             Runoff volume           48.33      0.00       48.33      c.m"
"             Runoff coefficient      0.163      0.000      0.163      "
"             Maximum flow            0.007      0.000      0.007      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.007     0.007     0.002     0.002"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                      0.007     0.007     0.007     0.002"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                 0.009    c.m/sec"
"             Hydrograph volume          234.525    c.m"
"                      0.007     0.007     0.007     0.009"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.007     0.000     0.007     0.009"
" 33          CATCHMENT 2022"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2022   Catchment 202-2"
"        24.000   % Impervious"
"        0.184   Total Area"
"        10.000   Flow length"
"         2.000   Overland Slope"
"         0.140   Pervious Area"
"        10.000   Pervious length"
"         2.000   Pervious slope"
"         0.044   Impervious Area"
"        10.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.163   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.831   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                      0.011     0.000     0.007     0.009 c.m/sec"
"             Catchment 2022          Pervious   Impervious Total Area "
"             Surface Area            0.140      0.044      0.184      hectare"
"             Time of concentration   14.261     1.143      6.174      minutes"
"             Time to Centroid        120.965    89.575     101.612    minutes"
"             Rainfall depth          34.259     34.259     34.259     mm"
"             Rainfall volume         47.91      15.13      63.04      c.m"
"             Rainfall losses         28.664     5.776      23.171     mm"
"             Runoff depth            5.594      28.482     11.088     mm"
"             Runoff volume           7.82       12.58      20.40      c.m"
"             Runoff coefficient      0.163      0.831      0.324      "
"             Maximum flow            0.003      0.010      0.011      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                      0.011     0.011     0.007     0.009"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                      0.011     0.011     0.011     0.009"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                 0.011    c.m/sec"
"             Hydrograph volume          254.926    c.m"
"                      0.011     0.011     0.011     0.011"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                      0.011     0.000     0.011     0.011"
" 33          CATCHMENT 2031"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2031   Catchment 203-1"
"        30.000   % Impervious"
"         0.216   Total Area"
"       130.000   Flow length"
"         2.000   Overland Slope"
"         0.151   Pervious Area"
"       130.000   Pervious length"
"         2.000   Pervious slope"
"         0.065   Impervious Area"
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"      130.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.163   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.851   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.014     0.000     0.011     0.011 c.m/sec"
"            Catchment 2031         Pervious   Impervious Total Area "
"            Surface Area           0.151      0.065      0.216      hectare"
"            Time of concentration  66.455     5.326      24.246     minutes"
"            Time to Centroid       183.401    96.017     123.063    minutes"
"            Rainfall depth         34.259     34.259     34.259     mm"
"            Rainfall volume        51.80      22.20      74.00      c.m"
"            Rainfall losses        28.658     5.104      21.592     mm"
"            Runoff depth           5.601      29.155     12.667     mm"
"            Runoff volume          8.47       18.89      27.36      c.m"
"            Runoff coefficient     0.163      0.851      0.370      "
"            Maximum flow           0.001      0.014      0.014      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.014     0.014     0.011     0.011"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.014     0.014     0.014     0.011"
" 40         HYDROGRAPH   Combine    700"
"          6   Combine "
"        700   Node #"
"              CULVERT"
"            Maximum flow                0.014    c.m/sec"
"            Hydrograph volume           27.361    c.m"
"                  0.014     0.014     0.014     0.014"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  0.014     0.000     0.014     0.014"
" 33         CATCHMENT 2032"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"       2032   Catchment 203-2"
"      0.000   % Impervious"
"      0.113   Total Area"
"     10.000   Flow length"
"     33.000   Overland Slope"
"      0.113   Pervious Area"
"     10.000   Pervious length"
"     33.000   Pervious slope"
"      0.000   Impervious Area"
"     10.000   Impervious length"
"     33.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     74.000   Pervious SCS Curve No."
"      0.162   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      8.924   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"
"                  0.003     0.000     0.014     0.014 c.m/sec"
"            Catchment 2032         Pervious   Impervious Total Area "
"            Surface Area           0.113      0.000      0.113      hectare"
"            Time of concentration  6.151      0.493      6.151      minutes"
"            Time to Centroid       111.394    89.327     111.394    minutes"
"            Rainfall depth         34.259     34.259     34.259     mm"
"            Rainfall volume        38.71      0.00       38.71      c.m"
"            Rainfall losses        28.713     7.785      28.713     mm"
"            Runoff depth           5.545      26.473     5.545      mm"
"            Runoff volume          6.27       0.00       6.27       c.m"
"            Runoff coefficient     0.162      0.000      0.162      "
"            Maximum flow           0.003      0.000      0.003      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.003     0.003     0.014     0.014"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.003     0.003     0.003     0.014"
" 40         HYDROGRAPH   Combine    700"
"          6   Combine "
"        700   Node #"
"              CULVERT"
"            Maximum flow                0.016    c.m/sec"
"            Hydrograph volume           33.627    c.m"
"                  0.003     0.003     0.003     0.016"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  0.003     0.000     0.003     0.016"
" 33         CATCHMENT 2033"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"       2033   Catchment 203-3"
"     100.000   % Impervious"
"      0.092   Total Area"
"     10.000   Flow length"
"      2.000   Overland Slope"
"      0.000   Pervious Area"
"     10.000   Pervious length"
"      2.000   Pervious slope"
"      0.092   Impervious Area"
"     10.000   Impervious length"
"      2.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     74.000   Pervious SCS Curve No."
"      0.000   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      8.924   Pervious Initial abstraction"
"      0.015   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.831   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                  0.022     0.000     0.003     0.016 c.m/sec"
"            Catchment 2033         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.092      0.092      hectare"
"            Time of concentration  14.261     1.143      1.143      minutes"
"            Time to Centroid       120.965    89.575     89.575     minutes"
"            Rainfall depth         34.259     34.259     34.259     mm"
"            Rainfall volume        0.00       31.52      31.52      c.m"
"            Rainfall losses        28.664     5.776      5.776      mm"
"            Runoff depth           5.594      28.482     28.482     mm"
"            Runoff volume          0.00       26.20      26.20      c.m"
"            Runoff coefficient     0.000      0.831      0.831      "
"            Maximum flow           0.000      0.022      0.022      c.m/sec"
```

```
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.022     0.022     0.003     0.016"
" 57          TRENCH Design d/s of 2033"
"        0.022   Peak inflow"
"       26.204   Hydrograph volume"
"      337.000   Ground elevation"
"      334.500   Downstream trench invert"
"        1.000   Trench height"
"      333.500   Water table elevation"
"        1.000   Trench top width"
"        1.000   Trench bottom width"
"       40.000   Voids ratio (%)"
"       30.000   Hydraulic conductivity"
"        0.000   Trench gradient (%)"
"       60.000   Trench length"
"        1.000   Include base width"
"          26.   Number of stages"
"                  Level Discharge    Volume"
"                334.500     0.000       0.0"
"                334.600     0.000       2.4"
"                334.700     0.000       4.8"
"                334.800     0.000       7.2"
"                334.900     0.000       9.6"
"                335.000     0.000      12.0"
"                335.100     0.000      14.4"
"                335.200     0.000      16.8"
"                335.300     0.000      19.2"
"                335.400     0.000      21.6"
"                335.500     0.000      24.0"
"                335.600     0.004      24.1"
"                335.700     0.006      24.2"
"                335.800     0.008      24.3"
"                335.900     0.010      24.5"
"                336.000     0.011      24.6"
"                336.100     0.013      24.7"
"                336.200     0.014      24.8"
"                336.300     0.015      24.9"
"                336.400     0.016      25.0"
"                336.500     0.017      25.1"
"                336.600     0.018      25.2"
"                336.700     0.019      25.4"
"                336.800     0.020      25.5"
"                336.900     0.020      25.6"
"                337.000     0.021      25.7"
"          1.   TRENCH PIPES"
"            Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                Invert    length     diam.    grade%     0=Yes  distance"
"                335.500    20.000     0.000     1.000     1.000     0.000"
"          1.   MANHOLE"
"               Access"
"              diameter"
"                 1.200"
"          1.   OUTFLOW PIPE"
"          0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                invert    invert    Length  Diameter       'n'   loss Ke"
"                335.500   335.300    20.000     0.100     0.013     0.500"
"            Peak outflow                 0.000    c.m/sec"
"            Outflow volume               0.002    c.m"
"            Peak exfiltration            0.002    c.m/sec"
"            Exfiltration volume         26.197    c.m"
"            Maximum level              335.237    metre"
"            Maximum storage             17.682    c.m"
"            Centroidal lag               4.429   hours"
"            Infiltration area 2 sides   88.407   sq.metre"
"            Infiltration Base area      60.000   sq.metre"
"                 0.022     0.022     0.000     0.002 c.m/sec"
" 40          HYDROGRAPH   Combine    700"
"            6   Combine "
"          700   Node #"
"                CULVERT"
"            Maximum flow                 0.016    c.m/sec"
"            Hydrograph volume           33.629    c.m"
"                    0.022     0.022     0.000     0.016"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.022     0.000     0.000     0.016"
" 33          CATCHMENT 204"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"          204   Catchment 204"
"        0.000   % Impervious"
"        0.198   Total Area"
"        8.000   Flow length"
"       20.000   Overland Slope"
"        0.198   Pervious Area"
"        8.000   Pervious length"
"       20.000   Pervious slope"
"        0.000   Impervious Area"
"        8.000   Impervious length"
"       20.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.162   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                    0.005     0.000     0.000     0.016 c.m/sec"
"            Catchment 204          Pervious   Impervious Total Area "
"            Surface Area           0.198      0.000      0.198      hectare"
"            Time of concentration  6.252      0.501      6.252      minutes"
"            Time to Centroid       111.541    89.345     111.541    minutes"
"            Rainfall depth         34.259     34.259     34.259     mm"
"            Rainfall volume        67.83      0.00       67.83      c.m"
"            Rainfall losses        28.719     7.755      28.719     mm"
"            Runoff depth           5.540      26.504     5.540      mm"
"            Runoff volume          10.97      0.00       10.97      c.m"
"            Runoff coefficient     0.162      0.000      0.162      "
"            Maximum flow           0.005      0.000      0.005      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.005     0.005     0.000     0.016"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.005     0.005     0.005     0.016"
" 40          HYDROGRAPH   Combine    700"
"            6   Combine "
"          700   Node #"
"                CULVERT"
"            Maximum flow                 0.021    c.m/sec"
"            Hydrograph volume           44.598    c.m"
"                    0.005     0.005     0.005     0.021"
" 40          HYDROGRAPH   Confluence    700"
"            7   Confluence "
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"          700   Node #"
"                CULVERT"
"             Maximum flow                  0.021    c.m/sec"
"             Hydrograph volume            44.598    c.m"
"                    0.005     0.021     0.005     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.005     0.021     0.021     0.000"
" 40          HYDROGRAPH   Combine    800"
"             6   Combine "
"          800   Node #"
"                TORRANCE CREEK"
"             Maximum flow                  0.030    c.m/sec"
"             Hydrograph volume           299.525    c.m"
"                    0.005     0.021     0.021     0.030"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    0.005     0.000     0.021     0.030"
" 33          CATCHMENT 2051"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2051   Catchment 205-1"
"        25.000   % Impervious"
"         0.098   Total Area"
"        15.000   Flow length"
"         2.000   Overland Slope"
"         0.073   Pervious Area"
"        15.000   Pervious length"
"         2.000   Pervious slope"
"         0.024   Impervious Area"
"        15.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.163   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.840   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.006     0.000     0.021     0.030 c.m/sec"
"             Catchment 2051         Pervious   Impervious Total Area "
"             Surface Area           0.073      0.024      0.098      hectare"
"             Time of concentration  18.189     1.458      7.621      minutes"
"             Time to Centroid       125.657    90.077     103.184    minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        25.18      8.39       33.57      c.m"
"             Rainfall losses        28.664     5.483      22.869     mm"
"             Runoff depth           5.594      28.775     11.390     mm"
"             Runoff volume          4.11       7.05       11.16      c.m"
"             Runoff coefficient     0.163      0.840      0.332      "
"             Maximum flow           0.001      0.006      0.006      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.006     0.006     0.021     0.030"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.006     0.006     0.006     0.030"
" 40          HYDROGRAPH   Combine    600"
"             6   Combine "
"          600   Node #"
"                Arkell Rd"
"             Maximum flow                  0.006    c.m/sec"
"             Hydrograph volume            11.162    c.m"
"                    0.006     0.006     0.006     0.006"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    0.006     0.000     0.006     0.006"
" 33          CATCHMENT 2052"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2052   Catchment 205-2"
"        40.000   % Impervious"
"         0.108   Total Area"
"        25.000   Flow length"
"         5.000   Overland Slope"
"         0.065   Pervious Area"
"        25.000   Pervious length"
"         5.000   Pervious slope"
"         0.043   Impervious Area"
"        25.000   Impervious length"
"         5.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.163   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.840   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.010     0.000     0.006     0.006 c.m/sec"
"             Catchment 2052         Pervious   Impervious Total Area "
"             Surface Area           0.065      0.043      0.108      hectare"
"             Time of concentration  18.773     1.505      5.402      minutes"
"             Time to Centroid       126.363    90.128     98.306     minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        22.20      14.80      37.00      c.m"
"             Rainfall losses        28.663     5.465      19.384     mm"
"             Runoff depth           5.596      28.794     14.875     mm"
"             Runoff volume          3.63       12.44      16.06      c.m"
"             Runoff coefficient     0.163      0.840      0.434      "
"             Maximum flow           0.001      0.010      0.010      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.010     0.010     0.006     0.006"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.010     0.010     0.010     0.006"
" 40          HYDROGRAPH   Combine    600"
"             6   Combine "
"          600   Node #"
"                Arkell Rd"
"             Maximum flow                  0.016    c.m/sec"
"             Hydrograph volume            27.227    c.m"
"                    0.010     0.010     0.010     0.016"
" 40          HYDROGRAPH   Confluence    600"
"             7   Confluence "
"          600   Node #"
"                Arkell Rd"
"             Maximum flow                  0.016    c.m/sec"
"             Hydrograph volume            27.227    c.m"
"                    0.010     0.016     0.010     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
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"                   0.010     0.016     0.016     0.000"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                 0.041    c.m/sec"
"             Hydrograph volume          326.751    c.m"
"                   0.010     0.016     0.016     0.041"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.010     0.000     0.016     0.041"
" 33          CATCHMENT 206"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         206   Catchment 206"
"      70.000   % Impervious"
"       0.035   Total Area"
"      20.000   Flow length"
"       1.250   Overland Slope"
"       0.011   Pervious Area"
"      20.000   Pervious length"
"       1.250   Pervious slope"
"       0.024   Impervious Area"
"      20.000   Impervious length"
"       1.250   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.163   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.842   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.005     0.000     0.016     0.041 c.m/sec"
"             Catchment 206          Pervious   Impervious Total Area "
"             Surface Area           0.011      0.024      0.035      hectare"
"             Time of concentration  24.889     1.995      3.753      minutes"
"             Time to Centroid       133.685    90.906     94.190     minutes"
"             Rainfall depth         34.259     34.259     34.259     mm"
"             Rainfall volume        3.60       8.39       11.99      c.m"
"             Rainfall losses        28.660     5.410      12.385     mm"
"             Runoff depth           5.598      28.848     21.873     mm"
"             Runoff volume          0.59       7.07       7.66       c.m"
"             Runoff coefficient     0.163      0.842      0.638      "
"             Maximum flow           0.000      0.005      0.005      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.005     0.005     0.016     0.041"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.005     0.005     0.005     0.041"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                 0.046    c.m/sec"
"             Hydrograph volume          334.407    c.m"
"                   0.005     0.005     0.005     0.046"
" 40          HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                 0.046    c.m/sec"
"             Hydrograph volume          334.407    c.m"
"                   0.005     0.046     0.005     0.000"
" 38          START/RE-START TOTALS 800"
"           3   Runoff Totals on EXIT"
"             Total Catchment area                    3.108    hectare"
"             Total Impervious area                   1.071    hectare"
"             Total % impervious                     34.445"
" 19          EXIT"
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"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                      Sunday, February 7, 2010"
"          10   Units used:                                        ie METRIC"
"               Job folder:           Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                       POST"
"               Output filename:                                   5yrPOST.in"
"               Licensee name:                                              A"
"               Company                                            Microsoft"
"               Date & Time last used:              10/5/2021 at 1:41:56 PM"
" 31          TIME PARAMETERS"
"       5.000   Time Step"
"     180.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"    1593.000   Coefficient A"
"      11.000   Constant B"
"       0.879   Exponent C"
"       0.400   Fraction R"
"     180.000   Duration"
"       1.000   Time step multiplier"
"             Maximum intensity          139.250    mm/hr"
"             Total depth                 47.240    mm"
"           6   005hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 2011"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2011   Catchment 201-1"
"      60.000   % Impervious"
"       0.519   Total Area"
"      60.000   Flow length"
"       0.750   Overland Slope"
"       0.208   Pervious Area"
"      60.000   Pervious length"
"       0.750   Pervious slope"
"       0.311   Impervious Area"
"      60.000   Impervious length"
"       0.750   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.244   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.878   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.090     0.000     0.000     0.000 c.m/sec"
"             Catchment 2011         Pervious   Impervious Total Area "
"             Surface Area           0.208      0.311      0.519      hectare"
"             Time of concentration  40.157     4.029      9.665      minutes"
"             Time to Centroid       147.725    91.876     100.588    minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        98.07      147.10     245.17     c.m"
"             Rainfall losses        35.735     5.740      17.738     mm"
"             Runoff depth           11.505     41.499     29.502     mm"
"             Runoff volume          23.89      129.23     153.11     c.m"
"             Runoff coefficient     0.244      0.878      0.625      "
"             Maximum flow           0.005      0.089      0.090      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.090     0.090     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.090     0.090     0.090     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.090    c.m/sec"
"             Hydrograph volume           153.114    c.m"
"                   0.090     0.090     0.090     0.090"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.090     0.000     0.090     0.090"
" 33          CATCHMENT 2012"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2012   Catchment 201-2"
"      70.000   % Impervious"
"       0.066   Total Area"
"      15.000   Flow length"
"       0.500   Overland Slope"
"       0.020   Pervious Area"
"      15.000   Pervious length"
"       0.500   Pervious slope"
"       0.046   Impervious Area"
"      15.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.243   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.878   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.014     0.000     0.090     0.090 c.m/sec"
"             Catchment 2012         Pervious   Impervious Total Area "
"             Surface Area           0.020      0.046      0.066      hectare"
"             Time of concentration  19.740     1.981      3.865      minutes"
"             Time to Centroid       122.738    88.783     92.386     minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        9.35       21.82      31.18      c.m"
"             Rainfall losses        35.749     5.741      14.743     mm"
"             Runoff depth           11.491     41.499     32.497     mm"
"             Runoff volume          2.28       19.17      21.45      c.m"
"             Runoff coefficient     0.243      0.878      0.688      "
"             Maximum flow           0.001      0.014      0.014      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.014     0.014     0.090     0.090"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.014     0.014     0.014     0.090"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.101    c.m/sec"
"             Hydrograph volume           174.561    c.m"
"                   0.014     0.014     0.014     0.101"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
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"                   0.014     0.000     0.014     0.101"
" 33          CATCHMENT 2013"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2013   Catchment 201-3"
"      75.000   % Impervious"
"       0.234   Total Area"
"      15.000   Flow length"
"       2.000   Overland Slope"
"       0.058   Pervious Area"
"      15.000   Pervious length"
"       2.000   Pervious slope"
"       0.176   Impervious Area"
"      15.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.243   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.056     0.000     0.014     0.101 c.m/sec"
"             Catchment 2013         Pervious   Impervious Total Area "
"             Surface Area           0.058      0.176      0.234      hectare"
"             Time of concentration  13.024     1.307      2.299      minutes"
"             Time to Centroid       114.543    87.817     90.081     minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        27.64      82.91      110.54     c.m"
"             Rainfall losses        35.778     5.949      13.406     mm"
"             Runoff depth           11.461     41.291     33.834     mm"
"             Runoff volume          6.70       72.47      79.17      c.m"
"             Runoff coefficient     0.243      0.874      0.716      "
"             Maximum flow           0.003      0.056      0.056      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.056     0.056     0.014     0.101"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.056     0.056     0.056     0.101"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                 0.149    c.m/sec"
"             Hydrograph volume          253.732    c.m"
"                   0.056     0.056     0.056     0.149"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.056     0.000     0.056     0.149"
" 33          CATCHMENT 2014"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2014   Catchment 201-4"
"     100.000   % Impervious"
"       0.065   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.065   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.862   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.021     0.000     0.056     0.149 c.m/sec"
"             Catchment 2014         Pervious   Impervious Total Area "
"             Surface Area           0.000      0.065      0.065      hectare"
"             Time of concentration  10.211     1.025      1.025      minutes"
"             Time to Centroid       111.096    87.416     87.416     minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        0.00       30.71      30.71      c.m"
"             Rainfall losses        35.782     6.504      6.504      mm"
"             Runoff depth           11.458     40.736     40.736     mm"
"             Runoff volume          0.00       26.48      26.48      c.m"
"             Runoff coefficient     0.000      0.862      0.862      "
"             Maximum flow           0.000      0.021      0.021      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.021     0.021     0.056     0.149"
" 57          TRENCH Design d/s of 2014"
"       0.021   Peak inflow"
"      26.478   Hydrograph volume"
"     337.000   Ground elevation"
"     334.200   Downstream trench invert"
"       1.000   Trench height"
"     333.200   Water table elevation"
"       5.000   Trench top width"
"       5.000   Trench bottom width"
"      40.000   Voids ratio (%)"
"      30.000   Hydraulic conductivity"
"       0.000   Trench gradient (%)"
"      10.000   Trench length"
"       1.000   Include base width"
"         29.   Number of stages"
"                 Level Discharge    Volume"
"               334.200     0.000       0.0"
"               334.300     0.000       2.0"
"               334.400     0.000       4.0"
"               334.500     0.000       6.0"
"               334.600     0.000       8.0"
"               334.700     0.000      10.0"
"               334.800     0.000      12.0"
"               334.900     0.000      14.0"
"               335.000     0.000      16.0"
"               335.100     0.000      18.0"
"               335.200     0.000      20.0"
"               335.300     0.004      20.1"
"               335.400     0.006      20.2"
"               335.500     0.008      20.3"
"               335.600     0.010      20.5"
"               335.700     0.011      20.6"
"               335.800     0.013      20.7"
"               335.900     0.014      20.8"
"               336.000     0.015      20.9"
"               336.100     0.016      21.0"
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"               336.200     0.017      21.1"
"               336.300     0.018      21.2"
"               336.400     0.019      21.4"
"               336.500     0.020      21.5"
"               336.600     0.020      21.6"
"               336.700     0.021      21.7"
"               336.800     0.022      21.8"
"               336.900     0.023      21.9"
"               337.000     0.023      22.0"
"          1.   TRENCH PIPES"
"            Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                Invert    length     diam.    grade%     0=Yes  distance"
"               335.200    20.000     0.000     1.000     1.000     0.000"
"          1.   MANHOLE"
"               Access"
"              diameter"
"                 1.200"
"          1.   OUTFLOW PIPE"
"          0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                invert    invert    Length  Diameter       'n'   loss Ke"
"               335.200   335.000    20.000     0.100     0.013     0.500"
"            Peak outflow                  0.001    c.m/sec"
"            Outflow volume                0.819    c.m"
"            Peak exfiltration             0.001    c.m/sec"
"            Exfiltration volume          25.594    c.m"
"            Maximum level               335.232    metre"
"            Maximum storage              20.036    c.m"
"            Centroidal lag                1.963   hours"
"            Infiltration area 2 sides    20.000   sq.metre"
"            Infiltration Base area       50.000   sq.metre"
"                 0.021     0.021     0.001     0.001 c.m/sec"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              SWMF"
"            Maximum flow                  0.149    c.m/sec"
"            Hydrograph volume           254.552    c.m"
"                    0.021     0.021     0.001     0.149"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                    0.021     0.000     0.001     0.149"
" 33         CATCHMENT 2015"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2015   Catchment 201-5"
"       85.000   % Impervious"
"        0.074   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.011   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.063   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.243   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                    0.020     0.000     0.001     0.149 c.m/sec"
"            Catchment 2015         Pervious   Impervious Total Area "
"            Surface Area           0.011      0.063      0.074      hectare"
"            Time of concentration  13.024     1.307      1.854      minutes"
"            Time to Centroid       114.543    87.817     89.065     minutes"
"            Rainfall depth         47.240     47.240     47.240     mm"
"            Rainfall volume        5.24       29.71      34.96      c.m"
"            Rainfall losses        35.778     5.949      10.423     mm"
"            Runoff depth           11.461     41.291     36.817     mm"
"            Runoff volume          1.27       25.97      27.24      c.m"
"            Runoff coefficient     0.243      0.874      0.779      "
"            Maximum flow           0.001      0.020      0.020      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                    0.020     0.020     0.001     0.149"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                    0.020     0.020     0.020     0.149"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              SWMF"
"            Maximum flow                  0.169    c.m/sec"
"            Hydrograph volume           281.796    c.m"
"                    0.020     0.020     0.020     0.169"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                    0.020     0.000     0.020     0.169"
" 33         CATCHMENT 2016"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2016   Catchment 201-6"
"      100.000   % Impervious"
"        0.032   Total Area"
"       10.000   Flow length"
"        2.000   Overland Slope"
"        0.000   Pervious Area"
"       10.000   Pervious length"
"        2.000   Pervious slope"
"        0.032   Impervious Area"
"       10.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.862   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.010     0.000     0.020     0.169 c.m/sec"
"            Catchment 2016         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.032      0.032      hectare"
"            Time of concentration  10.211     1.025      1.025      minutes"
"            Time to Centroid       111.096    87.416     87.416     minutes"
"            Rainfall depth         47.240     47.240     47.240     mm"
"            Rainfall volume        0.00       15.12      15.12      c.m"
"            Rainfall losses        35.782     6.504      6.504      mm"
"            Runoff depth           11.458     40.736     40.736     mm"
"            Runoff volume          0.00       13.04      13.04      c.m"
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"             Runoff coefficient     0.000      0.862      0.862      "
"             Maximum flow           0.000      0.010      0.010      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.010     0.010     0.020     0.169"
" 57          TRENCH Design d/s of 2016"
"         0.010   Peak inflow"
"        13.036   Hydrograph volume"
"       337.000   Ground elevation"
"       334.200   Downstream trench invert"
"         1.000   Trench height"
"       333.200   Water table elevation"
"         5.000   Trench top width"
"         5.000   Trench bottom width"
"        40.000   Voids ratio (%)"
"        30.000   Hydraulic conductivity"
"         0.000   Trench gradient (%)"
"         5.000   Trench length"
"         1.000   Include base width"
"           29.   Number of stages"
"                   Level Discharge    Volume"
"                 334.200     0.000       0.0"
"                 334.300     0.000       1.0"
"                 334.400     0.000       2.0"
"                 334.500     0.000       3.0"
"                 334.600     0.000       4.0"
"                 334.700     0.000       5.0"
"                 334.800     0.000       6.0"
"                 334.900     0.000       7.0"
"                 335.000     0.000       8.0"
"                 335.100     0.000       9.0"
"                 335.200     0.000      10.0"
"                 335.300     0.002      10.1"
"                 335.400     0.006      10.2"
"                 335.500     0.008      10.3"
"                 335.600     0.010      10.5"
"                 335.700     0.011      10.6"
"                 335.800     0.013      10.7"
"                 335.900     0.014      10.8"
"                 336.000     0.015      10.9"
"                 336.100     0.016      11.0"
"                 336.200     0.017      11.1"
"                 336.300     0.018      11.2"
"                 336.400     0.019      11.4"
"                 336.500     0.020      11.5"
"                 336.600     0.020      11.6"
"                 336.700     0.021      11.7"
"                 336.800     0.022      11.8"
"                 336.900     0.023      11.9"
"                 337.000     0.023      12.0"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"                 335.200   10.000     0.000     2.000     1.000     0.000"
"           1.   MANHOLE"
"                 Access"
"                diameter"
"                  1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"               Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                 invert    invert    Length  Diameter       'n'   loss Ke"
"                 335.200   335.000    10.000     0.100     0.013     0.500"
"             Peak outflow                 0.000    c.m/sec"
"             Outflow volume               0.253    c.m"
"             Peak exfiltration            0.000    c.m/sec"
"             Exfiltration volume         12.770    c.m"
"             Maximum level              335.216    metre"
"             Maximum storage             10.018    c.m"
"             Centroidal lag               2.074   hours"
"             Infiltration area 2 sides   10.000   sq.metre"
"             Infiltration Base area      25.000   sq.metre"
"                  0.010     0.010     0.000     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
"             Maximum flow                 0.169    c.m/sec"
"             Hydrograph volume          282.050    c.m"
"                    0.010     0.010     0.000     0.169"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.010     0.000     0.000     0.169"
" 33          CATCHMENT 2017"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2017   Catchment 201-7 - SWMF"
"        40.000   % Impervious"
"         0.211   Total Area"
"        10.000   Flow length"
"        10.000   Overland Slope"
"         0.127   Pervious Area"
"        10.000   Pervious length"
"        10.000   Pervious slope"
"         0.084   Impervious Area"
"        10.000   Impervious length"
"        10.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.241   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.824   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.029     0.000     0.000     0.169 c.m/sec"
"             Catchment 2017         Pervious   Impervious Total Area "
"             Surface Area           0.127      0.084      0.211      hectare"
"             Time of concentration  6.301      0.632      2.360      minutes"
"             Time to Centroid       106.453    87.264     93.114     minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        59.81      39.87      99.68      c.m"
"             Rainfall losses        35.855     8.303      24.834     mm"
"             Runoff depth           11.385     38.937     22.406     mm"
"             Runoff volume          14.41      32.86      47.28      c.m"
"             Runoff coefficient     0.241      0.824      0.474      "
"             Maximum flow           0.008      0.027      0.029      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.029     0.029     0.000     0.169"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.029     0.029     0.029     0.169"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
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"             Maximum flow                  0.198    c.m/sec"
"             Hydrograph volume           329.325    c.m"
"                    0.029     0.029     0.029     0.198"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.198    c.m/sec"
"             Hydrograph volume           329.325    c.m"
"                    0.029     0.198     0.029     0.000"
" 54          POND DESIGN"
"       0.198   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       329.3   Hydrograph volume    c.m"
"         13.   Number of stages"
"     334.400   Minimum water level    metre"
"     335.600   Maximum water level    metre"
"     334.400   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.400     0.000     0.000"
"               334.500   0.00150    40.000"
"               334.600   0.00230    85.000"
"               334.700   0.00290   135.000"
"               334.800   0.03110   189.000"
"               334.900   0.04300   249.000"
"               335.000   0.05220   314.000"
"               335.100   0.05990   384.000"
"               335.200   0.06680   457.000"
"               335.300   0.07300   534.000"
"               335.400    0.1628   614.000"
"               335.500    0.4275   698.000"
"               335.600    0.9140   786.000"
"             Peak outflow                  0.034    c.m/sec"
"             Maximum level               334.823    metre"
"             Maximum storage             203.005    c.m"
"             Centroidal lag                6.984   hours"
"                  0.029     0.198     0.034     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                    0.029     0.034     0.034     0.000"
" 54          POND DESIGN"
"       0.034   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       316.6   Hydrograph volume    c.m"
"         10.   Number of stages"
"     334.200   Minimum water level    metre"
"     335.100   Maximum water level    metre"
"     334.200   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.200     0.000     0.000"
"               334.300   0.00191    18.000"
"               334.400   0.00207    38.000"
"               334.500   0.00225    60.000"
"               334.600   0.00243    83.000"
"               334.700   0.00261   109.000"
"               334.800   0.00281   136.000"
"               334.900    0.1543   165.000"
"               335.000    0.4628   196.000"
"               335.100    0.9060   229.000"
"             Peak outflow                  0.016    c.m/sec"
"             Maximum level               334.809    metre"
"             Maximum storage             138.483    c.m"
"             Centroidal lag               15.315   hours"
"                  0.029     0.034     0.016     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.016    c.m/sec"
"             Hydrograph volume           254.866    c.m"
"                    0.029     0.034     0.016     0.016"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.029     0.000     0.016     0.016"
" 33          CATCHMENT 2021"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2021   Catchment 202-1"
"       0.000   % Impervious"
"       0.863   Total Area"
"      50.000   Flow length"
"       0.500   Overland Slope"
"       0.863   Pervious Area"
"      50.000   Pervious length"
"       0.500   Pervious slope"
"       0.000   Impervious Area"
"      50.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.243   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.020     0.000     0.016     0.016 c.m/sec"
"            Catchment 2021         Pervious   Impervious Total Area "
"            Surface Area           0.863      0.000      0.863      hectare"
"            Time of concentration  40.652     4.079      40.652     minutes"
"            Time to Centroid       148.337    91.940     148.336    minutes"
"            Rainfall depth         47.240     47.240     47.240     mm"
"            Rainfall volume        407.68     0.00       407.68     c.m"
"            Rainfall losses        35.737     5.719      35.737     mm"
"            Runoff depth           11.503     41.521     11.503     mm"
"            Runoff volume          99.27      0.00       99.27      c.m"
"            Runoff coefficient     0.243      0.000      0.243      "
"            Maximum flow           0.020      0.000      0.020      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.020     0.020     0.016     0.016"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.020     0.020     0.020     0.016"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.022    c.m/sec"
"             Hydrograph volume           354.135    c.m"
"                    0.020     0.020     0.020     0.022"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.020     0.000     0.020     0.022"
" 33          CATCHMENT 2022"
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"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2022   Catchment 202-2"
"      24.000   % Impervious"
"       0.184   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.140   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.044   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.243   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.862   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.016     0.000     0.020     0.022 c.m/sec"
"            Catchment 2022         Pervious   Impervious Total Area "
"            Surface Area           0.140      0.044      0.184      hectare"
"            Time of concentration  10.211     1.025      5.352      minutes"
"            Time to Centroid       111.096    87.416     98.571     minutes"
"            Rainfall depth         47.240     47.240     47.240     mm"
"            Rainfall volume        66.06      20.86      86.92      c.m"
"            Rainfall losses        35.782     6.504      28.755     mm"
"            Runoff depth           11.458     40.736     18.484     mm"
"            Runoff volume          16.02      17.99      34.01      c.m"
"            Runoff coefficient     0.243      0.862      0.391      "
"            Maximum flow           0.007      0.014      0.016      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.016     0.016     0.020     0.022"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.016     0.016     0.016     0.022"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                  0.027    c.m/sec"
"            Hydrograph volume           388.147    c.m"
"                   0.016     0.016     0.016     0.027"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.016     0.000     0.016     0.027"
" 33         CATCHMENT 2031"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2031   Catchment 203-1"
"      30.000   % Impervious"
"       0.216   Total Area"
"     130.000   Flow length"
"       2.000   Overland Slope"
"       0.151   Pervious Area"
"     130.000   Pervious length"
"       2.000   Pervious slope"
"       0.065   Impervious Area"
"     130.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.244   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.019     0.000     0.016     0.027 c.m/sec"
"            Catchment 2031         Pervious   Impervious Total Area "
"            Surface Area           0.151      0.065      0.216      hectare"
"            Time of concentration  47.583     4.774      21.543     minutes"
"            Time to Centroid       156.815    92.944     117.964    minutes"
"            Rainfall depth         47.240     47.240     47.240     mm"
"            Rainfall volume        71.43      30.61      102.04     c.m"
"            Rainfall losses        35.734     5.552      26.679     mm"
"            Runoff depth           11.506     41.688     20.560     mm"
"            Runoff volume          17.40      27.01      44.41      c.m"
"            Runoff coefficient     0.244      0.882      0.435      "
"            Maximum flow           0.003      0.019      0.019      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.019     0.019     0.016     0.027"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.019     0.019     0.019     0.027"
" 40         HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"            Maximum flow                  0.019    c.m/sec"
"            Hydrograph volume            44.410    c.m"
"                   0.019     0.019     0.019     0.019"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.019     0.000     0.019     0.019"
" 33         CATCHMENT 2032"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2032   Catchment 203-2"
"       0.000   % Impervious"
"       0.113   Total Area"
"      10.000   Flow length"
"      33.000   Overland Slope"
"       0.113   Pervious Area"
"      10.000   Pervious length"
"      33.000   Pervious slope"
"       0.000   Impervious Area"
"      10.000   Impervious length"
"      33.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.242   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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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"                   0.007     0.000     0.019     0.019 c.m/sec"
"            Catchment 2032         Pervious   Impervious Total Area "
"            Surface Area           0.113      0.000      0.113      hectare"
"            Time of concentration  4.404      0.442      4.404      minutes"
"            Time to Centroid       104.023    87.079     104.023    minutes"
"            Rainfall depth         47.240     47.240     47.240     mm"
"            Rainfall volume        53.38      0.00       53.38      c.m"
"            Rainfall losses        35.831     9.835      35.831     mm"
"            Runoff depth           11.408     37.405     11.408     mm"
"            Runoff volume          12.89      0.00       12.89      c.m"
"            Runoff coefficient     0.242      0.000      0.242      "
"            Maximum flow           0.007      0.000      0.007      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.007     0.007     0.019     0.019"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.007     0.007     0.007     0.019"
" 40         HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"            Maximum flow                  0.027    c.m/sec"
"            Hydrograph volume            57.302    c.m"
"                   0.007     0.007     0.007     0.027"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.007     0.000     0.007     0.027"
" 33         CATCHMENT 2033"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2033   Catchment 203-3"
"     100.000   % Impervious"
"       0.092   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.092   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.862   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.030     0.000     0.007     0.027 c.m/sec"
"            Catchment 2033         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.092      0.092      hectare"
"            Time of concentration  10.211     1.025      1.025      minutes"
"            Time to Centroid       111.096    87.416     87.416     minutes"
"            Rainfall depth         47.240     47.240     47.240     mm"
"            Rainfall volume        0.00       43.46      43.46      c.m"
"            Rainfall losses        35.782     6.504      6.504      mm"
"            Runoff depth           11.458     40.736     40.736     mm"
"            Runoff volume          0.00       37.48      37.48      c.m"
"            Runoff coefficient     0.000      0.862      0.862      "
"            Maximum flow           0.000      0.030      0.030      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.030     0.030     0.007     0.027"
" 57         TRENCH Design d/s of 2033"
"       0.030   Peak inflow"
"      37.477   Hydrograph volume"
"     337.000   Ground elevation"
"     334.500   Downstream trench invert"
"       1.000   Trench height"
"     333.500   Water table elevation"
"       1.000   Trench top width"
"       1.000   Trench bottom width"
"      40.000   Voids ratio (%)"
"      30.000   Hydraulic conductivity"
"       0.000   Trench gradient (%)"
"      60.000   Trench length"
"       1.000   Include base width"
"         26.   Number of stages"
"                 Level Discharge    Volume"
"               334.500     0.000       0.0"
"               334.600     0.000       2.4"
"               334.700     0.000       4.8"
"               334.800     0.000       7.2"
"               334.900     0.000       9.6"
"               335.000     0.000      12.0"
"               335.100     0.000      14.4"
"               335.200     0.000      16.8"
"               335.300     0.000      19.2"
"               335.400     0.000      21.6"
"               335.500     0.000      24.0"
"               335.600     0.004      24.1"
"               335.700     0.006      24.2"
"               335.800     0.008      24.3"
"               335.900     0.010      24.5"
"               336.000     0.011      24.6"
"               336.100     0.013      24.7"
"               336.200     0.014      24.8"
"               336.300     0.015      24.9"
"               336.400     0.016      25.0"
"               336.500     0.017      25.1"
"               336.600     0.018      25.2"
"               336.700     0.019      25.4"
"               336.800     0.020      25.5"
"               336.900     0.020      25.6"
"               337.000     0.021      25.7"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"               335.500    20.000     0.000     1.000     1.000     0.000"
"           1.   MANHOLE"
"                Access"
"               diameter"
"                  1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                invert    invert    Length  Diameter       'n'   loss Ke"
"               335.500   335.300    20.000     0.100     0.013     0.500"
"             Peak outflow                 0.003    c.m/sec"
"             Outflow volume               2.108    c.m"
"             Peak exfiltration            0.002    c.m/sec"
"             Exfiltration volume         34.919    c.m"
"             Maximum level              335.632    metre"
"             Maximum storage             24.149    c.m"
"             Centroidal lag               1.642   hours"
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"             Infiltration area 2 sides   120.000   sq.metre"
"             Infiltration Base area      60.000   sq.metre"
"                  0.030     0.030     0.003     0.002 c.m/sec"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.027    c.m/sec"
"             Hydrograph volume            59.410    c.m"
"                    0.030     0.030     0.003     0.027"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.030     0.000     0.003     0.027"
" 33          CATCHMENT 204"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         204   Catchment 204"
"       0.000   % Impervious"
"       0.198   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.198   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       8.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.242   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.013     0.000     0.003     0.027 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area "
"             Surface Area           0.198      0.000      0.198      hectare"
"             Time of concentration  4.476      0.449      4.476      minutes"
"             Time to Centroid       104.105    87.097     104.104    minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        93.53      0.00       93.53      c.m"
"             Rainfall losses        35.825     9.778      35.825     mm"
"             Runoff depth           11.415     37.462     11.415     mm"
"             Runoff volume          22.60      0.00       22.60      c.m"
"             Runoff coefficient     0.242      0.000      0.242      "
"             Maximum flow           0.013      0.000      0.013      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.013     0.013     0.003     0.027"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.013     0.013     0.013     0.027"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.040    c.m/sec"
"             Hydrograph volume            82.010    c.m"
"                    0.013     0.013     0.013     0.040"
" 40          HYDROGRAPH   Confluence    700"
"           7   Confluence "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.040    c.m/sec"
"             Hydrograph volume            82.010    c.m"
"                    0.013     0.040     0.013     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.013     0.040     0.040     0.000"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.058    c.m/sec"
"             Hydrograph volume           470.157    c.m"
"                    0.013     0.040     0.040     0.058"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.013     0.000     0.040     0.058"
" 33          CATCHMENT 2051"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2051   Catchment 205-1"
"      25.000   % Impervious"
"       0.098   Total Area"
"      15.000   Flow length"
"       2.000   Overland Slope"
"       0.073   Pervious Area"
"      15.000   Pervious length"
"       2.000   Pervious slope"
"       0.024   Impervious Area"
"      15.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.243   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.008     0.000     0.040     0.058 c.m/sec"
"             Catchment 2051         Pervious   Impervious Total Area "
"             Surface Area           0.073      0.024      0.098      hectare"
"             Time of concentration  13.024     1.307      6.631      minutes"
"             Time to Centroid       114.543    87.817     99.960     minutes"
"             Rainfall depth         47.240     47.240     47.240     mm"
"             Rainfall volume        34.72      11.57      46.30      c.m"
"             Rainfall losses        35.778     5.949      28.321     mm"
"             Runoff depth           11.461     41.291     18.919     mm"
"             Runoff volume          8.42       10.12      18.54      c.m"
"             Runoff coefficient     0.243      0.874      0.400      "
"             Maximum flow           0.004      0.008      0.008      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.008     0.008     0.040     0.058"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.008     0.008     0.008     0.058"
" 40          HYDROGRAPH   Combine    600"
"           6   Combine "
"         600   Node #"
"               Arkell Rd"
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"            Maximum flow                 0.008    c.m/sec"
"            Hydrograph volume           18.541    c.m"
"                   0.008     0.008     0.008     0.008"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.008     0.000     0.008     0.008"
" 33         CATCHMENT 2052"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2052   Catchment 205-2"
"      40.000   % Impervious"
"       0.108   Total Area"
"      25.000   Flow length"
"       5.000   Overland Slope"
"       0.065   Pervious Area"
"      25.000   Pervious length"
"       5.000   Pervious slope"
"       0.043   Impervious Area"
"      25.000   Impervious length"
"       5.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.243   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.875   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.014     0.000     0.008     0.008 c.m/sec"
"            Catchment 2052         Pervious   Impervious Total Area "
"            Surface Area           0.065      0.043      0.108      hectare"
"            Time of concentration  13.442     1.349      4.906      minutes"
"            Time to Centroid       115.044    87.865     95.860     minutes"
"            Rainfall depth         47.240     47.240     47.240     mm"
"            Rainfall volume        30.61      20.41      51.02      c.m"
"            Rainfall losses        35.756     5.905      23.816     mm"
"            Runoff depth           11.484     41.334     23.424     mm"
"            Runoff volume          7.44       17.86      25.30      c.m"
"            Runoff coefficient     0.243      0.875      0.496      "
"            Maximum flow           0.003      0.014      0.014      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.014     0.014     0.008     0.008"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.014     0.014     0.014     0.008"
" 40         HYDROGRAPH   Combine    600"
"           6   Combine "
"         600   Node #"
"               Arkell Rd"
"            Maximum flow                 0.022    c.m/sec"
"            Hydrograph volume           43.839    c.m"
"                   0.014     0.014     0.014     0.022"
" 40         HYDROGRAPH   Confluence    600"
"           7   Confluence "
"         600   Node #"
"               Arkell Rd"
"            Maximum flow                 0.022    c.m/sec"
"            Hydrograph volume           43.839    c.m"
"                   0.014     0.022     0.014     0.000"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.014     0.022     0.022     0.000"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                 0.077    c.m/sec"
"            Hydrograph volume          513.996    c.m"
"                   0.014     0.022     0.022     0.077"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.014     0.000     0.022     0.077"
" 33         CATCHMENT 206"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         206   Catchment 206"
"      70.000   % Impervious"
"       0.035   Total Area"
"      20.000   Flow length"
"       1.250   Overland Slope"
"       0.011   Pervious Area"
"      20.000   Pervious length"
"       1.250   Pervious slope"
"       0.024   Impervious Area"
"      20.000   Impervious length"
"       1.250   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.243   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.878   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.008     0.000     0.022     0.077 c.m/sec"
"            Catchment 206          Pervious   Impervious Total Area "
"            Surface Area           0.011      0.024      0.035      hectare"
"            Time of concentration  17.821     1.788      3.489      minutes"
"            Time to Centroid       120.385    88.491     91.875     minutes"
"            Rainfall depth         47.240     47.240     47.240     mm"
"            Rainfall volume        4.96       11.57      16.53      c.m"
"            Rainfall losses        35.749     5.749      14.749     mm"
"            Runoff depth           11.491     41.491     32.491     mm"
"            Runoff volume          1.21       10.17      11.37      c.m"
"            Runoff coefficient     0.243      0.878      0.688      "
"            Maximum flow           0.000      0.007      0.008      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.008     0.008     0.022     0.077"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.008     0.008     0.008     0.077"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                 0.083    c.m/sec"
"            Hydrograph volume          525.368    c.m"
"                   0.008     0.008     0.008     0.083"
" 40         HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               TORRANCE CREEK"
```

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"            Maximum flow                  0.083    c.m/sec"
"            Hydrograph volume           525.368    c.m"
"                    0.008     0.083     0.008     0.000"
" 38         START/RE-START TOTALS 800"
"           3   Runoff Totals on EXIT"
"            Total Catchment area                    3.108    hectare"
"            Total Impervious area                   1.071    hectare"
"            Total % impervious                     34.445"
" 19         EXIT"
```

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"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                        Sunday, February 7, 2010"
"          10   Units used:                                        ie METRIC"
"               Job folder:           Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                        POST"
"               Output filename:                                  10yrPOST.in"
"               Licensee name:                                              A"
"               Company                                            Microsoft"
"               Date & Time last used:                 10/5/2021 at 1:55:51 PM"
" 31         TIME PARAMETERS"
"       5.000   Time Step"
"     180.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 32         STORM Chicago storm"
"           1   Chicago storm"
"    2221.000   Coefficient A"
"      12.000   Constant B"
"       0.908   Exponent C"
"       0.400   Fraction R"
"     180.000   Duration"
"       1.000   Time step multiplier"
"            Maximum intensity          169.551    mm/hr"
"            Total depth                 56.290    mm"
"           6   010hyd   Hydrograph extension used in this file"
" 33         CATCHMENT 2011"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2011   Catchment 201-1"
"      60.000   % Impervious"
"       0.519   Total Area"
"      60.000   Flow length"
"       0.750   Overland Slope"
"       0.208   Pervious Area"
"      60.000   Pervious length"
"       0.750   Pervious slope"
"       0.311   Impervious Area"
"      60.000   Impervious length"
"       0.750   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.292   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.889   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"               0.110     0.000     0.000     0.000 c.m/sec"
"            Catchment 2011         Pervious   Impervious Total Area "
"            Surface Area           0.208      0.311      0.519      hectare"
"            Time of concentration  33.678     3.706      9.087      minutes"
"            Time to Centroid       138.194    90.447     99.019     minutes"
"            Rainfall depth         56.290     56.290     56.290     mm"
"            Rainfall volume        116.86     175.29     292.15     c.m"
"            Rainfall losses        39.872     6.269      19.710     mm"
"            Runoff depth           16.418     50.021     36.580     mm"
"            Runoff volume          34.08      155.77     189.85     c.m"
"            Runoff coefficient     0.292      0.889      0.650      "
"            Maximum flow           0.008      0.108      0.110      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"               0.110     0.110     0.000     0.000"
```

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" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                     0.110     0.110     0.110     0.000"
" 40          HYDROGRAPH   Combine    900"
"             6   Combine "
"           900   Node #"
"                 SWMF"
"               Maximum flow                  0.110    c.m/sec"
"               Hydrograph volume           189.851    c.m"
"                     0.110     0.110     0.110     0.110"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                     0.110     0.000     0.110     0.110"
" 33          CATCHMENT 2012"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2012   Catchment 201-2"
"        70.000   % Impervious"
"         0.066   Total Area"
"        15.000   Flow length"
"         0.500   Overland Slope"
"         0.020   Pervious Area"
"        15.000   Pervious length"
"         0.500   Pervious slope"
"         0.046   Impervious Area"
"        15.000   Impervious length"
"         0.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.291   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   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"
"                     0.018     0.000     0.110     0.110 c.m/sec"
"              Catchment 2012         Pervious   Impervious Total Area "
"              Surface Area           0.020      0.046      0.066      hectare"
"              Time of concentration  16.555     1.822      3.625      minutes"
"              Time to Centroid       116.815    87.573     91.151     minutes"
"              Rainfall depth         56.290     56.290     56.290     mm"
"              Rainfall volume        11.15      26.01      37.15      c.m"
"              Rainfall losses        39.909     5.945      16.134     mm"
"              Runoff depth           16.381     50.345     40.156     mm"
"              Runoff volume          3.24       23.26      26.50      c.m"
"              Runoff coefficient     0.291      0.894      0.713      "
"              Maximum flow           0.001      0.017      0.018      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     0.018     0.018     0.110     0.110"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                     0.018     0.018     0.018     0.110"
" 40          HYDROGRAPH   Combine    900"
"             6   Combine "
"           900   Node #"
"                 SWMF"
"               Maximum flow                  0.124    c.m/sec"
"               Hydrograph volume           216.354    c.m"
"                     0.018     0.018     0.018     0.124"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                     0.018     0.000     0.018     0.124"
" 33          CATCHMENT 2013"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2013   Catchment 201-3"
"        75.000   % Impervious"
"         0.234   Total Area"
"        15.000   Flow length"
"         2.000   Overland Slope"
"         0.058   Pervious Area"
"        15.000   Pervious length"
"         2.000   Pervious slope"
"         0.176   Impervious Area"
"        15.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.291   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.887   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                     0.070     0.000     0.018     0.124 c.m/sec"
"              Catchment 2013         Pervious   Impervious Total Area "
"              Surface Area           0.058      0.176      0.234      hectare"
"              Time of concentration  10.922     1.202      2.161      minutes"
"              Time to Centroid       109.745    86.719     88.991     minutes"
"              Rainfall depth         56.290     56.290     56.290     mm"
"              Rainfall volume        32.93      98.79      131.72     c.m"
"              Rainfall losses        39.899     6.369      14.752     mm"
"              Runoff depth           16.391     49.921     41.539     mm"
"              Runoff volume          9.59       87.61      97.20      c.m"
"              Runoff coefficient     0.291      0.887      0.738      "
"              Maximum flow           0.005      0.069      0.070      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     0.070     0.070     0.018     0.124"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                     0.070     0.070     0.070     0.124"
" 40          HYDROGRAPH   Combine    900"
"             6   Combine "
"           900   Node #"
"                 SWMF"
"               Maximum flow                  0.189    c.m/sec"
"               Hydrograph volume           313.554    c.m"
"                     0.070     0.070     0.070     0.189"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                     0.070     0.000     0.070     0.189"
" 33          CATCHMENT 2014"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2014   Catchment 201-4"
"       100.000   % Impervious"
"         0.065   Total Area"
"        10.000   Flow length"
"         2.000   Overland Slope"
"         0.000   Pervious Area"
"        10.000   Pervious length"
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"        2.000   Pervious slope"
"        0.065   Impervious Area"
"       10.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                  0.026     0.000     0.070     0.189 c.m/sec"
"             Catchment 2014         Pervious   Impervious Total Area "
"             Surface Area           0.000      0.065      0.065      hectare"
"             Time of concentration  8.564      0.942      0.942      minutes"
"             Time to Centroid       106.793    86.363     86.363     minutes"
"             Rainfall depth         56.290     56.290     56.290     mm"
"             Rainfall volume        0.00       36.59      36.59      c.m"
"             Rainfall losses        39.928     7.184      7.184      mm"
"             Runoff depth           16.362     49.106     49.106     mm"
"             Runoff volume          0.00       31.92      31.92      c.m"
"             Runoff coefficient     0.000      0.872      0.872      "
"             Maximum flow           0.000      0.026      0.026      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.026     0.026     0.070     0.189"
" 57          TRENCH Design d/s of 2014"
"        0.026   Peak inflow"
"       31.919   Hydrograph volume"
"      337.000   Ground elevation"
"      334.200   Downstream trench invert"
"        1.000   Trench height"
"      333.200   Water table elevation"
"        5.000   Trench top width"
"        5.000   Trench bottom width"
"       40.000   Voids ratio (%)"
"       30.000   Hydraulic conductivity"
"        0.000   Trench gradient (%)"
"       10.000   Trench length"
"        1.000   Include base width"
"          29.   Number of stages"
"                  Level Discharge    Volume"
"                334.200     0.000       0.0"
"                334.300     0.000       2.0"
"                334.400     0.000       4.0"
"                334.500     0.000       6.0"
"                334.600     0.000       8.0"
"                334.700     0.000      10.0"
"                334.800     0.000      12.0"
"                334.900     0.000      14.0"
"                335.000     0.000      16.0"
"                335.100     0.000      18.0"
"                335.200     0.000      20.0"
"                335.300     0.004      20.1"
"                335.400     0.006      20.2"
"                335.500     0.008      20.3"
"                335.600     0.010      20.5"
"                335.700     0.011      20.6"
"                335.800     0.013      20.7"
"                335.900     0.014      20.8"
"                336.000     0.015      20.9"
"                336.100     0.016      21.0"
"                336.200     0.017      21.1"
"                336.300     0.018      21.2"
"                336.400     0.019      21.4"
"                336.500     0.020      21.5"
"                336.600     0.020      21.6"
"                336.700     0.021      21.7"
"                336.800     0.022      21.8"
"                336.900     0.023      21.9"
"                337.000     0.023      22.0"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"                335.200    20.000     0.000     1.000     1.000     0.000"
"           1.   MANHOLE"
"                 Access"
"              diameter"
"                 1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                 invert    invert    Length  Diameter       'n'   loss Ke"
"                335.200   335.000    20.000     0.100     0.013     0.500"
"             Peak outflow                  0.006    c.m/sec"
"             Outflow volume                5.409    c.m"
"             Peak exfiltration             0.001    c.m/sec"
"             Exfiltration volume          25.898    c.m"
"             Maximum level               335.446    metre"
"             Maximum storage              20.277    c.m"
"             Centroidal lag                1.671   hours"
"             Infiltration area 2 sides    20.000   sq.metre"
"             Infiltration Base area       50.000   sq.metre"
"                  0.026     0.026     0.006     0.001 c.m/sec"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.189    c.m/sec"
"             Hydrograph volume           318.963    c.m"
"                    0.026     0.026     0.006     0.189"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.026     0.000     0.006     0.189"
" 33          CATCHMENT 2015"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2015   Catchment 201-5"
"        85.000   % Impervious"
"         0.074   Total Area"
"        15.000   Flow length"
"         2.000   Overland Slope"
"         0.011   Pervious Area"
"        15.000   Pervious length"
"         2.000   Pervious slope"
"         0.063   Impervious Area"
"        15.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.291   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.887   Impervious Runoff coefficient"
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"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.025     0.000     0.006     0.189 c.m/sec"
"             Catchment 2015         Pervious   Impervious Total Area "
"             Surface Area           0.011      0.063      0.074      hectare"
"             Time of concentration  10.922     1.202      1.734      minutes"
"             Time to Centroid       109.745    86.719     87.980     minutes"
"             Rainfall depth         56.290     56.290     56.290     mm"
"             Rainfall volume        6.25       35.41      41.65      c.m"
"             Rainfall losses        39.899     6.369      11.398     mm"
"             Runoff depth           16.391     49.921     44.892     mm"
"             Runoff volume          1.82       31.40      33.22      c.m"
"             Runoff coefficient     0.291      0.887      0.798      "
"             Maximum flow           0.001      0.025      0.025      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.025     0.025     0.006     0.189"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.025     0.025     0.025     0.189"
" 40          HYDROGRAPH   Combine    900"
"             6   Combine "
"           900   Node #"
"                 SWMF"
"             Maximum flow                  0.214    c.m/sec"
"             Hydrograph volume           352.183    c.m"
"                    0.025     0.025     0.025     0.214"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    0.025     0.000     0.025     0.214"
" 33          CATCHMENT 2016"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2016   Catchment 201-6"
"       100.000   % Impervious"
"         0.032   Total Area"
"        10.000   Flow length"
"         2.000   Overland Slope"
"         0.000   Pervious Area"
"        10.000   Pervious length"
"         2.000   Pervious slope"
"         0.032   Impervious Area"
"        10.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.000   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   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"
"                    0.013     0.000     0.025     0.214 c.m/sec"
"             Catchment 2016         Pervious   Impervious Total Area "
"             Surface Area           0.000      0.032      0.032      hectare"
"             Time of concentration  8.564      0.942      0.942      minutes"
"             Time to Centroid       106.793    86.363     86.363     minutes"
"             Rainfall depth         56.290     56.290     56.290     mm"
"             Rainfall volume        0.00       18.01      18.01      c.m"
"             Rainfall losses        39.928     7.184      7.184      mm"
"             Runoff depth           16.362     49.106     49.106     mm"
"             Runoff volume          0.00       15.71      15.71      c.m"
"             Runoff coefficient     0.000      0.872      0.872      "
"             Maximum flow           0.000      0.013      0.013      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.013     0.013     0.025     0.214"
" 57          TRENCH Design d/s of 2016"
"         0.013   Peak inflow"
"        15.714   Hydrograph volume"
"       337.000   Ground elevation"
"       334.200   Downstream trench invert"
"         1.000   Trench height"
"       333.200   Water table elevation"
"         5.000   Trench top width"
"         5.000   Trench bottom width"
"        40.000   Voids ratio (%)"
"        30.000   Hydraulic conductivity"
"         0.000   Trench gradient (%)"
"         5.000   Trench length"
"         1.000   Include base width"
"           29.   Number of stages"
"                   Level Discharge    Volume"
"                 334.200     0.000       0.0"
"                 334.300     0.000       1.0"
"                 334.400     0.000       2.0"
"                 334.500     0.000       3.0"
"                 334.600     0.000       4.0"
"                 334.700     0.000       5.0"
"                 334.800     0.000       6.0"
"                 334.900     0.000       7.0"
"                 335.000     0.000       8.0"
"                 335.100     0.000       9.0"
"                 335.200     0.000      10.0"
"                 335.300     0.002      10.1"
"                 335.400     0.006      10.2"
"                 335.500     0.008      10.3"
"                 335.600     0.010      10.5"
"                 335.700     0.011      10.6"
"                 335.800     0.013      10.7"
"                 335.900     0.014      10.8"
"                 336.000     0.015      10.9"
"                 336.100     0.016      11.0"
"                 336.200     0.017      11.1"
"                 336.300     0.018      11.2"
"                 336.400     0.019      11.4"
"                 336.500     0.020      11.5"
"                 336.600     0.020      11.6"
"                 336.700     0.021      11.7"
"                 336.800     0.022      11.8"
"                 336.900     0.023      11.9"
"                 337.000     0.023      12.0"
"             1.   TRENCH PIPES"
"               Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                   Invert    length     diam.    grade%     0=Yes  distance"
"                 335.200    10.000     0.000     2.000     1.000     0.000"
"             1.   MANHOLE"
"                   Access"
"                diameter"
"                   1.200"
"             1.   OUTFLOW PIPE"
"             0.   Inflow at upstream end of trench: 1=True; 0=False"
"                Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                  invert    invert    Length  Diameter       'n'   loss Ke"
"                 335.200   335.000    10.000     0.100     0.013     0.500"
"               Peak outflow                 0.003    c.m/sec"
"               Outflow volume               2.657    c.m"
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"             Peak exfiltration             0.000    c.m/sec"
"             Exfiltration volume          12.921    c.m"
"             Maximum level               335.327    metre"
"             Maximum storage              10.143    c.m"
"             Centroidal lag                1.676   hours"
"             Infiltration area 2 sides    10.000   sq.metre"
"             Infiltration Base area       25.000   sq.metre"
"                  0.013     0.013     0.003     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.214    c.m/sec"
"             Hydrograph volume           354.841    c.m"
"                   0.013     0.013     0.003     0.214"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.013     0.000     0.003     0.214"
" 33          CATCHMENT 2017"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2017   Catchment 201-7 - SWMF"
"       40.000   % Impervious"
"        0.211   Total Area"
"       10.000   Flow length"
"       10.000   Overland Slope"
"        0.127   Pervious Area"
"       10.000   Pervious length"
"       10.000   Pervious slope"
"        0.084   Impervious Area"
"       10.000   Impervious length"
"       10.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.290   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.829   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                   0.038     0.000     0.003     0.214 c.m/sec"
"             Catchment 2017         Pervious   Impervious Total Area "
"             Surface Area           0.127      0.084      0.211      hectare"
"             Time of concentration  5.284      0.581      2.201      minutes"
"             Time to Centroid       102.754    86.220     91.914     minutes"
"             Rainfall depth         56.290     56.290     56.290     mm"
"             Rainfall volume        71.26      47.51      118.77     c.m"
"             Rainfall losses        39.958     9.650      27.835     mm"
"             Runoff depth           16.332     46.640     28.455     mm"
"             Runoff volume          20.68      39.36      60.04      c.m"
"             Runoff coefficient     0.290      0.829      0.506      "
"             Maximum flow           0.012      0.033      0.038      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.038     0.038     0.003     0.214"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.038     0.038     0.038     0.214"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.253    c.m/sec"
"             Hydrograph volume           414.881    c.m"
"                   0.038     0.038     0.038     0.253"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.253    c.m/sec"
"             Hydrograph volume           414.881    c.m"
"                   0.038     0.253     0.038     0.000"
" 54          POND DESIGN"
"         0.253   Current peak flow    c.m/sec"
"         0.045   Target outflow    c.m/sec"
"         414.9   Hydrograph volume    c.m"
"           13.   Number of stages"
"       334.400   Minimum water level    metre"
"       335.600   Maximum water level    metre"
"       334.400   Starting water level    metre"
"             0   Keep Design Data: 1 = True; 0 = False"
"                   Level Discharge    Volume"
"                 334.400     0.000     0.000"
"                 334.500   0.00150    40.000"
"                 334.600   0.00230    85.000"
"                 334.700   0.00290   135.000"
"                 334.800   0.03110   189.000"
"                 334.900   0.04300   249.000"
"                 335.000   0.05220   314.000"
"                 335.100   0.05990   384.000"
"                 335.200   0.06680   457.000"
"                 335.300   0.07300   534.000"
"                 335.400    0.1628   614.000"
"                 335.500    0.4275   698.000"
"                 335.600    0.9140   786.000"
"             Peak outflow                  0.044    c.m/sec"
"             Maximum level               334.910    metre"
"             Maximum storage             255.192    c.m"
"             Centroidal lag                6.044   hours"
"                  0.038     0.253     0.044     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                   0.038     0.044     0.044     0.000"
" 54          POND DESIGN"
"         0.044   Current peak flow    c.m/sec"
"         0.045   Target outflow    c.m/sec"
"         402.6   Hydrograph volume    c.m"
"           10.   Number of stages"
"       334.200   Minimum water level    metre"
"       335.100   Maximum water level    metre"
"       334.200   Starting water level    metre"
"             0   Keep Design Data: 1 = True; 0 = False"
"                   Level Discharge    Volume"
"                 334.200     0.000     0.000"
"                 334.300   0.00191    18.000"
"                 334.400   0.00207    38.000"
"                 334.500   0.00225    60.000"
"                 334.600   0.00243    83.000"
"                 334.700   0.00261   109.000"
"                 334.800   0.00281   136.000"
"                 334.900    0.1543   165.000"
"                 335.000    0.4628   196.000"
"                 335.100    0.9060   229.000"
"             Peak outflow                  0.036    c.m/sec"
"             Maximum level               334.822    metre"
"             Maximum storage             142.339    c.m"
"             Centroidal lag               12.714   hours"
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"                0.038     0.044     0.036     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    800"
"             6   Combine "
"           800   Node #"
"                 TORRANCE CREEK"
"               Maximum flow                 0.036    c.m/sec"
"               Hydrograph volume          340.017    c.m"
"                       0.038     0.044     0.036     0.036"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                       0.038     0.000     0.036     0.036"
" 33          CATCHMENT 2021"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2021   Catchment 202-1"
"         0.000   % Impervious"
"         0.863   Total Area"
"        50.000   Flow length"
"         0.500   Overland Slope"
"         0.863   Pervious Area"
"        50.000   Pervious length"
"         0.500   Pervious slope"
"         0.000   Impervious Area"
"        50.000   Impervious length"
"         0.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.292   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   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"
"                       0.034     0.000     0.036     0.036 c.m/sec"
"               Catchment 2021          Pervious   Impervious Total Area "
"               Surface Area            0.863      0.000      0.863      hectare"
"               Time of concentration   34.093     3.752      34.093     minutes"
"               Time to Centroid        138.712    90.510     138.712    minutes"
"               Rainfall depth          56.290     56.290     56.290     mm"
"               Rainfall volume         485.78     0.00       485.78     c.m"
"               Rainfall losses         39.876     6.201      39.876     mm"
"               Runoff depth            16.415     50.089     16.415     mm"
"               Runoff volume           141.66     0.00       141.66     c.m"
"               Runoff coefficient      0.292      0.000      0.292      "
"               Maximum flow            0.034      0.000      0.034      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                       0.034     0.034     0.036     0.036"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                       0.034     0.034     0.034     0.036"
" 40          HYDROGRAPH   Combine    800"
"             6   Combine "
"           800   Node #"
"                 TORRANCE CREEK"
"               Maximum flow                 0.048    c.m/sec"
"               Hydrograph volume          481.675    c.m"
"                       0.034     0.034     0.034     0.048"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                       0.034     0.000     0.034     0.048"
" 33          CATCHMENT 2022"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2022   Catchment 202-2"
"         24.000   % Impervious"
"         0.184   Total Area"
"        10.000   Flow length"
"         2.000   Overland Slope"
"         0.140   Pervious Area"
"        10.000   Pervious length"
"         2.000   Pervious slope"
"         0.044   Impervious Area"
"        10.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.291   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   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"
"                       0.021     0.000     0.034     0.048 c.m/sec"
"               Catchment 2022          Pervious   Impervious Total Area "
"               Surface Area            0.140      0.044      0.184      hectare"
"               Time of concentration   8.564      0.942      4.855      minutes"
"               Time to Centroid        106.793    86.363     96.852     minutes"
"               Rainfall depth          56.290     56.290     56.290     mm"
"               Rainfall volume         78.72      24.86      103.57     c.m"
"               Rainfall losses         39.928     7.184      32.069     mm"
"               Runoff depth            16.362     49.106     24.221     mm"
"               Runoff volume           22.88      21.69      44.57      c.m"
"               Runoff coefficient      0.291      0.872      0.430      "
"               Maximum flow            0.012      0.018      0.021      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                       0.021     0.021     0.034     0.048"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                       0.021     0.021     0.021     0.048"
" 40          HYDROGRAPH   Combine    800"
"             6   Combine "
"           800   Node #"
"                 TORRANCE CREEK"
"               Maximum flow                 0.050    c.m/sec"
"               Hydrograph volume          526.241    c.m"
"                       0.021     0.021     0.021     0.050"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                       0.021     0.000     0.021     0.050"
" 33          CATCHMENT 2031"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2031   Catchment 203-1"
"         30.000   % Impervious"
"         0.216   Total Area"
"       130.000   Flow length"
"         2.000   Overland Slope"
"         0.151   Pervious Area"
"       130.000   Pervious length"
"         2.000   Pervious slope"
"         0.065   Impervious Area"
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"      130.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.292   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                  0.024     0.000     0.021     0.050 c.m/sec"
"            Catchment 2031         Pervious   Impervious Total Area "
"            Surface Area           0.151      0.065      0.216      hectare"
"            Time of concentration  39.905     4.391      19.696     minutes"
"            Time to Centroid       145.975    91.370     114.901    minutes"
"            Rainfall depth         56.290     56.290     56.290     mm"
"            Rainfall volume        85.11      36.48      121.59     c.m"
"            Rainfall losses        39.875     5.711      29.626     mm"
"            Runoff depth           16.415     50.579     26.665     mm"
"            Runoff volume          24.82      32.78      57.60      c.m"
"            Runoff coefficient     0.292      0.899      0.474      "
"            Maximum flow           0.005      0.023      0.024      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.024     0.024     0.021     0.050"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.024     0.024     0.024     0.050"
" 40         HYDROGRAPH   Combine    700"
"          6   Combine "
"        700   Node #"
"              CULVERT"
"            Maximum flow                0.024    c.m/sec"
"            Hydrograph volume           57.595    c.m"
"                  0.024     0.024     0.024     0.024"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  0.024     0.000     0.024     0.024"
" 33         CATCHMENT 2032"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"       2032   Catchment 203-2"
"      0.000   % Impervious"
"      0.113   Total Area"
"     10.000   Flow length"
"     33.000   Overland Slope"
"      0.113   Pervious Area"
"     10.000   Pervious length"
"     33.000   Pervious slope"
"      0.000   Impervious Area"
"     10.000   Impervious length"
"     33.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     74.000   Pervious SCS Curve No."
"      0.285   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      8.924   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"
"                  0.012     0.000     0.024     0.024 c.m/sec"
"            Catchment 2032         Pervious   Impervious Total Area "
"            Surface Area           0.113      0.000      0.113      hectare"
"            Time of concentration  3.693      0.406      3.693      minutes"
"            Time to Centroid       100.959    85.958     100.959    minutes"
"            Rainfall depth         56.290     56.290     56.290     mm"
"            Rainfall volume        63.61      0.00       63.61      c.m"
"            Rainfall losses        40.243     11.359     40.243     mm"
"            Runoff depth           16.047     44.931     16.047     mm"
"            Runoff volume          18.13      0.00       18.13      c.m"
"            Runoff coefficient     0.285      0.000      0.285      "
"            Maximum flow           0.012      0.000      0.012      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.012     0.012     0.024     0.024"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.012     0.012     0.012     0.024"
" 40         HYDROGRAPH   Combine    700"
"          6   Combine "
"        700   Node #"
"              CULVERT"
"            Maximum flow                0.036    c.m/sec"
"            Hydrograph volume           75.729    c.m"
"                  0.012     0.012     0.012     0.036"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  0.012     0.000     0.012     0.036"
" 33         CATCHMENT 2033"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"       2033   Catchment 203-3"
"     100.000   % Impervious"
"      0.092   Total Area"
"     10.000   Flow length"
"      2.000   Overland Slope"
"      0.000   Pervious Area"
"     10.000   Pervious length"
"      2.000   Pervious slope"
"      0.092   Impervious Area"
"     10.000   Impervious length"
"      2.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     74.000   Pervious SCS Curve No."
"      0.000   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      8.924   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"
"                  0.036     0.000     0.012     0.036 c.m/sec"
"            Catchment 2033         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.092      0.092      hectare"
"            Time of concentration  8.564      0.942      0.942      minutes"
"            Time to Centroid       106.793    86.363     86.363     minutes"
"            Rainfall depth         56.290     56.290     56.290     mm"
"            Rainfall volume        0.00       51.79      51.79      c.m"
"            Rainfall losses        39.928     7.184      7.184      mm"
"            Runoff depth           16.362     49.106     49.106     mm"
"            Runoff volume          0.00       45.18      45.18      c.m"
"            Runoff coefficient     0.000      0.872      0.872      "
"            Maximum flow           0.000      0.036      0.036      c.m/sec"
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" 40          HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                      0.036     0.036     0.012     0.036"
" 57          TRENCH Design d/s of 2033"
"         0.036   Peak inflow"
"        45.178   Hydrograph volume"
"       337.000   Ground elevation"
"       334.500   Downstream trench invert"
"         1.000   Trench height"
"       333.500   Water table elevation"
"         1.000   Trench top width"
"         1.000   Trench bottom width"
"        40.000   Voids ratio (%)"
"        30.000   Hydraulic conductivity"
"         0.000   Trench gradient (%)"
"        60.000   Trench length"
"         1.000   Include base width"
"           26.   Number of stages"
"                   Level Discharge    Volume"
"                 334.500     0.000       0.0"
"                 334.600     0.000       2.4"
"                 334.700     0.000       4.8"
"                 334.800     0.000       7.2"
"                 334.900     0.000       9.6"
"                 335.000     0.000      12.0"
"                 335.100     0.000      14.4"
"                 335.200     0.000      16.8"
"                 335.300     0.000      19.2"
"                 335.400     0.000      21.6"
"                 335.500     0.000      24.0"
"                 335.600     0.004      24.1"
"                 335.700     0.006      24.2"
"                 335.800     0.008      24.3"
"                 335.900     0.010      24.5"
"                 336.000     0.011      24.6"
"                 336.100     0.013      24.7"
"                 336.200     0.014      24.8"
"                 336.300     0.015      24.9"
"                 336.400     0.016      25.0"
"                 336.500     0.017      25.1"
"                 336.600     0.018      25.2"
"                 336.700     0.019      25.4"
"                 336.800     0.020      25.5"
"                 336.900     0.020      25.6"
"                 337.000     0.021      25.7"
"             1.   TRENCH PIPES"
"               Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                   Invert    length     diam.    grade%     0=Yes  distance"
"                 335.500    20.000     0.000     1.000     1.000     0.000"
"             1.   MANHOLE"
"                   Access"
"                 diameter"
"                    1.200"
"             1.   OUTFLOW PIPE"
"             0.   Inflow at upstream end of trench: 1=True; 0=False"
"                 Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                   invert    invert    Length  Diameter       'n'   loss Ke"
"                 335.500   335.300    20.000     0.100     0.013     0.500"
"               Peak outflow                 0.012    c.m/sec"
"               Outflow volume               8.771    c.m"
"               Peak exfiltration            0.003    c.m/sec"
"               Exfiltration volume         35.902    c.m"
"               Maximum level              336.118    metre"
"               Maximum storage             24.699    c.m"
"               Centroidal lag               1.522   hours"
"               Infiltration area 2 sides   120.000   sq.metre"
"               Infiltration Base area       60.000   sq.metre"
"                    0.036     0.036     0.012     0.003 c.m/sec"
" 40          HYDROGRAPH   Combine    700"
"              6   Combine "
"            700   Node #"
"                  CULVERT"
"               Maximum flow                  0.036    c.m/sec"
"               Hydrograph volume            84.500    c.m"
"                      0.036     0.036     0.012     0.036"
" 40          HYDROGRAPH Start - New Tributary"
"              2   Start - New Tributary"
"                      0.036     0.000     0.012     0.036"
" 33          CATCHMENT 204"
"              1   Triangular SCS"
"              1   Equal length"
"              1   SCS method"
"            204   Catchment 204"
"          0.000   % Impervious"
"          0.198   Total Area"
"          8.000   Flow length"
"         20.000   Overland Slope"
"          0.198   Pervious Area"
"          8.000   Pervious length"
"         20.000   Pervious slope"
"          0.000   Impervious Area"
"          8.000   Impervious length"
"         20.000   Impervious slope"
"          0.250   Pervious Manning 'n'"
"         74.000   Pervious SCS Curve No."
"          0.286   Pervious Runoff coefficient"
"          0.100   Pervious Ia/S coefficient"
"          8.924   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"
"                      0.021     0.000     0.012     0.036 c.m/sec"
"               Catchment 204          Pervious   Impervious Total Area "
"               Surface Area           0.198      0.000      0.198      hectare"
"               Time of concentration  3.754      0.413      3.754      minutes"
"               Time to Centroid       101.003    85.977     101.003    minutes"
"               Rainfall depth         56.290     56.290     56.290     mm"
"               Rainfall volume        111.45     0.00       111.45     c.m"
"               Rainfall losses        40.210     11.286     40.210     mm"
"               Runoff depth           16.080     45.004     16.080     mm"
"               Runoff volume          31.84      0.00       31.84      c.m"
"               Runoff coefficient     0.286      0.000      0.286      "
"               Maximum flow           0.021      0.000      0.021      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"              4   Add Runoff "
"                      0.021     0.021     0.012     0.036"
" 40          HYDROGRAPH Copy to Outflow"
"              8   Copy to Outflow"
"                      0.021     0.021     0.021     0.036"
" 40          HYDROGRAPH   Combine    700"
"              6   Combine "
"            700   Node #"
"                  CULVERT"
"               Maximum flow                  0.057    c.m/sec"
"               Hydrograph volume           116.338    c.m"
"                      0.021     0.021     0.021     0.057"
" 40          HYDROGRAPH   Confluence    700"
"              7   Confluence "
```

```
"          700   Node #"
"                CULVERT"
"             Maximum flow                  0.057    c.m/sec"
"             Hydrograph volume           116.338    c.m"
"                    0.021     0.057     0.021     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.021     0.057     0.057     0.000"
" 40          HYDROGRAPH   Combine    800"
"             6   Combine "
"          800   Node #"
"                TORRANCE CREEK"
"             Maximum flow                  0.086    c.m/sec"
"             Hydrograph volume           642.579    c.m"
"                    0.021     0.057     0.057     0.086"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    0.021     0.000     0.057     0.086"
" 33          CATCHMENT 2051"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2051   Catchment 205-1"
"        25.000   % Impervious"
"         0.098   Total Area"
"        15.000   Flow length"
"         2.000   Overland Slope"
"         0.073   Pervious Area"
"        15.000   Pervious length"
"         2.000   Pervious slope"
"         0.024   Impervious Area"
"        15.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.291   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.887   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.011     0.000     0.057     0.086 c.m/sec"
"             Catchment 2051         Pervious   Impervious Total Area "
"             Surface Area           0.073      0.024      0.098      hectare"
"             Time of concentration  10.922     1.202      6.025      minutes"
"             Time to Centroid       109.745    86.719     98.145     minutes"
"             Rainfall depth         56.290     56.290     56.290     mm"
"             Rainfall volume        41.37      13.79      55.16      c.m"
"             Rainfall losses        39.899     6.369      31.517     mm"
"             Runoff depth           16.391     49.921     24.773     mm"
"             Runoff volume          12.05      12.23      24.28      c.m"
"             Runoff coefficient     0.291      0.887      0.440      "
"             Maximum flow           0.006      0.010      0.011      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.011     0.011     0.057     0.086"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.011     0.011     0.011     0.086"
" 40          HYDROGRAPH   Combine    600"
"             6   Combine "
"          600   Node #"
"                Arkell Rd"
"             Maximum flow                  0.011    c.m/sec"
"             Hydrograph volume            24.278    c.m"
"                    0.011     0.011     0.011     0.011"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    0.011     0.000     0.011     0.011"
" 33          CATCHMENT 2052"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2052   Catchment 205-2"
"        40.000   % Impervious"
"         0.108   Total Area"
"        25.000   Flow length"
"         5.000   Overland Slope"
"         0.065   Pervious Area"
"        25.000   Pervious length"
"         5.000   Pervious slope"
"         0.043   Impervious Area"
"        25.000   Impervious length"
"         5.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.291   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   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"
"                    0.018     0.000     0.011     0.011 c.m/sec"
"             Catchment 2052         Pervious   Impervious Total Area "
"             Surface Area           0.065      0.043      0.108      hectare"
"             Time of concentration  11.273     1.241      4.548      minutes"
"             Time to Centroid       110.187    86.762     94.485     minutes"
"             Rainfall depth         56.290     56.290     56.290     mm"
"             Rainfall volume        36.48      24.32      60.79      c.m"
"             Rainfall losses        39.899     6.298      26.459     mm"
"             Runoff depth           16.391     49.992     29.832     mm"
"             Runoff volume          10.62      21.60      32.22      c.m"
"             Runoff coefficient     0.291      0.888      0.530      "
"             Maximum flow           0.005      0.017      0.018      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.018     0.018     0.011     0.011"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.018     0.018     0.018     0.011"
" 40          HYDROGRAPH   Combine    600"
"             6   Combine "
"          600   Node #"
"                Arkell Rd"
"             Maximum flow                  0.029    c.m/sec"
"             Hydrograph volume            56.496    c.m"
"                    0.018     0.018     0.018     0.029"
" 40          HYDROGRAPH   Confluence    600"
"             7   Confluence "
"          600   Node #"
"                Arkell Rd"
"             Maximum flow                  0.029    c.m/sec"
"             Hydrograph volume            56.496    c.m"
"                    0.018     0.029     0.018     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
```

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"                   0.018     0.029     0.029     0.000"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                 0.112    c.m/sec"
"             Hydrograph volume          699.075    c.m"
"                   0.018     0.029     0.029     0.112"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.018     0.000     0.029     0.112"
" 33          CATCHMENT 206"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         206   Catchment 206"
"      70.000   % Impervious"
"       0.035   Total Area"
"      20.000   Flow length"
"       1.250   Overland Slope"
"       0.011   Pervious Area"
"      20.000   Pervious length"
"       1.250   Pervious slope"
"       0.024   Impervious Area"
"      20.000   Impervious length"
"       1.250   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.291   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.009     0.000     0.029     0.112 c.m/sec"
"            Catchment 206          Pervious   Impervious Total Area "
"            Surface Area           0.011      0.024      0.035      hectare"
"            Time of concentration  14.946     1.645      3.273      minutes"
"            Time to Centroid       114.808    87.294     90.663     minutes"
"            Rainfall depth         56.290     56.290     56.290     mm"
"            Rainfall volume        5.91       13.79      19.70      c.m"
"            Rainfall losses        39.897     5.940      16.127     mm"
"            Runoff depth           16.393     50.350     40.163     mm"
"            Runoff volume          1.72       12.34      14.06      c.m"
"            Runoff coefficient     0.291      0.894      0.714      "
"            Maximum flow           0.001      0.009      0.009      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.009     0.009     0.029     0.112"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.009     0.009     0.009     0.112"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                 0.119    c.m/sec"
"             Hydrograph volume          713.132    c.m"
"                   0.009     0.009     0.009     0.119"
" 40          HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                 0.119    c.m/sec"
"             Hydrograph volume          713.132    c.m"
"                   0.009     0.119     0.009     0.000"
" 38          START/RE-START TOTALS 800"
"           3   Runoff Totals on EXIT"
"             Total Catchment area                    3.108    hectare"
"             Total Impervious area                   1.071    hectare"
"             Total % impervious                     34.445"
" 19          EXIT"
```

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"               MIDUSS Output ------------------------------------------------>"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                        Sunday, February 7, 2010"
"          10   Units used:                                        ie METRIC"
"               Job folder:           Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                        POST"
"               Output filename:                                 25yrPOST.in"
"               Licensee name:                                             A"
"               Company                                             Microsoft"
"               Date & Time last used:                10/5/2021 at 2:05:14 PM"
" 31          TIME PARAMETERS"
"       5.000   Time Step"
"     180.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"    3158.000   Coefficient A"
"      15.000   Constant B"
"       0.936   Exponent C"
"       0.400   Fraction R"
"     180.000   Duration"
"       1.000   Time step multiplier"
"             Maximum intensity          191.271    mm/hr"
"             Total depth                 68.087    mm"
"           6   025hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 2011"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2011   Catchment 201-1"
"      60.000   % Impervious"
"       0.519   Total Area"
"      60.000   Flow length"
"       0.750   Overland Slope"
"       0.208   Pervious Area"
"      60.000   Pervious length"
"       0.750   Pervious slope"
"       0.311   Impervious Area"
"      60.000   Impervious length"
"       0.750   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.346   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.903   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.128     0.000     0.000     0.000 c.m/sec"
"             Catchment 2011         Pervious   Impervious Total Area "
"             Surface Area           0.208      0.311      0.519      hectare"
"             Time of concentration  29.417     3.518      8.791      minutes"
"             Time to Centroid       131.369    89.616     98.117     minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        141.35     212.02     353.37     c.m"
"             Rainfall losses        44.516     6.617      21.777     mm"
"             Runoff depth           23.571     61.469     46.310     mm"
"             Runoff volume          48.93      191.41     240.35     c.m"
"             Runoff coefficient     0.346      0.903      0.680      "
"             Maximum flow           0.014      0.124      0.128      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.128     0.128     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.128     0.128     0.128     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.128    c.m/sec"
"             Hydrograph volume           240.348    c.m"
"                   0.128     0.128     0.128     0.128"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.128     0.000     0.128     0.128"
" 33          CATCHMENT 2012"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2012   Catchment 201-2"
"      70.000   % Impervious"
"       0.066   Total Area"
"      15.000   Flow length"
"       0.500   Overland Slope"
"       0.020   Pervious Area"
"      15.000   Pervious length"
"       0.500   Pervious slope"
"       0.046   Impervious Area"
"      15.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.346   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.910   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.021     0.000     0.128     0.128 c.m/sec"
"             Catchment 2012         Pervious   Impervious Total Area "
"             Surface Area           0.020      0.046      0.066      hectare"
"             Time of concentration  14.461     1.729      3.511      minutes"
"             Time to Centroid       112.827    86.924     90.550     minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        13.48      31.46      44.94      c.m"
"             Rainfall losses        44.561     6.138      17.665     mm"
"             Runoff depth           23.526     61.949     50.422     mm"
"             Runoff volume          4.66       28.62      33.28      c.m"
"             Runoff coefficient     0.346      0.910      0.741      "
"             Maximum flow           0.002      0.020      0.021      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.021     0.021     0.128     0.128"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.021     0.021     0.021     0.128"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.145    c.m/sec"
"             Hydrograph volume           273.626    c.m"
"                   0.021     0.021     0.021     0.145"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
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"                   0.021     0.000     0.021     0.145"
" 33          CATCHMENT 2013"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2013   Catchment 201-3"
"      75.000   % Impervious"
"       0.234   Total Area"
"      15.000   Flow length"
"       2.000   Overland Slope"
"       0.058   Pervious Area"
"      15.000   Pervious length"
"       2.000   Pervious slope"
"       0.176   Impervious Area"
"      15.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.344   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.082     0.000     0.021     0.145 c.m/sec"
"             Catchment 2013         Pervious   Impervious Total Area "
"             Surface Area           0.058      0.176      0.234      hectare"
"             Time of concentration  9.541      1.141      2.092      minutes"
"             Time to Centroid       106.721    86.165     88.492     minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        39.83      119.49     159.32     c.m"
"             Rainfall losses        44.632     6.843      16.290     mm"
"             Runoff depth           23.455     61.244     51.796     mm"
"             Runoff volume          13.72      107.48     121.20     c.m"
"             Runoff coefficient     0.344      0.899      0.761      "
"             Maximum flow           0.007      0.080      0.082      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.082     0.082     0.021     0.145"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.082     0.082     0.082     0.145"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                 0.225    c.m/sec"
"             Hydrograph volume          394.830    c.m"
"                   0.082     0.082     0.082     0.225"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.082     0.000     0.082     0.225"
" 33          CATCHMENT 2014"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2014   Catchment 201-4"
"     100.000   % Impervious"
"       0.065   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.065   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.883   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.030     0.000     0.082     0.225 c.m/sec"
"             Catchment 2014         Pervious   Impervious Total Area "
"             Surface Area           0.000      0.065      0.065      hectare"
"             Time of concentration  7.480      0.894      0.894      minutes"
"             Time to Centroid       104.266    85.842     85.842     minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        0.00       44.26      44.26      c.m"
"             Rainfall losses        44.633     7.961      7.961      mm"
"             Runoff depth           23.454     60.125     60.125     mm"
"             Runoff volume          0.00       39.08      39.08      c.m"
"             Runoff coefficient     0.000      0.883      0.883      "
"             Maximum flow           0.000      0.030      0.030      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.030     0.030     0.082     0.225"
" 57          TRENCH Design d/s of 2014"
"       0.030   Peak inflow"
"      39.081   Hydrograph volume"
"     337.000   Ground elevation"
"     334.200   Downstream trench invert"
"       1.000   Trench height"
"     333.200   Water table elevation"
"       5.000   Trench top width"
"       5.000   Trench bottom width"
"      40.000   Voids ratio (%)"
"      30.000   Hydraulic conductivity"
"       0.000   Trench gradient (%)"
"      10.000   Trench length"
"       1.000   Include base width"
"         29.   Number of stages"
"                 Level Discharge    Volume"
"               334.200     0.000       0.0"
"               334.300     0.000       2.0"
"               334.400     0.000       4.0"
"               334.500     0.000       6.0"
"               334.600     0.000       8.0"
"               334.700     0.000      10.0"
"               334.800     0.000      12.0"
"               334.900     0.000      14.0"
"               335.000     0.000      16.0"
"               335.100     0.000      18.0"
"               335.200     0.000      20.0"
"               335.300     0.004      20.1"
"               335.400     0.006      20.2"
"               335.500     0.008      20.3"
"               335.600     0.010      20.5"
"               335.700     0.011      20.6"
"               335.800     0.013      20.7"
"               335.900     0.014      20.8"
"               336.000     0.015      20.9"
"               336.100     0.016      21.0"
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"               336.200     0.017      21.1"
"               336.300     0.018      21.2"
"               336.400     0.019      21.4"
"               336.500     0.020      21.5"
"               336.600     0.020      21.6"
"               336.700     0.021      21.7"
"               336.800     0.022      21.8"
"               336.900     0.023      21.9"
"               337.000     0.023      22.0"
"          1.   TRENCH PIPES"
"            Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                Invert    length     diam.    grade%     0=Yes  distance"
"               335.200    20.000     0.000     1.000     1.000     0.000"
"          1.   MANHOLE"
"                Access"
"              diameter"
"                 1.200"
"          1.   OUTFLOW PIPE"
"          0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                invert    invert    Length  Diameter       'n'   loss Ke"
"               335.200   335.000    20.000     0.100     0.013     0.500"
"            Peak outflow                  0.012    c.m/sec"
"            Outflow volume               11.284    c.m"
"            Peak exfiltration             0.001    c.m/sec"
"            Exfiltration volume          26.325    c.m"
"            Maximum level               335.868    metre"
"            Maximum storage              20.756    c.m"
"            Centroidal lag                1.604   hours"
"            Infiltration area 2 sides    20.000   sq.metre"
"            Infiltration Base area       50.000   sq.metre"
"                 0.030     0.030     0.012     0.001 c.m/sec"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              SWMF"
"            Maximum flow                  0.225    c.m/sec"
"            Hydrograph volume           406.114    c.m"
"                    0.030     0.030     0.012     0.225"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                    0.030     0.000     0.012     0.225"
" 33         CATCHMENT 2015"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2015   Catchment 201-5"
"       85.000   % Impervious"
"        0.074   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.011   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.063   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.344   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   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"
"                    0.029     0.000     0.012     0.225 c.m/sec"
"            Catchment 2015         Pervious   Impervious Total Area "
"            Surface Area           0.011      0.063      0.074      hectare"
"            Time of concentration  9.541      1.141      1.673      minutes"
"            Time to Centroid       106.721    86.165     87.466     minutes"
"            Rainfall depth         68.087     68.087     68.087     mm"
"            Rainfall volume        7.56       42.83      50.38      c.m"
"            Rainfall losses        44.632     6.843      12.511     mm"
"            Runoff depth           23.455     61.244     55.575     mm"
"            Runoff volume          2.60       38.52      41.13      c.m"
"            Runoff coefficient     0.344      0.899      0.816      "
"            Maximum flow           0.001      0.029      0.029      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                    0.029     0.029     0.012     0.225"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                    0.029     0.029     0.029     0.225"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              SWMF"
"            Maximum flow                  0.254    c.m/sec"
"            Hydrograph volume           447.240    c.m"
"                    0.029     0.029     0.029     0.254"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                    0.029     0.000     0.029     0.254"
" 33         CATCHMENT 2016"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2016   Catchment 201-6"
"      100.000   % Impervious"
"        0.032   Total Area"
"       10.000   Flow length"
"        2.000   Overland Slope"
"        0.000   Pervious Area"
"       10.000   Pervious length"
"        2.000   Pervious slope"
"        0.032   Impervious Area"
"       10.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.883   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.015     0.000     0.029     0.254 c.m/sec"
"            Catchment 2016         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.032      0.032      hectare"
"            Time of concentration  7.480      0.894      0.894      minutes"
"            Time to Centroid       104.266    85.842     85.842     minutes"
"            Rainfall depth         68.087     68.087     68.087     mm"
"            Rainfall volume        0.00       21.79      21.79      c.m"
"            Rainfall losses        44.633     7.961      7.961      mm"
"            Runoff depth           23.454     60.125     60.125     mm"
"            Runoff volume          0.00       19.24      19.24      c.m"
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"             Runoff coefficient     0.000      0.883      0.883      "
"             Maximum flow           0.000      0.015      0.015      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.015     0.015     0.029     0.254"
" 57          TRENCH Design d/s of 2016"
"         0.015   Peak inflow"
"        19.240   Hydrograph volume"
"       337.000   Ground elevation"
"       334.200   Downstream trench invert"
"         1.000   Trench height"
"       333.200   Water table elevation"
"         5.000   Trench top width"
"         5.000   Trench bottom width"
"        40.000   Voids ratio (%)"
"        30.000   Hydraulic conductivity"
"         0.000   Trench gradient (%)"
"         5.000   Trench length"
"         1.000   Include base width"
"           29.   Number of stages"
"                   Level Discharge    Volume"
"                 334.200     0.000       0.0"
"                 334.300     0.000       1.0"
"                 334.400     0.000       2.0"
"                 334.500     0.000       3.0"
"                 334.600     0.000       4.0"
"                 334.700     0.000       5.0"
"                 334.800     0.000       6.0"
"                 334.900     0.000       7.0"
"                 335.000     0.000       8.0"
"                 335.100     0.000       9.0"
"                 335.200     0.000      10.0"
"                 335.300     0.002      10.1"
"                 335.400     0.006      10.2"
"                 335.500     0.008      10.3"
"                 335.600     0.010      10.5"
"                 335.700     0.011      10.6"
"                 335.800     0.013      10.7"
"                 335.900     0.014      10.8"
"                 336.000     0.015      10.9"
"                 336.100     0.016      11.0"
"                 336.200     0.017      11.1"
"                 336.300     0.018      11.2"
"                 336.400     0.019      11.4"
"                 336.500     0.020      11.5"
"                 336.600     0.020      11.6"
"                 336.700     0.021      11.7"
"                 336.800     0.022      11.8"
"                 336.900     0.023      11.9"
"                 337.000     0.023      12.0"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"                 335.200   10.000     0.000     2.000     1.000     0.000"
"           1.   MANHOLE"
"                 Access"
"                diameter"
"                  1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"               Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                 invert    invert    Length  Diameter       'n'   loss Ke"
"                 335.200   335.000    10.000     0.100     0.013     0.500"
"             Peak outflow                 0.006    c.m/sec"
"             Outflow volume               5.450    c.m"
"             Peak exfiltration            0.000    c.m/sec"
"             Exfiltration volume         13.116    c.m"
"             Maximum level              335.456    metre"
"             Maximum storage             10.289    c.m"
"             Centroidal lag               1.609   hours"
"             Infiltration area 2 sides   10.000   sq.metre"
"             Infiltration Base area      25.000   sq.metre"
"                  0.015     0.015     0.006     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
"             Maximum flow                 0.254    c.m/sec"
"             Hydrograph volume          452.690    c.m"
"                    0.015     0.015     0.006     0.254"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.015     0.000     0.006     0.254"
" 33          CATCHMENT 2017"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2017   Catchment 201-7 - SWMF"
"        40.000   % Impervious"
"         0.211   Total Area"
"        10.000   Flow length"
"        10.000   Overland Slope"
"         0.127   Pervious Area"
"        10.000   Pervious length"
"        10.000   Pervious slope"
"         0.084   Impervious Area"
"        10.000   Impervious length"
"        10.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.344   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.835   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.048     0.000     0.006     0.254 c.m/sec"
"             Catchment 2017         Pervious   Impervious Total Area "
"             Surface Area           0.127      0.084      0.211      hectare"
"             Time of concentration  4.616      0.552      2.105      minutes"
"             Time to Centroid       100.646    85.713     91.419     minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        86.20      57.47      143.66     c.m"
"             Rainfall losses        44.649     11.241     31.286     mm"
"             Runoff depth           23.437     56.845     36.801     mm"
"             Runoff volume          29.67      47.98      77.65      c.m"
"             Runoff coefficient     0.344      0.835      0.540      "
"             Maximum flow           0.019      0.038      0.048      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.048     0.048     0.006     0.254"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.048     0.048     0.048     0.254"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
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"             Maximum flow                  0.301    c.m/sec"
"             Hydrograph volume           530.339    c.m"
"                    0.048     0.048     0.048     0.301"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.301    c.m/sec"
"             Hydrograph volume           530.339    c.m"
"                    0.048     0.301     0.048     0.000"
" 54          POND DESIGN"
"       0.301   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       530.3   Hydrograph volume    c.m"
"         13.   Number of stages"
"     334.400   Minimum water level    metre"
"     335.600   Maximum water level    metre"
"     334.400   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.400     0.000     0.000"
"               334.500   0.00150    40.000"
"               334.600   0.00230    85.000"
"               334.700   0.00290   135.000"
"               334.800   0.03110   189.000"
"               334.900   0.04300   249.000"
"               335.000   0.05220   314.000"
"               335.100   0.05990   384.000"
"               335.200   0.06680   457.000"
"               335.300   0.07300   534.000"
"               335.400    0.1628   614.000"
"               335.500    0.4275   698.000"
"               335.600    0.9140   786.000"
"             Peak outflow                  0.054    c.m/sec"
"             Maximum level               335.020    metre"
"             Maximum storage             328.056    c.m"
"             Centroidal lag                5.448   hours"
"                  0.048     0.301     0.054     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                    0.048     0.054     0.054     0.000"
" 54          POND DESIGN"
"       0.054   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       516.7   Hydrograph volume    c.m"
"         10.   Number of stages"
"     334.200   Minimum water level    metre"
"     335.100   Maximum water level    metre"
"     334.200   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.200     0.000     0.000"
"               334.300   0.00191    18.000"
"               334.400   0.00207    38.000"
"               334.500   0.00225    60.000"
"               334.600   0.00243    83.000"
"               334.700   0.00261   109.000"
"               334.800   0.00281   136.000"
"               334.900    0.1543   165.000"
"               335.000    0.4628   196.000"
"               335.100    0.9060   229.000"
"             Peak outflow                  0.050    c.m/sec"
"             Maximum level               334.831    metre"
"             Maximum storage             144.995    c.m"
"             Centroidal lag               10.744   hours"
"                    0.048     0.054     0.050     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.050    c.m/sec"
"             Hydrograph volume           451.151    c.m"
"                    0.048     0.054     0.050     0.050"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.048     0.000     0.050     0.050"
" 33          CATCHMENT 2021"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2021   Catchment 202-1"
"       0.000   % Impervious"
"       0.863   Total Area"
"      50.000   Flow length"
"       0.500   Overland Slope"
"       0.863   Pervious Area"
"      50.000   Pervious length"
"       0.500   Pervious slope"
"       0.000   Impervious Area"
"      50.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.346   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.057     0.000     0.050     0.050 c.m/sec"
"            Catchment 2021         Pervious   Impervious Total Area "
"            Surface Area           0.863      0.000      0.863      hectare"
"            Time of concentration  29.780     3.561      29.780     minutes"
"            Time to Centroid       131.824    89.674     131.824    minutes"
"            Rainfall depth         68.087     68.087     68.087     mm"
"            Rainfall volume        587.59     0.00       587.59     c.m"
"            Rainfall losses        44.508     6.651      44.508     mm"
"            Runoff depth           23.579     61.435     23.579     mm"
"            Runoff volume          203.48     0.00       203.48     c.m"
"            Runoff coefficient     0.346      0.000      0.346      "
"            Maximum flow           0.057      0.000      0.057      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.057     0.057     0.050     0.050"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.057     0.057     0.057     0.050"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.072    c.m/sec"
"             Hydrograph volume           654.635    c.m"
"                    0.057     0.057     0.057     0.072"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.057     0.000     0.057     0.072"
" 33          CATCHMENT 2022"
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"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2022   Catchment 202-2"
"      24.000   % Impervious"
"       0.184   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.140   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.044   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.344   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.883   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.029     0.000     0.057     0.072 c.m/sec"
"            Catchment 2022         Pervious   Impervious Total Area "
"            Surface Area           0.140      0.044      0.184      hectare"
"            Time of concentration  7.480      0.894      4.534      minutes"
"            Time to Centroid       104.266    85.842     96.024     minutes"
"            Rainfall depth         68.087     68.087     68.087     mm"
"            Rainfall volume        95.21      30.07      125.28     c.m"
"            Rainfall losses        44.633     7.961      35.831     mm"
"            Runoff depth           23.454     60.125     32.255     mm"
"            Runoff volume          32.80      26.55      59.35      c.m"
"            Runoff coefficient     0.344      0.883      0.474      "
"            Maximum flow           0.019      0.020      0.029      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.029     0.029     0.057     0.072"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.029     0.029     0.029     0.072"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                  0.075    c.m/sec"
"            Hydrograph volume           713.985    c.m"
"                   0.029     0.029     0.029     0.075"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.029     0.000     0.029     0.075"
" 33         CATCHMENT 2031"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2031   Catchment 203-1"
"      30.000   % Impervious"
"       0.216   Total Area"
"     130.000   Flow length"
"       2.000   Overland Slope"
"       0.151   Pervious Area"
"     130.000   Pervious length"
"       2.000   Pervious slope"
"       0.065   Impervious Area"
"     130.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.346   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.029     0.000     0.029     0.075 c.m/sec"
"            Catchment 2031         Pervious   Impervious Total Area "
"            Surface Area           0.151      0.065      0.216      hectare"
"            Time of concentration  34.857     4.168      18.582     minutes"
"            Time to Centroid       138.118    90.497     112.864    minutes"
"            Rainfall depth         68.087     68.087     68.087     mm"
"            Rainfall volume        102.95     44.12      147.07     c.m"
"            Rainfall losses        44.521     6.000      32.965     mm"
"            Runoff depth           23.565     62.087     35.122     mm"
"            Runoff volume          35.63      40.23      75.86      c.m"
"            Runoff coefficient     0.346      0.912      0.516      "
"            Maximum flow           0.009      0.027      0.029      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.029     0.029     0.029     0.075"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.029     0.029     0.029     0.075"
" 40         HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"            Maximum flow                  0.029    c.m/sec"
"            Hydrograph volume            75.863    c.m"
"                   0.029     0.029     0.029     0.029"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.029     0.000     0.029     0.029"
" 33         CATCHMENT 2032"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2032   Catchment 203-2"
"       0.000   % Impervious"
"       0.113   Total Area"
"      10.000   Flow length"
"      33.000   Overland Slope"
"       0.113   Pervious Area"
"      10.000   Pervious length"
"      33.000   Pervious slope"
"       0.000   Impervious Area"
"      10.000   Impervious length"
"      33.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.338   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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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"                   0.017     0.000     0.029     0.029 c.m/sec"
"            Catchment 2032         Pervious   Impervious Total Area "
"            Surface Area           0.113      0.000      0.113      hectare"
"            Time of concentration  3.226      0.386      3.226      minutes"
"            Time to Centroid       99.023     85.385     99.023     minutes"
"            Rainfall depth         68.087     68.087     68.087     mm"
"            Rainfall volume        76.94      0.00       76.94      c.m"
"            Rainfall losses        45.081     13.216     45.081     mm"
"            Runoff depth           23.006     54.870     23.006     mm"
"            Runoff volume          26.00      0.00       26.00      c.m"
"            Runoff coefficient     0.338      0.000      0.338      "
"            Maximum flow           0.017      0.000      0.017      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.017     0.017     0.029     0.029"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.017     0.017     0.017     0.029"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"            Maximum flow                  0.046    c.m/sec"
"            Hydrograph volume           101.859    c.m"
"                   0.017     0.017     0.017     0.046"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.017     0.000     0.017     0.046"
" 33          CATCHMENT 2033"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2033   Catchment 203-3"
"     100.000   % Impervious"
"       0.092   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.092   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.883   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.042     0.000     0.017     0.046 c.m/sec"
"            Catchment 2033         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.092      0.092      hectare"
"            Time of concentration  7.480      0.894      0.894      minutes"
"            Time to Centroid       104.266    85.842     85.842     minutes"
"            Rainfall depth         68.087     68.087     68.087     mm"
"            Rainfall volume        0.00       62.64      62.64      c.m"
"            Rainfall losses        44.633     7.961      7.961      mm"
"            Runoff depth           23.454     60.125     60.125     mm"
"            Runoff volume          0.00       55.32      55.32      c.m"
"            Runoff coefficient     0.000      0.883      0.883      "
"            Maximum flow           0.000      0.042      0.042      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.042     0.042     0.017     0.046"
" 57          TRENCH Design d/s of 2033"
"       0.042   Peak inflow"
"      55.315   Hydrograph volume"
"     337.000   Ground elevation"
"     334.500   Downstream trench invert"
"       1.000   Trench height"
"     333.500   Water table elevation"
"       1.000   Trench top width"
"       1.000   Trench bottom width"
"      40.000   Voids ratio (%)"
"      30.000   Hydraulic conductivity"
"       0.000   Trench gradient (%)"
"      60.000   Trench length"
"       1.000   Include base width"
"         26.   Number of stages"
"                 Level Discharge    Volume"
"               334.500     0.000       0.0"
"               334.600     0.000       2.4"
"               334.700     0.000       4.8"
"               334.800     0.000       7.2"
"               334.900     0.000       9.6"
"               335.000     0.000      12.0"
"               335.100     0.000      14.4"
"               335.200     0.000      16.8"
"               335.300     0.000      19.2"
"               335.400     0.000      21.6"
"               335.500     0.000      24.0"
"               335.600     0.004      24.1"
"               335.700     0.006      24.2"
"               335.800     0.008      24.3"
"               335.900     0.010      24.5"
"               336.000     0.011      24.6"
"               336.100     0.013      24.7"
"               336.200     0.014      24.8"
"               336.300     0.015      24.9"
"               336.400     0.016      25.0"
"               336.500     0.017      25.1"
"               336.600     0.018      25.2"
"               336.700     0.019      25.4"
"               336.800     0.020      25.5"
"               336.900     0.020      25.6"
"               337.000     0.021      25.7"
"         1.   TRENCH PIPES"
"           Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"               Invert    length     diam.    grade%     0=Yes  distance"
"              335.500    20.000     0.000     1.000     1.000     0.000"
"         1.   MANHOLE"
"              Access"
"             diameter"
"                1.200"
"         1.   OUTFLOW PIPE"
"         0.   Inflow at upstream end of trench: 1=True; 0=False"
"            Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"               invert    invert    Length  Diameter       'n'   loss Ke"
"              335.500   335.300    20.000     0.100     0.013     0.500"
"           Peak outflow                 0.020    c.m/sec"
"           Outflow volume              18.859    c.m"
"           Peak exfiltration            0.003    c.m/sec"
"           Exfiltration volume         37.392    c.m"
"           Maximum level              336.946    metre"
"           Maximum storage             25.635    c.m"
"           Centroidal lag               1.475   hours"
```

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"             Infiltration area 2 sides   120.000   sq.metre"
"             Infiltration Base area      60.000   sq.metre"
"                  0.042     0.042     0.020     0.003 c.m/sec"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.066    c.m/sec"
"             Hydrograph volume           120.719    c.m"
"                    0.042     0.042     0.020     0.066"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.042     0.000     0.020     0.066"
" 33          CATCHMENT 204"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         204   Catchment 204"
"       0.000   % Impervious"
"       0.198   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.198   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       8.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.337   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.031     0.000     0.020     0.066 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area "
"             Surface Area           0.198      0.000      0.198      hectare"
"             Time of concentration  3.279      0.392      3.279      minutes"
"             Time to Centroid       99.107     85.405     99.107     minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        134.81     0.00       134.81     c.m"
"             Rainfall losses        45.109     13.152     45.109     mm"
"             Runoff depth           22.977     54.935     22.977     mm"
"             Runoff volume          45.50      0.00       45.50      c.m"
"             Runoff coefficient     0.337      0.000      0.337      "
"             Maximum flow           0.031      0.000      0.031      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.031     0.031     0.020     0.066"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.031     0.031     0.031     0.066"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.097    c.m/sec"
"             Hydrograph volume           166.214    c.m"
"                    0.031     0.031     0.031     0.097"
" 40          HYDROGRAPH   Confluence    700"
"           7   Confluence "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.097    c.m/sec"
"             Hydrograph volume           166.214    c.m"
"                    0.031     0.097     0.031     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.031     0.097     0.097     0.000"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.140    c.m/sec"
"             Hydrograph volume           880.199    c.m"
"                    0.031     0.097     0.097     0.140"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.031     0.000     0.097     0.140"
" 33          CATCHMENT 2051"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2051   Catchment 205-1"
"      25.000   % Impervious"
"       0.098   Total Area"
"      15.000   Flow length"
"       2.000   Overland Slope"
"       0.073   Pervious Area"
"      15.000   Pervious length"
"       2.000   Pervious slope"
"       0.024   Impervious Area"
"      15.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.344   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.015     0.000     0.097     0.140 c.m/sec"
"             Catchment 2051         Pervious   Impervious Total Area "
"             Surface Area           0.073      0.024      0.098      hectare"
"             Time of concentration  9.541      1.141      5.632      minutes"
"             Time to Centroid       106.721    86.165     97.155     minutes"
"             Rainfall depth         68.087     68.087     68.087     mm"
"             Rainfall volume        50.04      16.68      66.72      c.m"
"             Rainfall losses        44.632     6.843      35.185     mm"
"             Runoff depth           23.455     61.244     32.902     mm"
"             Runoff volume          17.24      15.00      32.24      c.m"
"             Runoff coefficient     0.344      0.899      0.483      "
"             Maximum flow           0.009      0.011      0.015      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.015     0.015     0.097     0.140"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.015     0.015     0.015     0.140"
" 40          HYDROGRAPH   Combine    600"
"           6   Combine "
"         600   Node #"
"               Arkell Rd"
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"            Maximum flow                 0.015    c.m/sec"
"            Hydrograph volume           32.244    c.m"
"                   0.015     0.015     0.015     0.015"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.015     0.000     0.015     0.015"
" 33         CATCHMENT 2052"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2052   Catchment 205-2"
"      40.000   % Impervious"
"       0.108   Total Area"
"      25.000   Flow length"
"       5.000   Overland Slope"
"       0.065   Pervious Area"
"      25.000   Pervious length"
"       5.000   Pervious slope"
"       0.043   Impervious Area"
"      25.000   Impervious length"
"       5.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.344   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.022     0.000     0.015     0.015 c.m/sec"
"            Catchment 2052         Pervious   Impervious Total Area "
"            Surface Area           0.065      0.043      0.108      hectare"
"            Time of concentration  9.847      1.177      4.335      minutes"
"            Time to Centroid       107.117    86.210     93.824     minutes"
"            Rainfall depth         68.087     68.087     68.087     mm"
"            Rainfall volume        44.12      29.41      73.53      c.m"
"            Rainfall losses        44.655     6.729      29.485     mm"
"            Runoff depth           23.431     61.358     38.602     mm"
"            Runoff volume          15.18      26.51      41.69      c.m"
"            Runoff coefficient     0.344      0.901      0.567      "
"            Maximum flow           0.008      0.020      0.022      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.022     0.022     0.015     0.015"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.022     0.022     0.022     0.015"
" 40         HYDROGRAPH   Combine    600"
"           6   Combine "
"         600   Node #"
"               Arkell Rd"
"            Maximum flow                 0.035    c.m/sec"
"            Hydrograph volume           73.934    c.m"
"                   0.022     0.022     0.022     0.035"
" 40         HYDROGRAPH   Confluence    600"
"           7   Confluence "
"         600   Node #"
"               Arkell Rd"
"            Maximum flow                 0.035    c.m/sec"
"            Hydrograph volume           73.934    c.m"
"                   0.022     0.035     0.022     0.000"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.022     0.035     0.035     0.000"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                 0.175    c.m/sec"
"            Hydrograph volume          954.133    c.m"
"                   0.022     0.035     0.035     0.175"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.022     0.000     0.035     0.175"
" 33         CATCHMENT 206"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         206   Catchment 206"
"      70.000   % Impervious"
"       0.035   Total Area"
"      20.000   Flow length"
"       1.250   Overland Slope"
"       0.011   Pervious Area"
"      20.000   Pervious length"
"       1.250   Pervious slope"
"       0.024   Impervious Area"
"      20.000   Impervious length"
"       1.250   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.345   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.909   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.011     0.000     0.035     0.175 c.m/sec"
"            Catchment 206          Pervious   Impervious Total Area "
"            Surface Area           0.011      0.024      0.035      hectare"
"            Time of concentration  13.055     1.561      3.170      minutes"
"            Time to Centroid       111.092    86.686     90.102     minutes"
"            Rainfall depth         68.087     68.087     68.087     mm"
"            Rainfall volume        7.15       16.68      23.83      c.m"
"            Rainfall losses        44.589     6.207      17.722     mm"
"            Runoff depth           23.497     61.880     50.365     mm"
"            Runoff volume          2.47       15.16      17.63      c.m"
"            Runoff coefficient     0.345      0.909      0.740      "
"            Maximum flow           0.001      0.011      0.011      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.011     0.011     0.035     0.175"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.011     0.011     0.011     0.175"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                 0.184    c.m/sec"
"            Hydrograph volume          971.760    c.m"
"                   0.011     0.011     0.011     0.184"
" 40         HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               TORRANCE CREEK"
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"            Maximum flow                  0.184    c.m/sec"
"            Hydrograph volume           971.760    c.m"
"                    0.011     0.184     0.011     0.000"
" 38         START/RE-START TOTALS 800"
"           3   Runoff Totals on EXIT"
"            Total Catchment area                    3.108    hectare"
"            Total Impervious area                   1.071    hectare"
"            Total % impervious                     34.445"
" 19         EXIT"
```

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"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                       Sunday, February 7, 2010"
"           10  Units used:                                        ie METRIC"
"               Job folder:           Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                        POST"
"               Output filename:                                  50yrPOST.in"
"               Licensee name:                                              A"
"               Company                                            Microsoft"
"               Date & Time last used:               10/5/2021 at 2:10:05 PM"
" 31         TIME PARAMETERS"
"       5.000   Time Step"
"     180.000   Max. Storm length"
"    1500.000   Max. Hydrograph"
" 32         STORM Chicago storm"
"           1   Chicago storm"
"    3886.000   Coefficient A"
"      16.000   Constant B"
"       0.950   Exponent C"
"       0.400   Fraction R"
"     180.000   Duration"
"       1.000   Time step multiplier"
"            Maximum intensity          215.474    mm/hr"
"            Total depth                 77.443    mm"
"           6   050hyd   Hydrograph extension used in this file"
" 33         CATCHMENT 2011"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2011   Catchment 201-1"
"      60.000   % Impervious"
"       0.519   Total Area"
"      60.000   Flow length"
"       0.750   Overland Slope"
"       0.208   Pervious Area"
"      60.000   Pervious length"
"       0.750   Pervious slope"
"       0.311   Impervious Area"
"      60.000   Impervious length"
"       0.750   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.384   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.913   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.145     0.000     0.000     0.000 c.m/sec"
"            Catchment 2011         Pervious   Impervious Total Area "
"            Surface Area           0.208      0.311      0.519      hectare"
"            Time of concentration  26.629     3.347      8.448      minutes"
"            Time to Centroid       127.071    88.941     97.295     minutes"
"            Rainfall depth         77.443     77.443     77.443     mm"
"            Rainfall volume        160.77     241.16     401.93     c.m"
"            Rainfall losses        47.699     6.760      23.136     mm"
"            Runoff depth           29.744     70.683     54.307     mm"
"            Runoff volume          61.75      220.11     281.85     c.m"
"            Runoff coefficient     0.384      0.913      0.701      "
"            Maximum flow           0.019      0.141      0.145      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.145     0.145     0.000     0.000"
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" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.145     0.145     0.145     0.000"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
"              Maximum flow                  0.145    c.m/sec"
"              Hydrograph volume           281.854    c.m"
"                    0.145     0.145     0.145     0.145"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.145     0.000     0.145     0.145"
" 33          CATCHMENT 2012"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2012   Catchment 201-2"
"       70.000   % Impervious"
"        0.066   Total Area"
"       15.000   Flow length"
"        0.500   Overland Slope"
"        0.020   Pervious Area"
"       15.000   Pervious length"
"        0.500   Pervious slope"
"        0.046   Impervious Area"
"       15.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.383   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.919   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.024     0.000     0.145     0.145 c.m/sec"
"             Catchment 2012         Pervious   Impervious Total Area "
"             Surface Area           0.020      0.046      0.066      hectare"
"             Time of concentration  13.090     1.645      3.380      minutes"
"             Time to Centroid       110.215    86.425     90.030     minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        15.33      35.78      51.11      c.m"
"             Rainfall losses        47.794     6.300      18.749     mm"
"             Runoff depth           29.648     71.142     58.694     mm"
"             Runoff volume          5.87       32.87      38.74      c.m"
"             Runoff coefficient     0.383      0.919      0.758      "
"             Maximum flow           0.003      0.023      0.024      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.024     0.024     0.145     0.145"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.024     0.024     0.024     0.145"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
"              Maximum flow                  0.166    c.m/sec"
"              Hydrograph volume           320.592    c.m"
"                    0.024     0.024     0.024     0.166"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.024     0.000     0.024     0.166"
" 33          CATCHMENT 2013"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2013   Catchment 201-3"
"       75.000   % Impervious"
"        0.234   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.058   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.176   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.383   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.906   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.093     0.000     0.024     0.166 c.m/sec"
"             Catchment 2013         Pervious   Impervious Total Area "
"             Surface Area           0.058      0.176      0.234      hectare"
"             Time of concentration  8.636      1.085      2.018      minutes"
"             Time to Centroid       104.625    85.713     88.049     minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        45.30      135.91     181.22     c.m"
"             Rainfall losses        47.804     7.314      17.437     mm"
"             Runoff depth           29.639     70.128     60.006     mm"
"             Runoff volume          17.34      123.08     140.41     c.m"
"             Runoff coefficient     0.383      0.906      0.775      "
"             Maximum flow           0.009      0.091      0.093      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.093     0.093     0.024     0.166"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.093     0.093     0.093     0.166"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
"              Maximum flow                  0.260    c.m/sec"
"              Hydrograph volume           461.006    c.m"
"                    0.093     0.093     0.093     0.260"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.093     0.000     0.093     0.260"
" 33          CATCHMENT 2014"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2014   Catchment 201-4"
"      100.000   % Impervious"
"        0.065   Total Area"
"       10.000   Flow length"
"        2.000   Overland Slope"
"        0.000   Pervious Area"
"       10.000   Pervious length"
```

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"        2.000   Pervious slope"
"        0.065   Impervious Area"
"       10.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.887   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.033     0.000     0.093     0.260 c.m/sec"
"             Catchment 2014         Pervious   Impervious Total Area "
"             Surface Area           0.000      0.065      0.065      hectare"
"             Time of concentration  6.771      0.851      0.851      minutes"
"             Time to Centroid       102.464    85.418     85.418     minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        0.00       50.34      50.34      c.m"
"             Rainfall losses        48.008     8.731      8.731      mm"
"             Runoff depth           29.434     68.712     68.712     mm"
"             Runoff volume          0.00       44.66      44.66      c.m"
"             Runoff coefficient     0.000      0.887      0.887      "
"             Maximum flow           0.000      0.033      0.033      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                  0.033     0.033     0.093     0.260"
" 57          TRENCH Design d/s of 2014"
"        0.033   Peak inflow"
"       44.663   Hydrograph volume"
"      337.000   Ground elevation"
"      334.200   Downstream trench invert"
"        1.000   Trench height"
"      333.200   Water table elevation"
"        5.000   Trench top width"
"        5.000   Trench bottom width"
"       40.000   Voids ratio (%)"
"       30.000   Hydraulic conductivity"
"        0.000   Trench gradient (%)"
"       10.000   Trench length"
"        1.000   Include base width"
"          29.   Number of stages"
"                  Level Discharge    Volume"
"                334.200     0.000       0.0"
"                334.300     0.000       2.0"
"                334.400     0.000       4.0"
"                334.500     0.000       6.0"
"                334.600     0.000       8.0"
"                334.700     0.000      10.0"
"                334.800     0.000      12.0"
"                334.900     0.000      14.0"
"                335.000     0.000      16.0"
"                335.100     0.000      18.0"
"                335.200     0.000      20.0"
"                335.300     0.004      20.1"
"                335.400     0.006      20.2"
"                335.500     0.008      20.3"
"                335.600     0.010      20.5"
"                335.700     0.011      20.6"
"                335.800     0.013      20.7"
"                335.900     0.014      20.8"
"                336.000     0.015      20.9"
"                336.100     0.016      21.0"
"                336.200     0.017      21.1"
"                336.300     0.018      21.2"
"                336.400     0.019      21.4"
"                336.500     0.020      21.5"
"                336.600     0.020      21.6"
"                336.700     0.021      21.7"
"                336.800     0.022      21.8"
"                336.900     0.023      21.9"
"                337.000     0.023      22.0"
"            1.   TRENCH PIPES"
"              Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                  Invert    length     diam.    grade%     0=Yes  distance"
"                  335.200   20.000     0.000     1.000     1.000     0.000"
"            1.   MANHOLE"
"                  Access"
"                diameter"
"                  1.200"
"            1.   OUTFLOW PIPE"
"            0.   Inflow at upstream end of trench: 1=True; 0=False"
"                Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                  invert    invert    Length  Diameter       'n'   loss Ke"
"                  335.200   335.000   20.000     0.100     0.013     0.500"
"              Peak outflow                  0.017    c.m/sec"
"              Outflow volume               18.824    c.m"
"              Peak exfiltration             0.001    c.m/sec"
"              Exfiltration volume          26.629    c.m"
"              Maximum level               336.319    metre"
"              Maximum storage              21.265    c.m"
"              Centroidal lag                1.535   hours"
"              Infiltration area 2 sides    20.000   sq.metre"
"              Infiltration Base area       50.000   sq.metre"
"                   0.033     0.033     0.017     0.001 c.m/sec"
" 40          HYDROGRAPH   Combine    900"
"             6   Combine "
"           900   Node #"
"                 SWMF"
"              Maximum flow                  0.260    c.m/sec"
"              Hydrograph volume           479.830    c.m"
"                     0.033     0.033     0.017     0.260"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                     0.033     0.000     0.017     0.260"
" 33          CATCHMENT 2015"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2015   Catchment 201-5"
"        85.000   % Impervious"
"         0.074   Total Area"
"        15.000   Flow length"
"         2.000   Overland Slope"
"         0.011   Pervious Area"
"        15.000   Pervious length"
"         2.000   Pervious slope"
"         0.063   Impervious Area"
"        15.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.383   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.906   Impervious Runoff coefficient"
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"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.033     0.000     0.017     0.260 c.m/sec"
"             Catchment 2015         Pervious   Impervious Total Area "
"             Surface Area           0.011      0.063      0.074      hectare"
"             Time of concentration  8.636      1.085      1.610      minutes"
"             Time to Centroid       104.625    85.713     87.026     minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        8.60       48.71      57.31      c.m"
"             Rainfall losses        47.804     7.314      13.388     mm"
"             Runoff depth           29.639     70.128     64.055     mm"
"             Runoff volume          3.29       44.11      47.40      c.m"
"             Runoff coefficient     0.383      0.906      0.827      "
"             Maximum flow           0.002      0.032      0.033      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.033     0.033     0.017     0.260"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.033     0.033     0.033     0.260"
" 40          HYDROGRAPH   Combine    900"
"             6   Combine "
"           900   Node #"
"                 SWMF"
"             Maximum flow                  0.293    c.m/sec"
"             Hydrograph volume           527.231    c.m"
"                    0.033     0.033     0.033     0.293"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    0.033     0.000     0.033     0.293"
" 33          CATCHMENT 2016"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2016   Catchment 201-6"
"       100.000   % Impervious"
"         0.032   Total Area"
"        10.000   Flow length"
"         2.000   Overland Slope"
"         0.000   Pervious Area"
"        10.000   Pervious length"
"         2.000   Pervious slope"
"         0.032   Impervious Area"
"        10.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.000   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.887   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.016     0.000     0.033     0.293 c.m/sec"
"             Catchment 2016         Pervious   Impervious Total Area "
"             Surface Area           0.000      0.032      0.032      hectare"
"             Time of concentration  6.771      0.851      0.851      minutes"
"             Time to Centroid       102.464    85.418     85.418     minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        0.00       24.78      24.78      c.m"
"             Rainfall losses        48.008     8.731      8.731      mm"
"             Runoff depth           29.434     68.712     68.712     mm"
"             Runoff volume          0.00       21.99      21.99      c.m"
"             Runoff coefficient     0.000      0.887      0.887      "
"             Maximum flow           0.000      0.016      0.016      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.016     0.016     0.033     0.293"
" 57          TRENCH Design d/s of 2016"
"         0.016   Peak inflow"
"        21.988   Hydrograph volume"
"       337.000   Ground elevation"
"       334.200   Downstream trench invert"
"         1.000   Trench height"
"       333.200   Water table elevation"
"         5.000   Trench top width"
"         5.000   Trench bottom width"
"        40.000   Voids ratio (%)"
"        30.000   Hydraulic conductivity"
"         0.000   Trench gradient (%)"
"         5.000   Trench length"
"         1.000   Include base width"
"           29.   Number of stages"
"                   Level Discharge    Volume"
"                 334.200     0.000       0.0"
"                 334.300     0.000       1.0"
"                 334.400     0.000       2.0"
"                 334.500     0.000       3.0"
"                 334.600     0.000       4.0"
"                 334.700     0.000       5.0"
"                 334.800     0.000       6.0"
"                 334.900     0.000       7.0"
"                 335.000     0.000       8.0"
"                 335.100     0.000       9.0"
"                 335.200     0.000      10.0"
"                 335.300     0.002      10.1"
"                 335.400     0.006      10.2"
"                 335.500     0.008      10.3"
"                 335.600     0.010      10.5"
"                 335.700     0.011      10.6"
"                 335.800     0.013      10.7"
"                 335.900     0.014      10.8"
"                 336.000     0.015      10.9"
"                 336.100     0.016      11.0"
"                 336.200     0.017      11.1"
"                 336.300     0.018      11.2"
"                 336.400     0.019      11.4"
"                 336.500     0.020      11.5"
"                 336.600     0.020      11.6"
"                 336.700     0.021      11.7"
"                 336.800     0.022      11.8"
"                 336.900     0.023      11.9"
"                 337.000     0.023      12.0"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"                 335.200   10.000     0.000     2.000     1.000     0.000"
"           1.   MANHOLE"
"                 Access"
"              diameter"
"                 1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                invert    invert    Length  Diameter       'n'   loss Ke"
"                335.200   335.000   10.000     0.100     0.013     0.500"
"             Peak outflow                  0.010    c.m/sec"
"             Outflow volume                9.325    c.m"
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"             Peak exfiltration             0.000    c.m/sec"
"             Exfiltration volume          13.231    c.m"
"             Maximum level               335.589    metre"
"             Maximum storage              10.439    c.m"
"             Centroidal lag                1.532   hours"
"             Infiltration area 2 sides    10.000   sq.metre"
"             Infiltration Base area       25.000   sq.metre"
"                  0.016     0.016     0.010     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.293    c.m/sec"
"             Hydrograph volume           536.556    c.m"
"                  0.016     0.016     0.010     0.293"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.016     0.000     0.010     0.293"
" 33          CATCHMENT 2017"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2017   Catchment 201-7 - SWMF"
"      40.000   % Impervious"
"       0.211   Total Area"
"      10.000   Flow length"
"      10.000   Overland Slope"
"       0.127   Pervious Area"
"      10.000   Pervious length"
"      10.000   Pervious slope"
"       0.084   Impervious Area"
"      10.000   Impervious length"
"      10.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.380   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.836   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.057     0.000     0.010     0.293 c.m/sec"
"             Catchment 2017         Pervious   Impervious Total Area "
"             Surface Area           0.127      0.084      0.211      hectare"
"             Time of concentration  4.178      0.525      2.005      minutes"
"             Time to Centroid       99.183     85.280     90.914     minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        98.04      65.36      163.40     c.m"
"             Rainfall losses        48.031     12.691     33.895     mm"
"             Runoff depth           29.412     64.751     43.548     mm"
"             Runoff volume          37.24      54.65      91.89      c.m"
"             Runoff coefficient     0.380      0.836      0.562      "
"             Maximum flow           0.024      0.042      0.057      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.057     0.057     0.010     0.293"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.057     0.057     0.057     0.293"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.350    c.m/sec"
"             Hydrograph volume           628.441    c.m"
"                    0.057     0.057     0.057     0.350"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.350    c.m/sec"
"             Hydrograph volume           628.441    c.m"
"                    0.057     0.350     0.057     0.000"
" 54          POND DESIGN"
"       0.350   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       628.4   Hydrograph volume    c.m"
"         13.   Number of stages"
"     334.400   Minimum water level    metre"
"     335.600   Maximum water level    metre"
"     334.400   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.400     0.000     0.000"
"               334.500   0.00150    40.000"
"               334.600   0.00230    85.000"
"               334.700   0.00290   135.000"
"               334.800   0.03110   189.000"
"               334.900   0.04300   249.000"
"               335.000   0.05220   314.000"
"               335.100   0.05990   384.000"
"               335.200   0.06680   457.000"
"               335.300   0.07300   534.000"
"               335.400    0.1628   614.000"
"               335.500    0.4275   698.000"
"               335.600    0.9140   786.000"
"             Peak outflow                  0.061    c.m/sec"
"             Maximum level               335.116    metre"
"             Maximum storage             395.533    c.m"
"             Centroidal lag                5.123   hours"
"                  0.057     0.350     0.061     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                  0.057     0.061     0.061     0.000"
" 54          POND DESIGN"
"       0.061   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       614.1   Hydrograph volume    c.m"
"         10.   Number of stages"
"     334.200   Minimum water level    metre"
"     335.100   Maximum water level    metre"
"     334.200   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.200     0.000     0.000"
"               334.300   0.00191    18.000"
"               334.400   0.00207    38.000"
"               334.500   0.00225    60.000"
"               334.600   0.00243    83.000"
"               334.700   0.00261   109.000"
"               334.800   0.00281   136.000"
"               334.900    0.1543   165.000"
"               335.000    0.4628   196.000"
"               335.100    0.9060   229.000"
"             Peak outflow                  0.058    c.m/sec"
"             Maximum level               334.837    metre"
"             Maximum storage             146.656    c.m"
"             Centroidal lag                9.528   hours"
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"                0.057     0.061     0.058     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    800"
"             6   Combine "
"           800   Node #"
"                 TORRANCE CREEK"
"               Maximum flow                 0.058    c.m/sec"
"               Hydrograph volume          548.572    c.m"
"                       0.057     0.061     0.058     0.058"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                       0.057     0.000     0.058     0.058"
" 33          CATCHMENT 2021"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2021   Catchment 202-1"
"         0.000   % Impervious"
"         0.863   Total Area"
"        50.000   Flow length"
"         0.500   Overland Slope"
"         0.863   Pervious Area"
"        50.000   Pervious length"
"         0.500   Pervious slope"
"         0.000   Impervious Area"
"        50.000   Impervious length"
"         0.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.384   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   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"
"                       0.077     0.000     0.058     0.058 c.m/sec"
"               Catchment 2021          Pervious   Impervious Total Area "
"               Surface Area            0.863      0.000      0.863      hectare"
"               Time of concentration   26.957     3.388      26.957     minutes"
"               Time to Centroid        127.483    89.006     127.483    minutes"
"               Rainfall depth          77.443     77.443     77.443     mm"
"               Rainfall volume         668.33     0.00       668.33     c.m"
"               Rainfall losses         47.692     6.765      47.692     mm"
"               Runoff depth            29.750     70.677     29.750     mm"
"               Runoff volume           256.74     0.00       256.75     c.m"
"               Runoff coefficient      0.384      0.000      0.384      "
"               Maximum flow            0.077      0.000      0.077      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                       0.077     0.077     0.058     0.058"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                       0.077     0.077     0.077     0.058"
" 40          HYDROGRAPH   Combine    800"
"             6   Combine "
"           800   Node #"
"                 TORRANCE CREEK"
"               Maximum flow                 0.091    c.m/sec"
"               Hydrograph volume          805.317    c.m"
"                       0.077     0.077     0.077     0.091"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                       0.077     0.000     0.077     0.091"
" 33          CATCHMENT 2022"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2022   Catchment 202-2"
"         24.000   % Impervious"
"         0.184   Total Area"
"        10.000   Flow length"
"         2.000   Overland Slope"
"         0.140   Pervious Area"
"        10.000   Pervious length"
"         2.000   Pervious slope"
"         0.044   Impervious Area"
"        10.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.380   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.887   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                       0.037     0.000     0.077     0.091 c.m/sec"
"               Catchment 2022          Pervious   Impervious Total Area "
"               Surface Area            0.140      0.044      0.184      hectare"
"               Time of concentration   6.771      0.851      4.259      minutes"
"               Time to Centroid        102.464    85.419     95.231     minutes"
"               Rainfall depth          77.443     77.443     77.443     mm"
"               Rainfall volume         108.30     34.20      142.49     c.m"
"               Rainfall losses         48.008     8.731      38.582     mm"
"               Runoff depth            29.434     68.712     38.861     mm"
"               Runoff volume           41.16      30.34      71.50      c.m"
"               Runoff coefficient      0.380      0.887      0.502      "
"               Maximum flow            0.025      0.023      0.037      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                       0.037     0.037     0.077     0.091"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                       0.037     0.037     0.037     0.091"
" 40          HYDROGRAPH   Combine    800"
"             6   Combine "
"           800   Node #"
"                 TORRANCE CREEK"
"               Maximum flow                 0.096    c.m/sec"
"               Hydrograph volume          876.821    c.m"
"                       0.037     0.037     0.037     0.096"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                       0.037     0.000     0.037     0.096"
" 33          CATCHMENT 2031"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2031   Catchment 203-1"
"         30.000   % Impervious"
"         0.216   Total Area"
"        130.000   Flow length"
"         2.000   Overland Slope"
"         0.151   Pervious Area"
"        130.000   Pervious length"
"         2.000   Pervious slope"
"         0.065   Impervious Area"
```

```
"      130.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.384   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.918   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.033     0.000     0.037     0.096 c.m/sec"
"            Catchment 2031         Pervious   Impervious Total Area "
"            Surface Area           0.151      0.065      0.216      hectare"
"            Time of concentration  31.553     3.966      17.588     minutes"
"            Time to Centroid       133.217    89.825     111.250    minutes"
"            Rainfall depth         77.443     77.443     77.443     mm"
"            Rainfall volume        117.09     50.18      167.28     c.m"
"            Rainfall losses        47.716     6.330      35.300     mm"
"            Runoff depth           29.727     71.113     42.143     mm"
"            Runoff volume          44.95      46.08      91.03      c.m"
"            Runoff coefficient     0.384      0.918      0.544      "
"            Maximum flow           0.012      0.030      0.033      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.033     0.033     0.037     0.096"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.033     0.033     0.033     0.096"
" 40         HYDROGRAPH   Combine    700"
"          6   Combine "
"        700   Node #"
"              CULVERT"
"            Maximum flow                0.033    c.m/sec"
"            Hydrograph volume           91.028    c.m"
"                  0.033     0.033     0.033     0.033"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  0.033     0.000     0.033     0.033"
" 33         CATCHMENT 2032"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"       2032   Catchment 203-2"
"      0.000   % Impervious"
"      0.113   Total Area"
"     10.000   Flow length"
"     33.000   Overland Slope"
"      0.113   Pervious Area"
"     10.000   Pervious length"
"     33.000   Pervious slope"
"      0.000   Impervious Area"
"     10.000   Impervious length"
"     33.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     74.000   Pervious SCS Curve No."
"      0.376   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      8.924   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"
"                  0.022     0.000     0.033     0.033 c.m/sec"
"            Catchment 2032         Pervious   Impervious Total Area "
"            Surface Area           0.113      0.000      0.113      hectare"
"            Time of concentration  2.920      0.367      2.920      minutes"
"            Time to Centroid       97.553     84.895     97.553     minutes"
"            Rainfall depth         77.443     77.443     77.443     mm"
"            Rainfall volume        87.51      0.00       87.51      c.m"
"            Rainfall losses        48.296     14.614     48.295     mm"
"            Runoff depth           29.147     62.828     29.147     mm"
"            Runoff volume          32.94      0.00       32.94      c.m"
"            Runoff coefficient     0.376      0.000      0.376      "
"            Maximum flow           0.022      0.000      0.022      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                  0.022     0.022     0.033     0.033"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                  0.022     0.022     0.022     0.033"
" 40         HYDROGRAPH   Combine    700"
"          6   Combine "
"        700   Node #"
"              CULVERT"
"            Maximum flow                0.055    c.m/sec"
"            Hydrograph volume           123.965    c.m"
"                  0.022     0.022     0.022     0.055"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                  0.022     0.000     0.022     0.055"
" 33         CATCHMENT 2033"
"          1   Triangular SCS"
"          1   Equal length"
"          1   SCS method"
"       2033   Catchment 203-3"
"     100.000   % Impervious"
"      0.092   Total Area"
"     10.000   Flow length"
"      2.000   Overland Slope"
"      0.000   Pervious Area"
"     10.000   Pervious length"
"      2.000   Pervious slope"
"      0.092   Impervious Area"
"     10.000   Impervious length"
"      2.000   Impervious slope"
"      0.250   Pervious Manning 'n'"
"     74.000   Pervious SCS Curve No."
"      0.000   Pervious Runoff coefficient"
"      0.100   Pervious Ia/S coefficient"
"      8.924   Pervious Initial abstraction"
"      0.015   Impervious Manning 'n'"
"     98.000   Impervious SCS Curve No."
"      0.887   Impervious Runoff coefficient"
"      0.100   Impervious Ia/S coefficient"
"      0.518   Impervious Initial abstraction"
"                  0.047     0.000     0.022     0.055 c.m/sec"
"            Catchment 2033         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.092      0.092      hectare"
"            Time of concentration  6.771      0.851      0.851      minutes"
"            Time to Centroid       102.464    85.418     85.418     minutes"
"            Rainfall depth         77.443     77.443     77.443     mm"
"            Rainfall volume        0.00       71.25      71.25      c.m"
"            Rainfall losses        48.008     8.731      8.731      mm"
"            Runoff depth           29.434     68.712     68.712     mm"
"            Runoff volume          0.00       63.21      63.21      c.m"
"            Runoff coefficient     0.000      0.887      0.887      "
"            Maximum flow           0.000      0.047      0.047      c.m/sec"
```

```
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                     0.047     0.047     0.022     0.055"
" 57          TRENCH Design d/s of 2033"
"         0.047   Peak inflow"
"        63.215   Hydrograph volume"
"       337.000   Ground elevation"
"       334.500   Downstream trench invert"
"         1.000   Trench height"
"       333.500   Water table elevation"
"         1.000   Trench top width"
"         1.000   Trench bottom width"
"        40.000   Voids ratio (%)"
"        30.000   Hydraulic conductivity"
"         0.000   Trench gradient (%)"
"        60.000   Trench length"
"         1.000   Include base width"
"           26.   Number of stages"
"                   Level Discharge    Volume"
"                 334.500     0.000       0.0"
"                 334.600     0.000       2.4"
"                 334.700     0.000       4.8"
"                 334.800     0.000       7.2"
"                 334.900     0.000       9.6"
"                 335.000     0.000      12.0"
"                 335.100     0.000      14.4"
"                 335.200     0.000      16.8"
"                 335.300     0.000      19.2"
"                 335.400     0.000      21.6"
"                 335.500     0.000      24.0"
"                 335.600     0.005      24.1"
"                 335.700     0.010      24.2"
"                 335.800     0.016      24.3"
"                 335.900     0.020      24.5"
"                 336.000     0.024      24.6"
"                 336.100     0.027      24.7"
"                 336.200     0.030      24.8"
"                 336.300     0.032      24.9"
"                 336.400     0.035      25.0"
"                 336.500     0.037      25.1"
"                 336.600     0.039      25.2"
"                 336.700     0.041      25.4"
"                 336.800     0.043      25.5"
"                 336.900     0.045      25.6"
"                 337.000     0.047      25.7"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"                335.500    20.000     0.000     1.000     1.000     0.000"
"           1.   MANHOLE"
"                 Access"
"               diameter"
"                  1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"               Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                 invert    invert    Length  Diameter       'n'   loss Ke"
"                335.500   335.300    20.000     0.150     0.013     0.500"
"             Peak outflow                 0.029    c.m/sec"
"             Outflow volume              23.211    c.m"
"             Peak exfiltration            0.003    c.m/sec"
"             Exfiltration volume         37.739    c.m"
"             Maximum level              336.367    metre"
"             Maximum storage             24.981    c.m"
"             Centroidal lag               1.473   hours"
"             Infiltration area 2 sides   120.000   sq.metre"
"             Infiltration Base area       60.000   sq.metre"
"                  0.047     0.047     0.029     0.003 c.m/sec"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.085    c.m/sec"
"             Hydrograph volume           147.175    c.m"
"                    0.047     0.047     0.029     0.085"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.047     0.000     0.029     0.085"
" 33          CATCHMENT 204"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         204   Catchment 204"
"       0.000   % Impervious"
"       0.198   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.198   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       8.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.376   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.039     0.000     0.029     0.085 c.m/sec"
"             Catchment 204          Pervious   Impervious Total Area "
"             Surface Area           0.198      0.000      0.198      hectare"
"             Time of concentration  2.968      0.373      2.968      minutes"
"             Time to Centroid       97.626     84.920     97.626     minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        153.34     0.00       153.34     c.m"
"             Rainfall losses        48.309     14.568     48.309     mm"
"             Runoff depth           29.134     62.875     29.134     mm"
"             Runoff volume          57.68      0.00       57.68      c.m"
"             Runoff coefficient     0.376      0.000      0.376      "
"             Maximum flow           0.039      0.000      0.039      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.039     0.039     0.029     0.085"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.039     0.039     0.039     0.085"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.124    c.m/sec"
"             Hydrograph volume           204.860    c.m"
"                    0.039     0.039     0.039     0.124"
" 40          HYDROGRAPH   Confluence    700"
"           7   Confluence "
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"          700   Node #"
"                CULVERT"
"             Maximum flow                  0.124    c.m/sec"
"             Hydrograph volume           204.860    c.m"
"                    0.039     0.124     0.039     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.039     0.124     0.124     0.000"
" 40          HYDROGRAPH   Combine    800"
"             6   Combine "
"          800   Node #"
"                TORRANCE CREEK"
"             Maximum flow                  0.184    c.m/sec"
"             Hydrograph volume          1081.681    c.m"
"                    0.039     0.124     0.124     0.184"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    0.039     0.000     0.124     0.184"
" 33          CATCHMENT 2051"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2051   Catchment 205-1"
"        25.000   % Impervious"
"         0.098   Total Area"
"        15.000   Flow length"
"         2.000   Overland Slope"
"         0.073   Pervious Area"
"        15.000   Pervious length"
"         2.000   Pervious slope"
"         0.024   Impervious Area"
"        15.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.383   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.906   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.019     0.000     0.124     0.184 c.m/sec"
"             Catchment 2051         Pervious   Impervious Total Area "
"             Surface Area           0.073      0.024      0.098      hectare"
"             Time of concentration  8.636      1.085      5.307      minutes"
"             Time to Centroid       104.625    85.713     96.286     minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        56.92      18.97      75.89      c.m"
"             Rainfall losses        47.804     7.314      37.681     mm"
"             Runoff depth           29.639     70.128     39.761     mm"
"             Runoff volume          21.78      17.18      38.97      c.m"
"             Runoff coefficient     0.383      0.906      0.513      "
"             Maximum flow           0.012      0.013      0.019      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.019     0.019     0.124     0.184"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.019     0.019     0.019     0.184"
" 40          HYDROGRAPH   Combine    600"
"             6   Combine "
"          600   Node #"
"                Arkell Rd"
"             Maximum flow                  0.019    c.m/sec"
"             Hydrograph volume            38.966    c.m"
"                    0.019     0.019     0.019     0.019"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                    0.019     0.000     0.019     0.019"
" 33          CATCHMENT 2052"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2052   Catchment 205-2"
"        40.000   % Impervious"
"         0.108   Total Area"
"        25.000   Flow length"
"         5.000   Overland Slope"
"         0.065   Pervious Area"
"        25.000   Pervious length"
"         5.000   Pervious slope"
"         0.043   Impervious Area"
"        25.000   Impervious length"
"         5.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.382   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   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"
"                    0.025     0.000     0.019     0.019 c.m/sec"
"             Catchment 2052         Pervious   Impervious Total Area "
"             Surface Area           0.065      0.043      0.108      hectare"
"             Time of concentration  8.914      1.120      4.138      minutes"
"             Time to Centroid       104.988    85.758     93.205     minutes"
"             Rainfall depth         77.443     77.443     77.443     mm"
"             Rainfall volume        50.18      33.46      83.64      c.m"
"             Rainfall losses        47.837     7.179      31.574     mm"
"             Runoff depth           29.605     70.264     45.869     mm"
"             Runoff volume          19.18      30.35      49.54      c.m"
"             Runoff coefficient     0.382      0.907      0.592      "
"             Maximum flow           0.010      0.022      0.025      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                    0.025     0.025     0.019     0.019"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                    0.025     0.025     0.025     0.019"
" 40          HYDROGRAPH   Combine    600"
"             6   Combine "
"          600   Node #"
"                Arkell Rd"
"             Maximum flow                  0.043    c.m/sec"
"             Hydrograph volume            88.504    c.m"
"                    0.025     0.025     0.025     0.043"
" 40          HYDROGRAPH   Confluence    600"
"             7   Confluence "
"          600   Node #"
"                Arkell Rd"
"             Maximum flow                  0.043    c.m/sec"
"             Hydrograph volume            88.504    c.m"
"                    0.025     0.043     0.025     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
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"                   0.025     0.043     0.043     0.000"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.227    c.m/sec"
"             Hydrograph volume          1170.185    c.m"
"                   0.025     0.043     0.043     0.227"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.025     0.000     0.043     0.227"
" 33          CATCHMENT 206"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         206   Catchment 206"
"      70.000   % Impervious"
"       0.035   Total Area"
"      20.000   Flow length"
"       1.250   Overland Slope"
"       0.011   Pervious Area"
"      20.000   Pervious length"
"       1.250   Pervious slope"
"       0.024   Impervious Area"
"      20.000   Impervious length"
"       1.250   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.383   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.917   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.013     0.000     0.043     0.227 c.m/sec"
"            Catchment 206          Pervious   Impervious Total Area "
"            Surface Area           0.011      0.024      0.035      hectare"
"            Time of concentration  11.818     1.485      3.054      minutes"
"            Time to Centroid       108.607    86.190     89.592     minutes"
"            Rainfall depth         77.443     77.443     77.443     mm"
"            Rainfall volume        8.13       18.97      27.10      c.m"
"            Rainfall losses        47.777     6.393      18.808     mm"
"            Runoff depth           29.666     71.050     58.635     mm"
"            Runoff volume          3.11       17.41      20.52      c.m"
"            Runoff coefficient     0.383      0.917      0.757      "
"            Maximum flow           0.001      0.012      0.013      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.013     0.013     0.043     0.227"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.013     0.013     0.013     0.227"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.237    c.m/sec"
"             Hydrograph volume          1190.707    c.m"
"                   0.013     0.013     0.013     0.237"
" 40          HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.237    c.m/sec"
"             Hydrograph volume          1190.707    c.m"
"                   0.013     0.237     0.013     0.000"
" 38          START/RE-START TOTALS 800"
"           3   Runoff Totals on EXIT"
"             Total Catchment area                    3.108    hectare"
"             Total Impervious area                   1.071    hectare"
"             Total % impervious                     34.445"
" 19          EXIT"
```

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"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                        Sunday, February 7, 2010"
"          10   Units used:                                        ie METRIC"
"               Job folder:           Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                        POST"
"               Output filename:                                 100yrPOST.in"
"               Licensee name:                                              A"
"               Company                                             Microsoft"
"               Date & Time last used:               10/5/2021 at 2:19:34 PM"
" 31          TIME PARAMETERS"
"        5.000   Time Step"
"      180.000   Max. Storm length"
"     1500.000   Max. Hydrograph"
" 32          STORM Chicago storm"
"           1   Chicago storm"
"     4688.000   Coefficient A"
"       17.000   Constant B"
"        0.962   Exponent C"
"        0.400   Fraction R"
"      180.000   Duration"
"        1.000   Time step multiplier"
"             Maximum intensity           239.650    mm/hr"
"             Total depth                  87.263    mm"
"           6   100hyd   Hydrograph extension used in this file"
" 33          CATCHMENT 2011"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2011   Catchment 201-1"
"       60.000   % Impervious"
"        0.519   Total Area"
"       60.000   Flow length"
"        0.750   Overland Slope"
"        0.208   Pervious Area"
"       60.000   Pervious length"
"        0.750   Pervious slope"
"        0.311   Impervious Area"
"       60.000   Impervious length"
"        0.750   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.419   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.919   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.163     0.000     0.000     0.000 c.m/sec"
"             Catchment 2011         Pervious   Impervious Total Area "
"             Surface Area           0.208      0.311      0.519      hectare"
"             Time of concentration  24.435     3.203      8.155      minutes"
"             Time to Centroid       123.623    88.411     96.625     minutes"
"             Rainfall depth         87.263     87.263     87.263     mm"
"             Rainfall volume        181.16     271.74     452.90     c.m"
"             Rainfall losses        50.658     7.047      24.491     mm"
"             Runoff depth           36.605     80.217     62.772     mm"
"             Runoff volume          75.99      249.79     325.79     c.m"
"             Runoff coefficient     0.419      0.919      0.719      "
"             Maximum flow           0.024      0.160      0.163      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.163     0.163     0.000     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.163     0.163     0.163     0.000"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.163    c.m/sec"
"             Hydrograph volume           325.787    c.m"
"                  0.163     0.163     0.163     0.163"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.163     0.000     0.163     0.163"
" 33          CATCHMENT 2012"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2012   Catchment 201-2"
"       70.000   % Impervious"
"        0.066   Total Area"
"       15.000   Flow length"
"        0.500   Overland Slope"
"        0.020   Pervious Area"
"       15.000   Pervious length"
"        0.500   Pervious slope"
"        0.046   Impervious Area"
"       15.000   Impervious length"
"        0.500   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.418   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.925   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.027     0.000     0.163     0.163 c.m/sec"
"             Catchment 2012         Pervious   Impervious Total Area "
"             Surface Area           0.020      0.046      0.066      hectare"
"             Time of concentration  12.012     1.574      3.268      minutes"
"             Time to Centroid       108.087    86.019     89.600     minutes"
"             Rainfall depth         87.263     87.263     87.263     mm"
"             Rainfall volume        17.28      40.32      57.59      c.m"
"             Rainfall losses        50.758     6.508      19.783     mm"
"             Runoff depth           36.505     80.755     67.480     mm"
"             Runoff volume          7.23       37.31      44.54      c.m"
"             Runoff coefficient     0.418      0.925      0.773      "
"             Maximum flow           0.003      0.026      0.027      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.027     0.027     0.163     0.163"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.027     0.027     0.027     0.163"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.189    c.m/sec"
"             Hydrograph volume           370.324    c.m"
"                  0.027     0.027     0.027     0.189"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
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"                   0.027     0.000     0.027     0.189"
" 33          CATCHMENT 2013"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2013   Catchment 201-3"
"      75.000   % Impervious"
"       0.234   Total Area"
"      15.000   Flow length"
"       2.000   Overland Slope"
"       0.058   Pervious Area"
"      15.000   Pervious length"
"       2.000   Pervious slope"
"       0.176   Impervious Area"
"      15.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.418   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.910   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.105     0.000     0.027     0.189 c.m/sec"
"             Catchment 2013          Pervious   Impervious Total Area "
"             Surface Area            0.058      0.176      0.234      hectare"
"             Time of concentration   7.925      1.039      1.954      minutes"
"             Time to Centroid        103.037    85.361     87.709     minutes"
"             Rainfall depth          87.263     87.263     87.263     mm"
"             Rainfall volume         51.05      153.15     204.20     c.m"
"             Rainfall losses         50.764     7.853      18.581     mm"
"             Runoff depth            36.499     79.410     68.683     mm"
"             Runoff volume           21.35      139.37     160.72     c.m"
"             Runoff coefficient      0.418      0.910      0.787      "
"             Maximum flow            0.012      0.101      0.105      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.105     0.105     0.027     0.189"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.105     0.105     0.105     0.189"
" 40          HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"             Maximum flow                 0.294    c.m/sec"
"             Hydrograph volume          531.041    c.m"
"                   0.105     0.105     0.105     0.294"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.105     0.000     0.105     0.294"
" 33          CATCHMENT 2014"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2014   Catchment 201-4"
"     100.000   % Impervious"
"       0.065   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.065   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.890   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.037     0.000     0.105     0.294 c.m/sec"
"             Catchment 2014          Pervious   Impervious Total Area "
"             Surface Area            0.000      0.065      0.065      hectare"
"             Time of concentration   6.214      0.814      0.814      minutes"
"             Time to Centroid        100.973    85.085     85.085     minutes"
"             Rainfall depth          87.263     87.263     87.263     mm"
"             Rainfall volume         0.00       56.72      56.72      c.m"
"             Rainfall losses         51.029     9.575      9.575      mm"
"             Runoff depth            36.234     77.688     77.688     mm"
"             Runoff volume           0.00       50.50      50.50      c.m"
"             Runoff coefficient      0.000      0.890      0.890      "
"             Maximum flow            0.000      0.037      0.037      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.037     0.037     0.105     0.294"
" 57          TRENCH Design d/s of 2014"
"       0.037   Peak inflow"
"      50.497   Hydrograph volume"
"     337.000   Ground elevation"
"     334.200   Downstream trench invert"
"       1.000   Trench height"
"     333.200   Water table elevation"
"       5.000   Trench top width"
"       5.000   Trench bottom width"
"      40.000   Voids ratio (%)"
"      30.000   Hydraulic conductivity"
"       0.000   Trench gradient (%)"
"      10.000   Trench length"
"       1.000   Include base width"
"         29.   Number of stages"
"                 Level Discharge    Volume"
"               334.200     0.000       0.0"
"               334.300     0.000       2.0"
"               334.400     0.000       4.0"
"               334.500     0.000       6.0"
"               334.600     0.000       8.0"
"               334.700     0.000      10.0"
"               334.800     0.000      12.0"
"               334.900     0.000      14.0"
"               335.000     0.000      16.0"
"               335.100     0.000      18.0"
"               335.200     0.000      20.0"
"               335.300     0.004      20.1"
"               335.400     0.006      20.2"
"               335.500     0.008      20.3"
"               335.600     0.010      20.5"
"               335.700     0.011      20.6"
"               335.800     0.013      20.7"
"               335.900     0.014      20.8"
"               336.000     0.015      20.9"
"               336.100     0.016      21.0"
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"               336.200     0.017      21.1"
"               336.300     0.018      21.2"
"               336.400     0.019      21.4"
"               336.500     0.020      21.5"
"               336.600     0.020      21.6"
"               336.700     0.021      21.7"
"               336.800     0.022      21.8"
"               336.900     0.023      21.9"
"               337.000     0.023      22.0"
"          1.   TRENCH PIPES"
"            Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                Invert    length     diam.    grade%     0=Yes  distance"
"               335.200    20.000     0.000     1.000     1.000     0.000"
"          1.   MANHOLE"
"               Access"
"              diameter"
"                 1.200"
"          1.   OUTFLOW PIPE"
"          0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                invert    invert    Length  Diameter       'n'   loss Ke"
"               335.200   335.000    20.000     0.100     0.013     0.500"
"            Peak outflow                  0.023    c.m/sec"
"            Outflow volume               22.935    c.m"
"            Peak exfiltration             0.001    c.m/sec"
"            Exfiltration volume          26.845    c.m"
"            Maximum level               336.908    metre"
"            Maximum storage              21.932    c.m"
"            Centroidal lag                1.536   hours"
"            Infiltration area 2 sides    20.000   sq.metre"
"            Infiltration Base area       50.000   sq.metre"
"                 0.037     0.037     0.023     0.001 c.m/sec"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              SWMF"
"            Maximum flow                  0.294    c.m/sec"
"            Hydrograph volume           553.977    c.m"
"                    0.037     0.037     0.023     0.294"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                    0.037     0.000     0.023     0.294"
" 33         CATCHMENT 2015"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2015   Catchment 201-5"
"       85.000   % Impervious"
"        0.074   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.011   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.063   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.418   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.910   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.037     0.000     0.023     0.294 c.m/sec"
"            Catchment 2015         Pervious   Impervious Total Area "
"            Surface Area           0.011      0.063      0.074      hectare"
"            Time of concentration  7.925      1.039      1.555      minutes"
"            Time to Centroid       103.037    85.361     86.687     minutes"
"            Rainfall depth         87.263     87.263     87.263     mm"
"            Rainfall volume        9.69       54.89      64.57      c.m"
"            Rainfall losses        50.764     7.853      14.290     mm"
"            Runoff depth           36.499     79.410     72.974     mm"
"            Runoff volume          4.05       49.95      54.00      c.m"
"            Runoff coefficient     0.418      0.910      0.836      "
"            Maximum flow           0.002      0.036      0.037      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"          4   Add Runoff "
"                    0.037     0.037     0.023     0.294"
" 40         HYDROGRAPH Copy to Outflow"
"          8   Copy to Outflow"
"                    0.037     0.037     0.037     0.294"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              SWMF"
"            Maximum flow                  0.331    c.m/sec"
"            Hydrograph volume           607.975    c.m"
"                    0.037     0.037     0.037     0.331"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                    0.037     0.000     0.037     0.331"
" 33         CATCHMENT 2016"
"            1   Triangular SCS"
"            1   Equal length"
"            1   SCS method"
"         2016   Catchment 201-6"
"      100.000   % Impervious"
"        0.032   Total Area"
"       10.000   Flow length"
"        2.000   Overland Slope"
"        0.000   Pervious Area"
"       10.000   Pervious length"
"        2.000   Pervious slope"
"        0.032   Impervious Area"
"       10.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.890   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                    0.018     0.000     0.037     0.331 c.m/sec"
"            Catchment 2016         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.032      0.032      hectare"
"            Time of concentration  6.214      0.814      0.814      minutes"
"            Time to Centroid       100.973    85.085     85.085     minutes"
"            Rainfall depth         87.263     87.263     87.263     mm"
"            Rainfall volume        0.00       27.92      27.92      c.m"
"            Rainfall losses        51.029     9.575      9.575      mm"
"            Runoff depth           36.234     77.688     77.688     mm"
"            Runoff volume          0.00       24.86      24.86      c.m"
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"             Runoff coefficient     0.000      0.890      0.890      "
"             Maximum flow           0.000      0.018      0.018      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.018     0.018     0.037     0.331"
" 57          TRENCH Design d/s of 2016"
"         0.018   Peak inflow"
"        24.860   Hydrograph volume"
"       337.000   Ground elevation"
"       334.200   Downstream trench invert"
"         1.000   Trench height"
"       333.200   Water table elevation"
"         5.000   Trench top width"
"         5.000   Trench bottom width"
"        40.000   Voids ratio (%)"
"        30.000   Hydraulic conductivity"
"         0.000   Trench gradient (%)"
"         5.000   Trench length"
"         1.000   Include base width"
"           29.   Number of stages"
"                   Level Discharge    Volume"
"                 334.200     0.000       0.0"
"                 334.300     0.000       1.0"
"                 334.400     0.000       2.0"
"                 334.500     0.000       3.0"
"                 334.600     0.000       4.0"
"                 334.700     0.000       5.0"
"                 334.800     0.000       6.0"
"                 334.900     0.000       7.0"
"                 335.000     0.000       8.0"
"                 335.100     0.000       9.0"
"                 335.200     0.000      10.0"
"                 335.300     0.002      10.1"
"                 335.400     0.006      10.2"
"                 335.500     0.008      10.3"
"                 335.600     0.010      10.5"
"                 335.700     0.011      10.6"
"                 335.800     0.013      10.7"
"                 335.900     0.014      10.8"
"                 336.000     0.015      10.9"
"                 336.100     0.016      11.0"
"                 336.200     0.017      11.1"
"                 336.300     0.018      11.2"
"                 336.400     0.019      11.4"
"                 336.500     0.020      11.5"
"                 336.600     0.020      11.6"
"                 336.700     0.021      11.7"
"                 336.800     0.022      11.8"
"                 336.900     0.023      11.9"
"                 337.000     0.023      12.0"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"                 335.200   10.000     0.000     2.000     1.000     0.000"
"           1.   MANHOLE"
"                 Access"
"                diameter"
"                  1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"               Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                 invert    invert    Length  Diameter       'n'   loss Ke"
"                 335.200   335.000    10.000     0.100     0.013     0.500"
"             Peak outflow                 0.012    c.m/sec"
"             Outflow volume              11.156    c.m"
"             Peak exfiltration            0.001    c.m/sec"
"             Exfiltration volume         13.333    c.m"
"             Maximum level              335.775    metre"
"             Maximum storage             10.650    c.m"
"             Centroidal lag               1.535   hours"
"             Infiltration area 2 sides   10.000   sq.metre"
"             Infiltration Base area      25.000   sq.metre"
"                  0.018     0.018     0.012     0.001 c.m/sec"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
"             Maximum flow                 0.331    c.m/sec"
"             Hydrograph volume          619.134    c.m"
"                    0.018     0.018     0.012     0.331"
" 40          HYDROGRAPH Start - New Tributary"
"            2   Start - New Tributary"
"                    0.018     0.000     0.012     0.331"
" 33          CATCHMENT 2017"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2017   Catchment 201-7 - SWMF"
"        40.000   % Impervious"
"         0.211   Total Area"
"        10.000   Flow length"
"        10.000   Overland Slope"
"         0.127   Pervious Area"
"        10.000   Pervious length"
"        10.000   Pervious slope"
"         0.084   Impervious Area"
"        10.000   Impervious length"
"        10.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.412   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.838   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                    0.068     0.000     0.012     0.331 c.m/sec"
"               Catchment 2017         Pervious   Impervious Total Area "
"               Surface Area           0.127      0.084      0.211      hectare"
"               Time of concentration  3.834      0.502      1.915      minutes"
"               Time to Centroid       98.024     84.924     90.480     minutes"
"               Rainfall depth         87.263     87.263     87.263     mm"
"               Rainfall volume        110.48     73.65      184.13     c.m"
"               Rainfall losses        51.338     14.098     36.442     mm"
"               Runoff depth           35.925     73.165     50.821     mm"
"               Runoff volume          45.48      61.75      107.23     c.m"
"               Runoff coefficient     0.412      0.838      0.582      "
"               Maximum flow           0.031      0.047      0.068      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"            4   Add Runoff "
"                    0.068     0.068     0.012     0.331"
" 40          HYDROGRAPH Copy to Outflow"
"            8   Copy to Outflow"
"                    0.068     0.068     0.068     0.331"
" 40          HYDROGRAPH   Combine    900"
"            6   Combine "
"          900   Node #"
"                SWMF"
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"             Maximum flow                  0.399    c.m/sec"
"             Hydrograph volume           726.367    c.m"
"                    0.068     0.068     0.068     0.399"
" 40          HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               SWMF"
"             Maximum flow                  0.399    c.m/sec"
"             Hydrograph volume           726.367    c.m"
"                    0.068     0.399     0.068     0.000"
" 54          POND DESIGN"
"       0.399   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       726.4   Hydrograph volume    c.m"
"         13.   Number of stages"
"     334.400   Minimum water level    metre"
"     335.600   Maximum water level    metre"
"     334.400   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.400     0.000     0.000"
"               334.500   0.00150    40.000"
"               334.600   0.00230    85.000"
"               334.700   0.00290   135.000"
"               334.800   0.03110   189.000"
"               334.900   0.04300   249.000"
"               335.000   0.05220   314.000"
"               335.100   0.05990   384.000"
"               335.200   0.06680   457.000"
"               335.300   0.07300   534.000"
"               335.400    0.1628   614.000"
"               335.500    0.4275   698.000"
"               335.600    0.9140   786.000"
"             Peak outflow                  0.067    c.m/sec"
"             Maximum level               335.210    metre"
"             Maximum storage             464.298    c.m"
"             Centroidal lag                4.845   hours"
"                  0.068     0.399     0.067     0.000 c.m/sec"
" 40          HYDROGRAPH Next link "
"           5   Next link "
"                    0.068     0.067     0.067     0.000"
" 54          POND DESIGN"
"       0.067   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"       712.8   Hydrograph volume    c.m"
"         10.   Number of stages"
"     334.200   Minimum water level    metre"
"     335.100   Maximum water level    metre"
"     334.200   Starting water level    metre"
"           0   Keep Design Data: 1 = True; 0 = False"
"                 Level Discharge    Volume"
"               334.200     0.000     0.000"
"               334.300   0.00191    18.000"
"               334.400   0.00207    38.000"
"               334.500   0.00225    60.000"
"               334.600   0.00243    83.000"
"               334.700   0.00261   109.000"
"               334.800   0.00281   136.000"
"               334.900    0.1543   165.000"
"               335.000    0.4628   196.000"
"               335.100    0.9060   229.000"
"             Peak outflow                  0.066    c.m/sec"
"             Maximum level               334.842    metre"
"             Maximum storage             148.057    c.m"
"             Centroidal lag                8.722   hours"
"                  0.068     0.067     0.066     0.000 c.m/sec"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.066    c.m/sec"
"             Hydrograph volume           645.849    c.m"
"                    0.068     0.067     0.066     0.066"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.068     0.000     0.066     0.066"
" 33          CATCHMENT 2021"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2021   Catchment 202-1"
"       0.000   % Impervious"
"       0.863   Total Area"
"      50.000   Flow length"
"       0.500   Overland Slope"
"       0.863   Pervious Area"
"      50.000   Pervious length"
"       0.500   Pervious slope"
"       0.000   Impervious Area"
"      50.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.419   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.101     0.000     0.066     0.066 c.m/sec"
"             Catchment 2021         Pervious   Impervious Total Area "
"             Surface Area           0.863      0.000      0.863      hectare"
"             Time of concentration  24.737     3.242      24.736     minutes"
"             Time to Centroid       124.000    88.466     124.000    minutes"
"             Rainfall depth         87.263     87.263     87.263     mm"
"             Rainfall volume        753.08     0.00       753.08     c.m"
"             Rainfall losses        50.668     7.034      50.668     mm"
"             Runoff depth           36.595     80.229     36.595     mm"
"             Runoff volume          315.82     0.00       315.82     c.m"
"             Runoff coefficient     0.419      0.000      0.419      "
"             Maximum flow           0.101      0.000      0.101      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.101     0.101     0.066     0.066"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.101     0.101     0.101     0.066"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.111    c.m/sec"
"             Hydrograph volume           961.668    c.m"
"                    0.101     0.101     0.101     0.111"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.101     0.000     0.101     0.111"
" 33          CATCHMENT 2022"
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"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2022   Catchment 202-2"
"      24.000   % Impervious"
"       0.184   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.140   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.044   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.415   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.890   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.046     0.000     0.101     0.111 c.m/sec"
"            Catchment 2022         Pervious   Impervious Total Area "
"            Surface Area           0.140      0.044      0.184      hectare"
"            Time of concentration  6.214      0.814      4.034      minutes"
"            Time to Centroid       100.973    85.085     94.559     minutes"
"            Rainfall depth         87.263     87.263     87.263     mm"
"            Rainfall volume        122.03     38.54      160.56     c.m"
"            Rainfall losses        51.029     9.575      41.080     mm"
"            Runoff depth           36.234     77.688     46.183     mm"
"            Runoff volume          50.67      34.31      84.98      c.m"
"            Runoff coefficient     0.415      0.890      0.529      "
"            Maximum flow           0.030      0.025      0.046      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.046     0.046     0.101     0.111"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.046     0.046     0.046     0.111"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                  0.120    c.m/sec"
"            Hydrograph volume          1046.645    c.m"
"                   0.046     0.046     0.046     0.120"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.046     0.000     0.046     0.120"
" 33         CATCHMENT 2031"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2031   Catchment 203-1"
"      30.000   % Impervious"
"       0.216   Total Area"
"     130.000   Flow length"
"       2.000   Overland Slope"
"       0.151   Pervious Area"
"     130.000   Pervious length"
"       2.000   Pervious slope"
"       0.065   Impervious Area"
"     130.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.419   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.921   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.038     0.000     0.046     0.120 c.m/sec"
"            Catchment 2031         Pervious   Impervious Total Area "
"            Surface Area           0.151      0.065      0.216      hectare"
"            Time of concentration  28.954     3.795      16.752     minutes"
"            Time to Centroid       129.260    89.264     109.862    minutes"
"            Rainfall depth         87.263     87.263     87.263     mm"
"            Rainfall volume        131.94     56.55      188.49     c.m"
"            Rainfall losses        50.682     6.880      37.542     mm"
"            Runoff depth           36.581     80.383     49.722     mm"
"            Runoff volume          55.31      52.09      107.40     c.m"
"            Runoff coefficient     0.419      0.921      0.570      "
"            Maximum flow           0.016      0.033      0.038      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.038     0.038     0.046     0.120"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.038     0.038     0.038     0.120"
" 40         HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"            Maximum flow                  0.038    c.m/sec"
"            Hydrograph volume           107.399    c.m"
"                   0.038     0.038     0.038     0.038"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.038     0.000     0.038     0.038"
" 33         CATCHMENT 2032"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2032   Catchment 203-2"
"       0.000   % Impervious"
"       0.113   Total Area"
"      10.000   Flow length"
"      33.000   Overland Slope"
"       0.113   Pervious Area"
"      10.000   Pervious length"
"      33.000   Pervious slope"
"       0.000   Impervious Area"
"      10.000   Impervious length"
"      33.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.412   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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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"                   0.027     0.000     0.038     0.038 c.m/sec"
"            Catchment 2032         Pervious   Impervious Total Area "
"            Surface Area           0.113      0.000      0.113      hectare"
"            Time of concentration  2.680      0.351      2.680      minutes"
"            Time to Centroid       96.408     84.507     96.408     minutes"
"            Rainfall depth         87.263     87.263     87.263     mm"
"            Rainfall volume        98.61      0.00       98.61      c.m"
"            Rainfall losses        51.352     16.110     51.352     mm"
"            Runoff depth           35.911     71.153     35.911     mm"
"            Runoff volume          40.58      0.00       40.58      c.m"
"            Runoff coefficient     0.412      0.000      0.412      "
"            Maximum flow           0.027      0.000      0.027      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.027     0.027     0.038     0.038"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.027     0.027     0.027     0.038"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"            Maximum flow                 0.065    c.m/sec"
"            Hydrograph volume          147.979    c.m"
"                   0.027     0.027     0.027     0.065"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.027     0.000     0.027     0.065"
" 33          CATCHMENT 2033"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2033   Catchment 203-3"
"     100.000   % Impervious"
"       0.092   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.092   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.890   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.053     0.000     0.027     0.065 c.m/sec"
"            Catchment 2033         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.092      0.092      hectare"
"            Time of concentration  6.214      0.814      0.814      minutes"
"            Time to Centroid       100.973    85.085     85.085     minutes"
"            Rainfall depth         87.263     87.263     87.263     mm"
"            Rainfall volume        0.00       80.28      80.28      c.m"
"            Rainfall losses        51.029     9.575      9.575      mm"
"            Runoff depth           36.234     77.688     77.688     mm"
"            Runoff volume          0.00       71.47      71.47      c.m"
"            Runoff coefficient     0.000      0.890      0.890      "
"            Maximum flow           0.000      0.053      0.053      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.053     0.053     0.027     0.065"
" 57          TRENCH Design d/s of 2033"
"       0.053   Peak inflow"
"      71.473   Hydrograph volume"
"     337.000   Ground elevation"
"     334.500   Downstream trench invert"
"       1.000   Trench height"
"     333.500   Water table elevation"
"       1.000   Trench top width"
"       1.000   Trench bottom width"
"      40.000   Voids ratio (%)"
"      30.000   Hydraulic conductivity"
"       0.000   Trench gradient (%)"
"      60.000   Trench length"
"       1.000   Include base width"
"         26.   Number of stages"
"                 Level Discharge    Volume"
"               334.500     0.000       0.0"
"               334.600     0.000       2.4"
"               334.700     0.000       4.8"
"               334.800     0.000       7.2"
"               334.900     0.000       9.6"
"               335.000     0.000      12.0"
"               335.100     0.000      14.4"
"               335.200     0.000      16.8"
"               335.300     0.000      19.2"
"               335.400     0.000      21.6"
"               335.500     0.000      24.0"
"               335.600     0.005      24.1"
"               335.700     0.010      24.2"
"               335.800     0.016      24.3"
"               335.900     0.020      24.5"
"               336.000     0.024      24.6"
"               336.100     0.027      24.7"
"               336.200     0.030      24.8"
"               336.300     0.032      24.9"
"               336.400     0.035      25.0"
"               336.500     0.037      25.1"
"               336.600     0.039      25.2"
"               336.700     0.041      25.4"
"               336.800     0.043      25.5"
"               336.900     0.045      25.6"
"               337.000     0.047      25.7"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"               335.500    20.000     0.000     1.000     1.000     0.000"
"           1.   MANHOLE"
"                Access"
"               diameter"
"                  1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                invert    invert    Length  Diameter       'n'   loss Ke"
"               335.500   335.300    20.000     0.150     0.013     0.500"
"             Peak outflow                 0.033    c.m/sec"
"             Outflow volume              27.188    c.m"
"             Peak exfiltration            0.003    c.m/sec"
"             Exfiltration volume         38.435    c.m"
"             Maximum level              336.730    metre"
"             Maximum storage             25.391    c.m"
"             Centroidal lag               1.483   hours"
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"             Infiltration area 2 sides   120.000   sq.metre"
"             Infiltration Base area      60.000   sq.metre"
"                  0.053     0.053     0.033     0.003 c.m/sec"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.098    c.m/sec"
"             Hydrograph volume           175.167    c.m"
"                  0.053     0.053     0.033     0.098"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.053     0.000     0.033     0.098"
" 33          CATCHMENT 204"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         204   Catchment 204"
"       0.000   % Impervious"
"       0.198   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.198   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       8.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.411   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                  0.048     0.000     0.033     0.098 c.m/sec"
"           Catchment 204          Pervious   Impervious Total Area "
"           Surface Area           0.198      0.000      0.198      hectare"
"           Time of concentration  2.724      0.357      2.724      minutes"
"           Time to Centroid       96.470     84.532     96.470     minutes"
"           Rainfall depth         87.263     87.263     87.263     mm"
"           Rainfall volume        172.78     0.00       172.78     c.m"
"           Rainfall losses        51.380     16.052     51.380     mm"
"           Runoff depth           35.883     71.212     35.883     mm"
"           Runoff volume          71.05      0.00       71.05      c.m"
"           Runoff coefficient     0.411      0.000      0.411      "
"           Maximum flow           0.048      0.000      0.048      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.048     0.048     0.033     0.098"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.048     0.048     0.048     0.098"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.146    c.m/sec"
"             Hydrograph volume           246.216    c.m"
"                  0.048     0.048     0.048     0.146"
" 40          HYDROGRAPH   Confluence    700"
"           7   Confluence "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.146    c.m/sec"
"             Hydrograph volume           246.216    c.m"
"                  0.048     0.146     0.048     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.048     0.146     0.146     0.000"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.225    c.m/sec"
"             Hydrograph volume          1292.862    c.m"
"                  0.048     0.146     0.146     0.225"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.048     0.000     0.146     0.225"
" 33          CATCHMENT 2051"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2051   Catchment 205-1"
"      25.000   % Impervious"
"       0.098   Total Area"
"      15.000   Flow length"
"       2.000   Overland Slope"
"       0.073   Pervious Area"
"      15.000   Pervious length"
"       2.000   Pervious slope"
"       0.024   Impervious Area"
"      15.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.418   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.910   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.024     0.000     0.146     0.225 c.m/sec"
"           Catchment 2051         Pervious   Impervious Total Area "
"           Surface Area           0.073      0.024      0.098      hectare"
"           Time of concentration  7.925      1.039      5.030      minutes"
"           Time to Centroid       103.037    85.361     95.607     minutes"
"           Rainfall depth         87.263     87.263     87.263     mm"
"           Rainfall volume        64.14      21.38      85.52      c.m"
"           Rainfall losses        50.764     7.853      40.036     mm"
"           Runoff depth           36.499     79.410     47.227     mm"
"           Runoff volume          26.83      19.46      46.28      c.m"
"           Runoff coefficient     0.418      0.910      0.541      "
"           Maximum flow           0.015      0.014      0.024      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.024     0.024     0.146     0.225"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.024     0.024     0.024     0.225"
" 40          HYDROGRAPH   Combine    600"
"           6   Combine "
"         600   Node #"
"               Arkell Rd"
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"            Maximum flow                 0.024    c.m/sec"
"            Hydrograph volume           46.282    c.m"
"                   0.024     0.024     0.024     0.024"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.024     0.000     0.024     0.024"
" 33         CATCHMENT 2052"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2052   Catchment 205-2"
"      40.000   % Impervious"
"       0.108   Total Area"
"      25.000   Flow length"
"       5.000   Overland Slope"
"       0.065   Pervious Area"
"      25.000   Pervious length"
"       5.000   Pervious slope"
"       0.043   Impervious Area"
"      25.000   Impervious length"
"       5.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.418   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                   0.030     0.000     0.024     0.024 c.m/sec"
"            Catchment 2052         Pervious   Impervious Total Area "
"            Surface Area           0.065      0.043      0.108      hectare"
"            Time of concentration  8.179      1.072      3.969      minutes"
"            Time to Centroid       103.355    85.398     92.718     minutes"
"            Rainfall depth         87.263     87.263     87.263     mm"
"            Rainfall volume        56.55      37.70      94.24      c.m"
"            Rainfall losses        50.750     7.675      33.520     mm"
"            Runoff depth           36.513     79.588     53.743     mm"
"            Runoff volume          23.66      34.38      58.04      c.m"
"            Runoff coefficient     0.418      0.912      0.616      "
"            Maximum flow           0.013      0.025      0.030      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.030     0.030     0.024     0.024"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.030     0.030     0.030     0.024"
" 40         HYDROGRAPH   Combine    600"
"           6   Combine "
"         600   Node #"
"               Arkell Rd"
"            Maximum flow                 0.055    c.m/sec"
"            Hydrograph volume          104.325    c.m"
"                   0.030     0.030     0.030     0.055"
" 40         HYDROGRAPH   Confluence    600"
"           7   Confluence "
"         600   Node #"
"               Arkell Rd"
"            Maximum flow                 0.055    c.m/sec"
"            Hydrograph volume          104.325    c.m"
"                   0.030     0.055     0.030     0.000"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.030     0.055     0.055     0.000"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                 0.280    c.m/sec"
"            Hydrograph volume         1397.186    c.m"
"                   0.030     0.055     0.055     0.280"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.030     0.000     0.055     0.280"
" 33         CATCHMENT 206"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         206   Catchment 206"
"      70.000   % Impervious"
"       0.035   Total Area"
"      20.000   Flow length"
"       1.250   Overland Slope"
"       0.011   Pervious Area"
"      20.000   Pervious length"
"       1.250   Pervious slope"
"       0.024   Impervious Area"
"      20.000   Impervious length"
"       1.250   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.419   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.924   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.015     0.000     0.055     0.280 c.m/sec"
"            Catchment 206          Pervious   Impervious Total Area "
"            Surface Area           0.011      0.024      0.035      hectare"
"            Time of concentration  10.844     1.421      2.954      minutes"
"            Time to Centroid       106.618    85.803     89.189     minutes"
"            Rainfall depth         87.263     87.263     87.263     mm"
"            Rainfall volume        9.16       21.38      30.54      c.m"
"            Rainfall losses        50.713     6.652      19.870     mm"
"            Runoff depth           36.551     80.611     67.393     mm"
"            Runoff volume          3.84       19.75      23.59      c.m"
"            Runoff coefficient     0.419      0.924      0.772      "
"            Maximum flow           0.002      0.014      0.015      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.015     0.015     0.055     0.280"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.015     0.015     0.015     0.280"
" 40         HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"            Maximum flow                 0.292    c.m/sec"
"            Hydrograph volume         1420.774    c.m"
"                   0.015     0.015     0.015     0.292"
" 40         HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               TORRANCE CREEK"
```

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"            Maximum flow                  0.292    c.m/sec"
"            Hydrograph volume          1420.774    c.m"
"                    0.015     0.292     0.015     0.000"
" 38         START/RE-START TOTALS 800"
"           3   Runoff Totals on EXIT"
"            Total Catchment area                    3.108    hectare"
"            Total Impervious area                   1.071    hectare"
"            Total % impervious                     34.445"
" 19         EXIT"
```

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"               MIDUSS Output ----------------------------------------------->"
"               MIDUSS version                          Version 2.25  rev. 473"
"               MIDUSS created                  Sunday, February 7, 2010"
"           10  Units used:                                      ie METRIC"
"               Job folder:          Q:\42063\104\SWM\September 2021\MIDUSS\"
"                                                                      POST"
"               Output filename:                                  RegPOST.in"
"               Licensee name:                                             A"
"               Company                                           Microsoft"
"               Date & Time last used:              10/5/2021 at 2:23:30 PM"
" 31         TIME PARAMETERS"
"       5.000   Time Step"
"    2880.000   Max. Storm length"
"    9000.000   Max. Hydrograph"
" 32         STORM Mass Curve"
"           3   Mass Curve"
"     285.000   Rainfall depth"
"    2880.000   Duration"
"          69   Q:\42063\104\SWM\September 2021\MIDUSS\POST\Hazel entire 48 hours.mrd   Hurricane
Hazel (entire 48 h)"
"            Maximum intensity           53.012    mm/hr"
"            Total depth                285.000    mm"
"           8   99999hyd   Hydrograph extension used in this file"
" 33         CATCHMENT 2011"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2011   Catchment 201-1"
"      60.000   % Impervious"
"       0.519   Total Area"
"      60.000   Flow length"
"       0.750   Overland Slope"
"       0.208   Pervious Area"
"      60.000   Pervious length"
"       0.750   Pervious slope"
"       0.311   Impervious Area"
"      60.000   Impervious length"
"       0.750   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.732   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.972   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                0.075     0.000     0.000     0.000 c.m/sec"
"            Catchment 2011         Pervious   Impervious Total Area "
"            Surface Area           0.208      0.311      0.519      hectare"
"            Time of concentration  32.556     5.818      14.755     minutes"
"            Time to Centroid       2531.753   2271.613   2358.566   minutes"
"            Rainfall depth         285.000    285.000    285.000    mm"
"            Rainfall volume        591.66     887.49     1479.15    c.m"
"            Rainfall losses        76.442     8.071      35.419     mm"
"            Runoff depth           208.558    276.929    249.581    mm"
"            Runoff volume          432.97     862.36     1295.32    c.m"
"            Runoff coefficient     0.732      0.972      0.876      "
"            Maximum flow           0.030      0.048      0.075      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                 0.075     0.075     0.000     0.000"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
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"                   0.075     0.075     0.075     0.000"
" 40          HYDROGRAPH   Combine    900"
"             6   Combine "
"           900   Node #"
"                 SWMF"
"               Maximum flow                  0.075    c.m/sec"
"               Hydrograph volume          1295.324    c.m"
"                   0.075     0.075     0.075     0.075"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                   0.075     0.000     0.075     0.075"
" 33          CATCHMENT 2012"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2012   Catchment 201-2"
"        70.000   % Impervious"
"         0.066   Total Area"
"        15.000   Flow length"
"         0.500   Overland Slope"
"         0.020   Pervious Area"
"        15.000   Pervious length"
"         0.500   Pervious slope"
"         0.046   Impervious Area"
"        15.000   Impervious length"
"         0.500   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.730   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.965   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                   0.009     0.000     0.075     0.075 c.m/sec"
"               Catchment 2012         Pervious   Impervious Total Area "
"               Surface Area           0.020      0.046      0.066      hectare"
"               Time of concentration  16.004     2.860      6.077      minutes"
"               Time to Centroid       2507.937   2265.585   2324.907   minutes"
"               Rainfall depth         285.000    285.000    285.000    mm"
"               Rainfall volume        56.43      131.67     188.10     c.m"
"               Rainfall losses        76.941     9.886      30.002     mm"
"               Runoff depth           208.059    275.114    254.998    mm"
"               Runoff volume          41.20      127.10     168.30     c.m"
"               Runoff coefficient     0.730      0.965      0.895      "
"               Maximum flow           0.003      0.007      0.009      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                   0.009     0.009     0.075     0.075"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                   0.009     0.009     0.009     0.075"
" 40          HYDROGRAPH   Combine    900"
"             6   Combine "
"           900   Node #"
"                 SWMF"
"               Maximum flow                  0.084    c.m/sec"
"               Hydrograph volume          1463.622    c.m"
"                   0.009     0.009     0.009     0.084"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                   0.009     0.000     0.009     0.084"
" 33          CATCHMENT 2013"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2013   Catchment 201-3"
"        75.000   % Impervious"
"         0.234   Total Area"
"        15.000   Flow length"
"         2.000   Overland Slope"
"         0.058   Pervious Area"
"        15.000   Pervious length"
"         2.000   Pervious slope"
"         0.176   Impervious Area"
"        15.000   Impervious length"
"         2.000   Impervious slope"
"         0.250   Pervious Manning 'n'"
"        74.000   Pervious SCS Curve No."
"         0.730   Pervious Runoff coefficient"
"         0.100   Pervious Ia/S coefficient"
"         8.924   Pervious Initial abstraction"
"         0.015   Impervious Manning 'n'"
"        98.000   Impervious SCS Curve No."
"         0.963   Impervious Runoff coefficient"
"         0.100   Impervious Ia/S coefficient"
"         0.518   Impervious Initial abstraction"
"                   0.034     0.000     0.009     0.084 c.m/sec"
"               Catchment 2013         Pervious   Impervious Total Area "
"               Surface Area           0.058      0.176      0.234      hectare"
"               Time of concentration  10.558     1.887      3.637      minutes"
"               Time to Centroid       2500.416   2269.665   2316.233   minutes"
"               Rainfall depth         285.000    285.000    285.000    mm"
"               Rainfall volume        166.72     500.18     666.90     c.m"
"               Rainfall losses        76.931     10.683     27.245     mm"
"               Runoff depth           208.069    274.317    257.755    mm"
"               Runoff volume          121.72     481.43     603.15     c.m"
"               Runoff coefficient     0.730      0.963      0.904      "
"               Maximum flow           0.008      0.026      0.034      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"             4   Add Runoff "
"                   0.034     0.034     0.009     0.084"
" 40          HYDROGRAPH Copy to Outflow"
"             8   Copy to Outflow"
"                   0.034     0.034     0.034     0.084"
" 40          HYDROGRAPH   Combine    900"
"             6   Combine "
"           900   Node #"
"                 SWMF"
"               Maximum flow                  0.118    c.m/sec"
"               Hydrograph volume          2066.769    c.m"
"                   0.034     0.034     0.034     0.118"
" 40          HYDROGRAPH Start - New Tributary"
"             2   Start - New Tributary"
"                   0.034     0.000     0.034     0.118"
" 33          CATCHMENT 2014"
"             1   Triangular SCS"
"             1   Equal length"
"             1   SCS method"
"          2014   Catchment 201-4"
"       100.000   % Impervious"
"         0.065   Total Area"
"        10.000   Flow length"
"         2.000   Overland Slope"
"         0.000   Pervious Area"
"        10.000   Pervious length"
"         2.000   Pervious slope"
"         0.065   Impervious Area"
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"       10.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.000   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.970   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.009     0.000     0.034     0.118 c.m/sec"
"            Catchment 2014         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.065      0.065      hectare"
"            Time of concentration  8.278      1.479      1.479      minutes"
"            Time to Centroid       2497.307   2266.252   2266.252   minutes"
"            Rainfall depth         285.000    285.000    285.000    mm"
"            Rainfall volume        0.00       185.25     185.25     c.m"
"            Rainfall losses        76.932     8.442      8.442      mm"
"            Runoff depth           208.068    276.558    276.558    mm"
"            Runoff volume          0.00       179.76     179.76     c.m"
"            Runoff coefficient     0.000      0.970      0.970      "
"            Maximum flow           0.000      0.009      0.009      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.009     0.009     0.034     0.118"
" 57         TRENCH Design d/s of 2014"
"       0.009   Peak inflow"
"     179.762   Hydrograph volume"
"     337.000   Ground elevation"
"     334.200   Downstream trench invert"
"       1.000   Trench height"
"     333.200   Water table elevation"
"       5.000   Trench top width"
"       5.000   Trench bottom width"
"      40.000   Voids ratio (%)"
"      30.000   Hydraulic conductivity"
"       0.000   Trench gradient (%)"
"      10.000   Trench length"
"       1.000   Include base width"
"         29.   Number of stages"
"                 Level Discharge    Volume"
"               334.200     0.000       0.0"
"               334.300     0.000       2.0"
"               334.400     0.000       4.0"
"               334.500     0.000       6.0"
"               334.600     0.000       8.0"
"               334.700     0.000      10.0"
"               334.800     0.000      12.0"
"               334.900     0.000      14.0"
"               335.000     0.000      16.0"
"               335.100     0.000      18.0"
"               335.200     0.000      20.0"
"               335.300     0.004      20.1"
"               335.400     0.006      20.2"
"               335.500     0.008      20.3"
"               335.600     0.010      20.5"
"               335.700     0.011      20.6"
"               335.800     0.013      20.7"
"               335.900     0.014      20.8"
"               336.000     0.015      20.9"
"               336.100     0.016      21.0"
"               336.200     0.017      21.1"
"               336.300     0.018      21.2"
"               336.400     0.019      21.4"
"               336.500     0.020      21.5"
"               336.600     0.020      21.6"
"               336.700     0.021      21.7"
"               336.800     0.022      21.8"
"               336.900     0.023      21.9"
"               337.000     0.023      22.0"
"         1.   TRENCH PIPES"
"           Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"               Invert    length     diam.    grade%     0=Yes  distance"
"               335.200    20.000     0.000     1.000     1.000     0.000"
"         1.   MANHOLE"
"              Access"
"            diameter"
"               1.200"
"         1.   OUTFLOW PIPE"
"         0.   Inflow at upstream end of trench: 1=True; 0=False"
"            Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"              invert    invert    Length  Diameter       'n'   loss Ke"
"              335.200   335.000    20.000     0.100     0.013     0.500"
"           Peak outflow                  0.008    c.m/sec"
"           Outflow volume               83.978    c.m"
"           Peak exfiltration             0.001    c.m/sec"
"           Exfiltration volume          95.573    c.m"
"           Maximum level               335.523    metre"
"           Maximum storage              20.365    c.m"
"           Centroidal lag               45.082   hours"
"           Infiltration area 2 sides    20.000   sq.metre"
"           Infiltration Base area       50.000   sq.metre"
"                0.009     0.009     0.008     0.001 c.m/sec"
" 40         HYDROGRAPH   Combine    900"
"          6   Combine "
"        900   Node #"
"              SWMF"
"           Maximum flow                  0.127    c.m/sec"
"           Hydrograph volume          2150.744    c.m"
"                 0.009     0.009     0.008     0.127"
" 40         HYDROGRAPH Start - New Tributary"
"          2   Start - New Tributary"
"                0.009     0.000     0.008     0.127"
" 33         CATCHMENT 2015"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2015   Catchment 201-5"
"       85.000   % Impervious"
"        0.074   Total Area"
"       15.000   Flow length"
"        2.000   Overland Slope"
"        0.011   Pervious Area"
"       15.000   Pervious length"
"        2.000   Pervious slope"
"        0.063   Impervious Area"
"       15.000   Impervious length"
"        2.000   Impervious slope"
"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.730   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.963   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
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"                   0.011     0.000     0.008     0.127 c.m/sec"
"            Catchment 2015         Pervious   Impervious Total Area "
"            Surface Area           0.011      0.063      0.074      hectare"
"            Time of concentration  10.558     1.887      2.911      minutes"
"            Time to Centroid       2500.415   2269.665   2296.907   minutes"
"            Rainfall depth         285.000    285.000    285.000    mm"
"            Rainfall volume        31.64      179.26     210.90     c.m"
"            Rainfall losses        76.931     10.684     20.621     mm"
"            Runoff depth           208.069    274.316    264.379    mm"
"            Runoff volume          23.10      172.55     195.64     c.m"
"            Runoff coefficient     0.730      0.963      0.928      "
"            Maximum flow           0.002      0.009      0.011      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.011     0.011     0.008     0.127"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                   0.011     0.011     0.011     0.127"
" 40         HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"            Maximum flow                  0.137    c.m/sec"
"            Hydrograph volume          2346.385    c.m"
"                   0.011     0.011     0.011     0.137"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                   0.011     0.000     0.011     0.137"
" 33         CATCHMENT 2016"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2016   Catchment 201-6"
"      100.000   % Impervious"
"       0.032   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.032   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.970   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                   0.005     0.000     0.011     0.137 c.m/sec"
"            Catchment 2016         Pervious   Impervious Total Area "
"            Surface Area           0.000      0.032      0.032      hectare"
"            Time of concentration  8.278      1.479      1.479      minutes"
"            Time to Centroid       2497.307   2266.252   2266.252   minutes"
"            Rainfall depth         285.000    285.000    285.000    mm"
"            Rainfall volume        0.00       91.20      91.20      c.m"
"            Rainfall losses        76.932     8.442      8.442      mm"
"            Runoff depth           208.068    276.558    276.558    mm"
"            Runoff volume          0.00       88.50      88.50      c.m"
"            Runoff coefficient     0.000      0.970      0.970      "
"            Maximum flow           0.000      0.005      0.005      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                   0.005     0.005     0.011     0.137"
" 57         TRENCH Design d/s of 2016"
"       0.005   Peak inflow"
"      88.498   Hydrograph volume"
"     337.000   Ground elevation"
"     334.200   Downstream trench invert"
"       1.000   Trench height"
"     333.200   Water table elevation"
"       5.000   Trench top width"
"       5.000   Trench bottom width"
"      40.000   Voids ratio (%)"
"      30.000   Hydraulic conductivity"
"       0.000   Trench gradient (%)"
"       5.000   Trench length"
"       1.000   Include base width"
"         29.   Number of stages"
"                 Level Discharge    Volume"
"               334.200     0.000       0.0"
"               334.300     0.000       1.0"
"               334.400     0.000       2.0"
"               334.500     0.000       3.0"
"               334.600     0.000       4.0"
"               334.700     0.000       5.0"
"               334.800     0.000       6.0"
"               334.900     0.000       7.0"
"               335.000     0.000       8.0"
"               335.100     0.000       9.0"
"               335.200     0.000      10.0"
"               335.300     0.002      10.1"
"               335.400     0.006      10.2"
"               335.500     0.008      10.3"
"               335.600     0.010      10.5"
"               335.700     0.011      10.6"
"               335.800     0.013      10.7"
"               335.900     0.014      10.8"
"               336.000     0.015      10.9"
"               336.100     0.016      11.0"
"               336.200     0.017      11.1"
"               336.300     0.018      11.2"
"               336.400     0.019      11.4"
"               336.500     0.020      11.5"
"               336.600     0.020      11.6"
"               336.700     0.021      11.7"
"               336.800     0.022      11.8"
"               336.900     0.023      11.9"
"               337.000     0.023      12.0"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"               335.200    10.000     0.000     2.000     1.000     0.000"
"           1.   MANHOLE"
"                Access"
"               diameter"
"                  1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                invert    invert    Length  Diameter       'n'   loss Ke"
"               335.200   335.000    10.000     0.100     0.013     0.500"
"             Peak outflow                0.004    c.m/sec"
"             Outflow volume             41.317    c.m"
"             Peak exfiltration           0.000    c.m/sec"
"             Exfiltration volume        47.255    c.m"
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"            Maximum level              335.356    metre"
"            Maximum storage             10.176    c.m"
"            Centroidal lag              45.094   hours"
"            Infiltration area 2 sides   10.000   sq.metre"
"            Infiltration Base area      25.000   sq.metre"
"                 0.005     0.005     0.004     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"            Maximum flow                 0.141    c.m/sec"
"            Hydrograph volume         2387.699    c.m"
"                  0.005     0.005     0.004     0.141"
" 40         HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.005     0.000     0.004     0.141"
" 33         CATCHMENT 2017"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2017   Catchment 201-7 - SWMF"
"      40.000   % Impervious"
"       0.211   Total Area"
"      10.000   Flow length"
"      10.000   Overland Slope"
"       0.127   Pervious Area"
"      10.000   Pervious length"
"      10.000   Pervious slope"
"       0.084   Impervious Area"
"      10.000   Impervious length"
"      10.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.729   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.938   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.029     0.000     0.004     0.141 c.m/sec"
"            Catchment 2017         Pervious   Impervious Total Area "
"            Surface Area           0.127      0.084      0.211      hectare"
"            Time of concentration  5.108      0.913      3.171      minutes"
"            Time to Centroid       2493.048   2266.347   2388.354   minutes"
"            Rainfall depth         285.000    285.000    285.000    mm"
"            Rainfall volume        360.81     240.54     601.35     c.m"
"            Rainfall losses        77.349     17.727     53.500     mm"
"            Runoff depth           207.651    267.273    231.500    mm"
"            Runoff volume          262.89     225.58     488.46     c.m"
"            Runoff coefficient     0.729      0.938      0.812      "
"            Maximum flow           0.017      0.011      0.029      c.m/sec"
" 40         HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.029     0.029     0.004     0.141"
" 40         HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.029     0.029     0.029     0.141"
" 40         HYDROGRAPH   Combine    900"
"           6   Combine "
"         900   Node #"
"               SWMF"
"            Maximum flow                 0.170    c.m/sec"
"            Hydrograph volume         2876.164    c.m"
"                  0.029     0.029     0.029     0.170"
" 40         HYDROGRAPH   Confluence    900"
"           7   Confluence "
"         900   Node #"
"               SWMF"
"            Maximum flow                 0.170    c.m/sec"
"            Hydrograph volume         2876.164    c.m"
"                  0.029     0.170     0.029     0.000"
" 54         POND DESIGN"
"       0.170   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"      2876.2   Hydrograph volume    c.m"
"         13.   Number of stages"
"      334.400   Minimum water level    metre"
"      335.600   Maximum water level    metre"
"      334.400   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                334.400     0.000     0.000"
"                334.500   0.00150    40.000"
"                334.600   0.00230    85.000"
"                334.700   0.00290   135.000"
"                334.800   0.03110   189.000"
"                334.900   0.04300   249.000"
"                335.000   0.05220   314.000"
"                335.100   0.05990   384.000"
"                335.200   0.06680   457.000"
"                335.300   0.07300   534.000"
"                335.400    0.1628   614.000"
"                335.500    0.4275   698.000"
"                335.600    0.9140   786.000"
"            Peak outflow                 0.130    c.m/sec"
"            Maximum level              335.363    metre"
"            Maximum storage            584.560    c.m"
"            Centroidal lag              42.524   hours"
"                 0.029     0.170     0.130     0.000 c.m/sec"
" 40         HYDROGRAPH Next link "
"           5   Next link "
"                  0.029     0.130     0.130     0.000"
" 54         POND DESIGN"
"       0.130   Current peak flow    c.m/sec"
"       0.045   Target outflow    c.m/sec"
"      2876.6   Hydrograph volume    c.m"
"         10.   Number of stages"
"      334.200   Minimum water level    metre"
"      335.100   Maximum water level    metre"
"      334.200   Starting water level    metre"
"            0   Keep Design Data: 1 = True; 0 = False"
"                  Level Discharge    Volume"
"                334.200     0.000     0.000"
"                334.300   0.00191    18.000"
"                334.400   0.00207    38.000"
"                334.500   0.00225    60.000"
"                334.600   0.00243    83.000"
"                334.700   0.00261   109.000"
"                334.800   0.00281   136.000"
"                334.900    0.1543   165.000"
"                335.000    0.4628   196.000"
"                335.100    0.9060   229.000"
"            Peak outflow                 0.129    c.m/sec"
"            Maximum level              334.883    metre"
"            Maximum storage            160.155    c.m"
"            Centroidal lag              44.861   hours"
"                 0.029     0.130     0.129     0.000 c.m/sec"
" 40         HYDROGRAPH   Combine    800"
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"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                0.129    c.m/sec"
"             Hydrograph volume         2876.545    c.m"
"                    0.029     0.130     0.129     0.129"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.029     0.000     0.129     0.129"
" 33          CATCHMENT 2021"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2021   Catchment 202-1"
"       0.000   % Impervious"
"       0.863   Total Area"
"      50.000   Flow length"
"       0.500   Overland Slope"
"       0.863   Pervious Area"
"      50.000   Pervious length"
"       0.500   Pervious slope"
"       0.000   Impervious Area"
"      50.000   Impervious length"
"       0.500   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.732   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.123     0.000     0.129     0.129 c.m/sec"
"             Catchment 2021         Pervious   Impervious Total Area "
"             Surface Area           0.863      0.000      0.863      hectare"
"             Time of concentration  32.957     5.890      32.957     minutes"
"             Time to Centroid       2532.306   2271.773   2532.307   minutes"
"             Rainfall depth         285.000    285.000    285.000    mm"
"             Rainfall volume        2459.55    0.00       2459.55    c.m"
"             Rainfall losses        76.445     8.151      76.445     mm"
"             Runoff depth           208.555    276.849    208.555    mm"
"             Runoff volume          1799.83    0.00       1799.83    c.m"
"             Runoff coefficient     0.732      0.000      0.732      "
"             Maximum flow           0.123      0.000      0.123      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.123     0.123     0.129     0.129"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.123     0.123     0.123     0.129"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                0.243    c.m/sec"
"             Hydrograph volume         4676.375    c.m"
"                    0.123     0.123     0.123     0.243"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.123     0.000     0.123     0.243"
" 33          CATCHMENT 2022"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2022   Catchment 202-2"
"      24.000   % Impervious"
"       0.184   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.140   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.044   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.730   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.970   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.026     0.000     0.123     0.243 c.m/sec"
"             Catchment 2022         Pervious   Impervious Total Area "
"             Surface Area           0.140      0.044      0.184      hectare"
"             Time of concentration  8.278      1.479      6.268      minutes"
"             Time to Centroid       2497.306   2266.253   2428.997   minutes"
"             Rainfall depth         285.000    285.000    285.000    mm"
"             Rainfall volume        398.54     125.86     524.40     c.m"
"             Rainfall losses        76.932     8.442      60.495     mm"
"             Runoff depth           208.068    276.558    224.505    mm"
"             Runoff volume          290.96     122.13     413.09     c.m"
"             Runoff coefficient     0.730      0.970      0.788      "
"             Maximum flow           0.019      0.006      0.026      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.026     0.026     0.123     0.243"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.026     0.026     0.026     0.243"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                0.262    c.m/sec"
"             Hydrograph volume         5089.458    c.m"
"                    0.026     0.026     0.026     0.262"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.026     0.000     0.026     0.262"
" 33          CATCHMENT 2031"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2031   Catchment 203-1"
"      30.000   % Impervious"
"       0.216   Total Area"
"     130.000   Flow length"
"       2.000   Overland Slope"
"       0.151   Pervious Area"
"     130.000   Pervious length"
"       2.000   Pervious slope"
"       0.065   Impervious Area"
"     130.000   Impervious length"
"       2.000   Impervious slope"
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"        0.250   Pervious Manning 'n'"
"       74.000   Pervious SCS Curve No."
"        0.732   Pervious Runoff coefficient"
"        0.100   Pervious Ia/S coefficient"
"        8.924   Pervious Initial abstraction"
"        0.015   Impervious Manning 'n'"
"       98.000   Impervious SCS Curve No."
"        0.972   Impervious Runoff coefficient"
"        0.100   Impervious Ia/S coefficient"
"        0.518   Impervious Initial abstraction"
"                  0.031     0.000     0.026     0.262 c.m/sec"
"             Catchment 2031         Pervious   Impervious Total Area "
"             Surface Area           0.151      0.065      0.216      hectare"
"             Time of concentration  38.576     6.894      27.083     minutes"
"             Time to Centroid       2540.184   2273.879   2443.578   minutes"
"             Rainfall depth         285.000    285.000    285.000    mm"
"             Rainfall volume        430.92     184.68     615.60     c.m"
"             Rainfall losses        76.446     7.973      55.904     mm"
"             Runoff depth           208.554    277.027    229.096    mm"
"             Runoff volume          315.33     179.51     494.85     c.m"
"             Runoff coefficient     0.732      0.972      0.804      "
"             Maximum flow           0.022      0.010      0.031      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.031     0.031     0.026     0.262"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.031     0.031     0.031     0.262"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.031    c.m/sec"
"             Hydrograph volume           494.847    c.m"
"                  0.031     0.031     0.031     0.031"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.031     0.000     0.031     0.031"
" 33          CATCHMENT 2032"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2032   Catchment 203-2"
"       0.000   % Impervious"
"       0.113   Total Area"
"      10.000   Flow length"
"      33.000   Overland Slope"
"       0.113   Pervious Area"
"      10.000   Pervious length"
"      33.000   Pervious slope"
"       0.000   Impervious Area"
"      10.000   Impervious length"
"      33.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.713   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                  0.015     0.000     0.031     0.031 c.m/sec"
"             Catchment 2032         Pervious   Impervious Total Area "
"             Surface Area           0.113      0.000      0.113      hectare"
"             Time of concentration  3.570      0.638      3.570      minutes"
"             Time to Centroid       2485.798   2237.542   2485.797   minutes"
"             Rainfall depth         285.000    285.000    285.000    mm"
"             Rainfall volume        322.05     0.00       322.05     c.m"
"             Rainfall losses        81.898     25.077     81.898     mm"
"             Runoff depth           203.102    259.923    203.102    mm"
"             Runoff volume          229.51     0.00       229.51     c.m"
"             Runoff coefficient     0.713      0.000      0.713      "
"             Maximum flow           0.015      0.000      0.015      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                  0.015     0.015     0.031     0.031"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                  0.015     0.015     0.015     0.031"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.045    c.m/sec"
"             Hydrograph volume           724.353    c.m"
"                  0.015     0.015     0.015     0.045"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                  0.015     0.000     0.015     0.045"
" 33          CATCHMENT 2033"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2033   Catchment 203-3"
"      100.000   % Impervious"
"       0.092   Total Area"
"      10.000   Flow length"
"       2.000   Overland Slope"
"       0.000   Pervious Area"
"      10.000   Pervious length"
"       2.000   Pervious slope"
"       0.092   Impervious Area"
"      10.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.000   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.970   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                  0.013     0.000     0.015     0.045 c.m/sec"
"             Catchment 2033         Pervious   Impervious Total Area "
"             Surface Area           0.000      0.092      0.092      hectare"
"             Time of concentration  8.278      1.479      1.479      minutes"
"             Time to Centroid       2497.307   2266.251   2266.253   minutes"
"             Rainfall depth         285.000    285.000    285.000    mm"
"             Rainfall volume        0.00       262.20     262.20     c.m"
"             Rainfall losses        76.932     8.442      8.442      mm"
"             Runoff depth           208.068    276.558    276.558    mm"
"             Runoff volume          0.00       254.43     254.43     c.m"
"             Runoff coefficient     0.000      0.970      0.970      "
"             Maximum flow           0.000      0.013      0.013      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
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"                  0.013     0.013     0.015     0.045"
" 57          TRENCH Design d/s of 2033"
"       0.013   Peak inflow"
"     254.433   Hydrograph volume"
"     337.000   Ground elevation"
"     334.500   Downstream trench invert"
"       1.000   Trench height"
"     333.500   Water table elevation"
"       1.000   Trench top width"
"       1.000   Trench bottom width"
"      40.000   Voids ratio (%)"
"      30.000   Hydraulic conductivity"
"       0.000   Trench gradient (%)"
"      60.000   Trench length"
"       1.000   Include base width"
"         26.   Number of stages"
"                 Level Discharge    Volume"
"               334.500     0.000       0.0"
"               334.600     0.000       2.4"
"               334.700     0.000       4.8"
"               334.800     0.000       7.2"
"               334.900     0.000       9.6"
"               335.000     0.000      12.0"
"               335.100     0.000      14.4"
"               335.200     0.000      16.8"
"               335.300     0.000      19.2"
"               335.400     0.000      21.6"
"               335.500     0.000      24.0"
"               335.600     0.005      24.1"
"               335.700     0.010      24.2"
"               335.800     0.016      24.3"
"               335.900     0.020      24.5"
"               336.000     0.024      24.6"
"               336.100     0.027      24.7"
"               336.200     0.030      24.8"
"               336.300     0.032      24.9"
"               336.400     0.035      25.0"
"               336.500     0.037      25.1"
"               336.600     0.039      25.2"
"               336.700     0.041      25.4"
"               336.800     0.043      25.5"
"               336.900     0.045      25.6"
"               337.000     0.047      25.7"
"           1.   TRENCH PIPES"
"             Downstream      Pipe      Pipe      Pipe Perf'ted?    Offset"
"                 Invert    length     diam.    grade%     0=Yes  distance"
"               335.500    20.000     0.000     1.000     1.000     0.000"
"           1.   MANHOLE"
"                 Access"
"              diameter"
"                 1.200"
"           1.   OUTFLOW PIPE"
"           0.   Inflow at upstream end of trench: 1=True; 0=False"
"              Upstream Downstr'm      Pipe      Pipe   Manning     Entry"
"                 invert    invert    Length  Diameter       'n'   loss Ke"
"               335.500   335.300    20.000     0.150     0.013     0.500"
"             Peak outflow                  0.011    c.m/sec"
"             Outflow volume               92.641    c.m"
"             Peak exfiltration             0.002    c.m/sec"
"             Exfiltration volume         161.871    c.m"
"             Maximum level               335.721    metre"
"             Maximum storage              24.249    c.m"
"             Centroidal lag               45.242   hours"
"             Infiltration area 2 sides   120.000   sq.metre"
"             Infiltration Base area      60.000   sq.metre"
"                  0.013     0.013     0.011     0.002 c.m/sec"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.056    c.m/sec"
"             Hydrograph volume           816.992    c.m"
"                    0.013     0.013     0.011     0.056"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.013     0.000     0.011     0.056"
" 33          CATCHMENT 204"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         204   Catchment 204"
"       0.000   % Impervious"
"       0.198   Total Area"
"       8.000   Flow length"
"      20.000   Overland Slope"
"       0.198   Pervious Area"
"       8.000   Pervious length"
"      20.000   Pervious slope"
"       0.000   Impervious Area"
"       8.000   Impervious length"
"      20.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.712   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   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"
"                    0.026     0.000     0.011     0.056 c.m/sec"
"                Catchment 204          Pervious   Impervious Total Area "
"                Surface Area           0.198      0.000      0.198      hectare"
"                Time of concentration  3.629      0.649      3.629      minutes"
"                Time to Centroid       2485.856   2238.670   2485.855   minutes"
"                Rainfall depth         285.000    285.000    285.000    mm"
"                Rainfall volume        564.30     0.00       564.30     c.m"
"                Rainfall losses        82.021     24.612     82.021     mm"
"                Runoff depth           202.979    260.388    202.979    mm"
"                Runoff volume          401.90     0.00       401.90     c.m"
"                Runoff coefficient     0.712      0.000      0.712      "
"                Maximum flow           0.026      0.000      0.026      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.026     0.026     0.011     0.056"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.026     0.026     0.026     0.056"
" 40          HYDROGRAPH   Combine    700"
"           6   Combine "
"         700   Node #"
"               CULVERT"
"             Maximum flow                  0.081    c.m/sec"
"             Hydrograph volume          1218.890    c.m"
"                    0.026     0.026     0.026     0.081"
" 40          HYDROGRAPH   Confluence    700"
"           7   Confluence "
"         700   Node #"
"               CULVERT"
```

```
"             Maximum flow                  0.081    c.m/sec"
"             Hydrograph volume          1218.890    c.m"
"                    0.026     0.081     0.026     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.026     0.081     0.081     0.000"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                  0.332    c.m/sec"
"             Hydrograph volume          6308.347    c.m"
"                    0.026     0.081     0.081     0.332"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.026     0.000     0.081     0.332"
" 33          CATCHMENT 2051"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2051   Catchment 205-1"
"      25.000   % Impervious"
"       0.098   Total Area"
"      15.000   Flow length"
"       2.000   Overland Slope"
"       0.073   Pervious Area"
"      15.000   Pervious length"
"       2.000   Pervious slope"
"       0.024   Impervious Area"
"      15.000   Impervious length"
"       2.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.730   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.963   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.014     0.000     0.081     0.332 c.m/sec"
"             Catchment 2051         Pervious   Impervious Total Area "
"             Surface Area           0.073      0.024      0.098      hectare"
"             Time of concentration  10.558     1.887      7.911      minutes"
"             Time to Centroid       2500.415   2269.665   2429.968   minutes"
"             Rainfall depth         285.000    285.000    285.000    mm"
"             Rainfall volume        209.48     69.82      279.30     c.m"
"             Rainfall losses        76.931     10.684     60.369     mm"
"             Runoff depth           208.069    274.316    224.631    mm"
"             Runoff volume          152.93     67.21      220.14     c.m"
"             Runoff coefficient     0.730      0.963      0.788      "
"             Maximum flow           0.010      0.004      0.014      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.014     0.014     0.081     0.332"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.014     0.014     0.014     0.332"
" 40          HYDROGRAPH   Combine    600"
"           6   Combine "
"         600   Node #"
"               Arkell Rd"
"             Maximum flow                  0.014    c.m/sec"
"             Hydrograph volume           220.138    c.m"
"                    0.014     0.014     0.014     0.014"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.014     0.000     0.014     0.014"
" 33          CATCHMENT 2052"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"        2052   Catchment 205-2"
"      40.000   % Impervious"
"       0.108   Total Area"
"      25.000   Flow length"
"       5.000   Overland Slope"
"       0.065   Pervious Area"
"      25.000   Pervious length"
"       5.000   Pervious slope"
"       0.043   Impervious Area"
"      25.000   Impervious length"
"       5.000   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.730   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.962   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.015     0.000     0.014     0.014 c.m/sec"
"             Catchment 2052         Pervious   Impervious Total Area "
"             Surface Area           0.065      0.043      0.108      hectare"
"             Time of concentration  10.898     1.948      6.711      minutes"
"             Time to Centroid       2500.806   2267.411   2391.624   minutes"
"             Rainfall depth         285.000    285.000    285.000    mm"
"             Rainfall volume        184.68     123.12     307.80     c.m"
"             Rainfall losses        76.968     10.709     50.464     mm"
"             Runoff depth           208.032    274.291    234.536    mm"
"             Runoff volume          134.80     118.49     253.30     c.m"
"             Runoff coefficient     0.730      0.962      0.823      "
"             Maximum flow           0.009      0.006      0.015      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.015     0.015     0.014     0.014"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.015     0.015     0.015     0.014"
" 40          HYDROGRAPH   Combine    600"
"           6   Combine "
"         600   Node #"
"               Arkell Rd"
"             Maximum flow                  0.029    c.m/sec"
"             Hydrograph volume           473.437    c.m"
"                    0.015     0.015     0.015     0.029"
" 40          HYDROGRAPH   Confluence    600"
"           7   Confluence "
"         600   Node #"
"               Arkell Rd"
"             Maximum flow                  0.029    c.m/sec"
"             Hydrograph volume           473.437    c.m"
"                    0.015     0.029     0.015     0.000"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.015     0.029     0.029     0.000"
" 40          HYDROGRAPH   Combine    800"
```

```
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                0.358    c.m/sec"
"             Hydrograph volume         6781.785    c.m"
"                    0.015     0.029     0.029     0.358"
" 40          HYDROGRAPH Start - New Tributary"
"           2   Start - New Tributary"
"                    0.015     0.000     0.029     0.358"
" 33          CATCHMENT 206"
"           1   Triangular SCS"
"           1   Equal length"
"           1   SCS method"
"         206   Catchment 206"
"      70.000   % Impervious"
"       0.035   Total Area"
"      20.000   Flow length"
"       1.250   Overland Slope"
"       0.011   Pervious Area"
"      20.000   Pervious length"
"       1.250   Pervious slope"
"       0.024   Impervious Area"
"      20.000   Impervious length"
"       1.250   Impervious slope"
"       0.250   Pervious Manning 'n'"
"      74.000   Pervious SCS Curve No."
"       0.731   Pervious Runoff coefficient"
"       0.100   Pervious Ia/S coefficient"
"       8.924   Pervious Initial abstraction"
"       0.015   Impervious Manning 'n'"
"      98.000   Impervious SCS Curve No."
"       0.963   Impervious Runoff coefficient"
"       0.100   Impervious Ia/S coefficient"
"       0.518   Impervious Initial abstraction"
"                    0.005     0.000     0.029     0.358 c.m/sec"
"             Catchment 206          Pervious   Impervious Total Area "
"             Surface Area           0.011      0.024      0.035      hectare"
"             Time of concentration  14.448     2.582      5.495      minutes"
"             Time to Centroid       2505.975   2268.321   2326.666   minutes"
"             Rainfall depth         285.000    285.000    285.000    mm"
"             Rainfall volume        29.93      69.82      99.75      c.m"
"             Rainfall losses        76.699     10.643     30.460     mm"
"             Runoff depth           208.301    274.357    254.540    mm"
"             Runoff volume          21.87      67.22      89.09      c.m"
"             Runoff coefficient     0.731      0.963      0.893      "
"             Maximum flow           0.001      0.004      0.005      c.m/sec"
" 40          HYDROGRAPH Add Runoff "
"           4   Add Runoff "
"                    0.005     0.005     0.029     0.358"
" 40          HYDROGRAPH Copy to Outflow"
"           8   Copy to Outflow"
"                    0.005     0.005     0.005     0.358"
" 40          HYDROGRAPH   Combine    800"
"           6   Combine "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                0.362    c.m/sec"
"             Hydrograph volume         6870.874    c.m"
"                    0.005     0.005     0.005     0.362"
" 40          HYDROGRAPH   Confluence    800"
"           7   Confluence "
"         800   Node #"
"               TORRANCE CREEK"
"             Maximum flow                0.362    c.m/sec"
"             Hydrograph volume         6870.875    c.m"
"                    0.005     0.362     0.005     0.000"
" 38          START/RE-START TOTALS 800"
"           3   Runoff Totals on EXIT"
"             Total Catchment area                  3.108    hectare"
"             Total Impervious area                 1.071    hectare"
"             Total % impervious                   34.445"
" 19          EXIT"
```

Appendix D

Proposed SWM Facility Design Calculations

Arkell Road
STORMWATER MANAGEMENT
Guelph, Ontario

Project Number:	42063-104
Date:	October 8, 2021
Design By:	AJC
File:	Q:\42063\104\SWM\September 2021\42063-104 Master SWM Facility Design Sheet.xlsx

Step 1: Choose Level of Water Quality Control

Enhanced 80% long-term S.S. removal

Step 2: Choose Type of Facility

Wet Pond

Step 3: Define Catchment area and Imperviousness

Catchment Area (ha)	Imperviousness (%)
1.201	64.7

Interpolated Storage Volume Requirement (m^3/ha)

212.63

Permanent Pool Required (m^3)

207.33

Extended Detention Volume Required (m^3)

48.04

Table 3.2 Water Quality Storage Requirements based on Receiving Waters (from MOE Stormwater Management Planning and Design Manual, March 2003)

Protection Level	SWMP Type	Storage Volume (m^3/ha) for Impervious Level			
		35	55	70	85
Enhanced 80% long-term S.S. removal	*Wetlands*	80	105	120	140
	Hybrid Wet Pond/Wetland	110	150	175	195
	Wet Pond	140	190	225	250
Normal 70% long-term S.S. Removal	*Wetlands*	60	70	80	90
	Hybrid Wet Pond/Wetland	75	90	105	120
	Wet Pond	90	110	130	150
Basic 60% long-term S.S. Removal	*Wetlands*	60	60	60	60
	Hybrid Wet Pond/Wetland	60	70	75	80
	Wet Pond	60	75	85	95
	Dry Pond (Continuous Flow)	90	150	200	240

35	55	70	85

Arkell Road
STORMWATER MANAGEMENT
Guelph, Ontario

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Orifice Calculations

$Q_o=C_d*A_o*(2*g*H_o)^{0.5}$

	Orifice 1	Orifice 2	Orifice 3
C_d	0.63	0.63	0.63
Invert (m)	334.40	334.70	500.00
Width (m)			
Diameter/Height (m)	0.050	0.200	
Type (H/V)	V	H	V

C_d	Description
0.63	Orifice Plate
0.80	Orifice Tube

Weir Calculations

$Q_w = 2/3*C_d*(2g)^{1/2}*L*H_w^{3/2} + 8/15*C_d*(2g)^{1/2}*\tan\theta*H_w^{5/2}$

C_d	0.50	0.50
Invert (m)	335.30	500.00
Length (m)	1.000	
Side Slope (H:V)	10	1
Side Slope (rad)	1.471	0.785

STAGE-DISCHARGE RELATIONSHIP (WET CELL)

Stage	Active Volume	Orifice 1			Orifice 2			Orifice 3			Weir 1 Flow	Weir 2 Flow	Total Flow		Average Discharge	Increment Volume	Increment Dewatering Time	Extended Detention: Cumulative Dewatering Time	Erosion Control: Cumulative Dewatering Time
		Area	H_o	Flow	Area	H_o	Flow	Area	H_o	Flow									
m	m^3	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^2	*m*	m^3/s	m^3/s		m^3/s		m^3/s	m^3	*hours*	*hours*	*hours*
334.40	0	0.00	0.00	0.0000	0.03	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0000		0.0008	40	14.90	29.80	29.80
334.50	40	0.00	0.08	0.0015	0.03	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0015		0.0019	45	6.57	14.90	14.90
334.60	85	0.00	0.18	0.0023	0.03	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0023		0.0026	50	5.33	8.33	8.33
334.70	135	0.00	0.28	0.0029	0.03	0.00	0.0000	0.00	0.00	0.0000	0.0000	0.0000	0.0029		0.0170	55	0.89	3.00	3.00
334.80	189	0.00	0.38	0.0034	0.03	0.10	0.0277	0.00	0.00	0.0000	0.0000	0.0000	0.0311		0.0370	60	0.45	2.10	2.10
334.90	249	0.00	0.48	0.0038	0.03	0.20	0.0392	0.00	0.00	0.0000	0.0000	0.0000	0.0430		0.0476	65	0.38	1.65	1.65
335.00	314	0.00	0.58	0.0042	0.03	0.30	0.0480	0.00	0.00	0.0000	0.0000	0.0000	0.0522		0.0561	70	0.35	1.27	1.27
335.10	384	0.00	0.68	0.0045	0.03	0.40	0.0554	0.00	0.00	0.0000	0.0000	0.0000	0.0599		0.0634	73	0.32	0.93	0.93
335.20	457	0.00	0.78	0.0048	0.03	0.50	0.0620	0.00	0.00	0.0000	0.0000	0.0000	0.0668		0.0699	77	0.30	0.61	0.61
335.30	534	0.00	0.88	0.0051	0.03	0.60	0.0679	0.00	0.00	0.0000	0.0000	0.0000	0.0730		0.1179	80	0.19	0.30	0.30
335.40	614	0.00	0.98	0.0054	0.03	0.70	0.0733	0.00	0.00	0.0000	0.0840	0.0000	0.1628		0.2951	84	0.08	0.12	0.12
335.50	698	0.00	1.08	0.0057	0.03	0.80	0.0784	0.00	0.00	0.0000	0.3434	0.0000	0.4275		0.6707	88	0.04	0.04	0.04
335.60	786	0.00	1.18	0.0059	0.03	0.90	0.0832	0.00	0.00	0.0000	0.8249	0.0000	0.9140						

Arkell Road
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STAGE-STORAGE RELATIONSHIP (WET CELL)

Stage	Active Depth	Wet Cell			Total Pond Volume	Active Storage Volume	Volume Summary	Ponding Elevation	Comments	Stage
		Area	Volume	Cumulative Volume						
m	*m*	m^2	m^3	m^3	m^3	m^3	m^3	*m*		*m*
333.20		54	0	0	0					333.20
333.30		69	6	6	6				Bottom of Cell	333.30
333.40		84	8	14	14					333.40
333.50		101	9	23	23					333.50
333.60		118	11	34	34					333.60
333.70		136	13	47	47					333.70
333.80		154	15	61	61					333.80
333.90		186	17	78	78					333.90
334.00		221	20	99	99					334.00
334.10		257	24	122	122					334.10
334.20		296	28	150	150					334.20
334.30		337	32	182	182					334.30
334.40	0.00	380	36	218	218	0			Permanent Pool	334.40
334.50	0.10	425	40	258	258	40	48	334.52	MOE Extended Detention	334.50
334.60	0.20	472	45	303	303	85	119	334.67	25mm4hr	334.60
334.70	0.30	520	50	352	352	135	155	334.74	2yr	334.70
334.80	0.40	571	55	407	407	189	203	334.82	5yr	334.80
334.90	0.50	625	60	467	467	249	255	334.91	10yr	334.90
335.00	0.60	680	65	532	532	314	328	335.02	25yr	335.00
335.10	0.70	713	70	602	602	384	396	335.12	50yr	335.10
335.20	0.80	747	73	675	675	457	464	335.21	100yr	335.20
335.30	0.90	784	77	751	751	534				335.30
335.40	1.00	821	80	831	831	614				335.40
335.50	1.10	857	84	915	915	698				335.50
335.60	1.20	905	88	1003	1003	786			Top of Berm	335.60

Arkell Road
STORMWATER MANAGEMENT
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INFILTRATION CELL
STAGE-STORAGE RELATIONSHIP

Stage	Area	Depth	Inc. volume	Total Volume	Infiltration*	Weir Flow	Total Flow
m	m^2	*m*	m^3	m^3	m^3/s	m^3/s	m^3/s
334.2	177	0	0	0	0.00000	0.0000	0.00000
334.3	191	0.1	18	18	0.00191	0.0000	0.00191
334.4	207	0.2	20	38	0.00207	0.0000	0.00207
334.5	225	0.3	22	60	0.00225	0.0000	0.00225
334.6	243	0.4	23	83	0.00243	0.0000	0.00243
334.7	261	0.5	25	109	0.00261	0.0000	0.00261
334.8	281	0.6	27	136	0.00281	0.0000	0.00281
334.9	301	0.7	29	165	0.00301	0.1513	0.15429
335	322	0.8	31	196	0.00322	0.4596	0.46279
335.1	350	0.9	34	229	0.00350	0.9025	0.90601

Notes:

* based on Darcy Law , Q=K*A*i

hydraulic conductivity k (cm/s)= 1.00E-03 PML Geotech, Oct 2018 San/ Sand and Gravel

gradient i (m/m) = 1

A Design Manual for Sizing Infiltration Ponds, Joel A. Massman, Washington State Departent Of Transportation Technical Monitor

Weir Calculations

$Q_w = 2/3*C_d*(2g)^{1/2}*L*H_w^{3/2} + 8/15*C_d*(2g)^{1/2}*\tan\theta*H_w^{5/2}$

C_d	0.50
Invert (m)	334.80
Length (m)	3.000
Side Slope (H:V)	3
Side Slope (rad)	1.249

Arkell Road
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FOREBAY DESIGN CALCULATIONS
MOE SWM Planning and Design Manual, 2003

Forebay Design Flows

Flow into forebay during the 1:5-year return period event	0.198	m^3/s
Flow into forebay during the 25 mm - 4 hour design storm event	0.088	m^3/s
Peak flow from main pond outlet for the 25mm design storm (from MIDUSS)	0.003	m^3/s

Forebay Characteristics

b =	**2.5**	*m*	bottom width
y =	1.2	*m*	depth
z =	3	:1	side slope
w =	6.1	*m*	average width
R =	0.73	*m*	hydraulic radius
A =	7.3	m^2	cross-sectional area

1. Length Calculation Based on Settling Velocity

L = forebay flow length *(m)*
r = length-to-width ratio
Q_p = peak flow rate through forebay *(m^3/s)*
v_s = settling velocity *(m/s)*

Equation 4.5: Forebay Settling Length

a) Required Settling Length (assuming Q_p = forebay through-flow & v_s = 0.0055 m/s)

Q_p =	0.09	m^3/s	peak flow rate through forebay
v_s =	0.0055	*m/s*	settling velocity
r =	0.43		length-to-width ratio
L =	2.6	*m*	required settling length
L =	*2.6*	*m*	*trial length*

b) Required Settling Length (assuming Q_p = pond discharge & v_s = 0.0003 m/s)

Q_p =	0.003	m^3/s	peak flow rate through forebay
v_s =	0.0003	*m/s*	settling velocity
r =	0.28		length-to-width ratio
L =	1.7	*m*	required settling length
L =	*1.7*	*m*	*trial length*

Table 1: Average settling velocities

	Mass Removed	Particle Size Range	Average Settling Velocity
	%	μm	m/s
	80 - 100	x ≤ 20	0.00000254
Enhanced:	70 - 80	20 < x ≤ 40	0.00001300
Normal:	60 - 70	40 < x ≤ 60	0.00002540
Basic:	40 - 60	60 < x ≤ 130	0.00012700
Medium Sand:	20 - 40	130 < x ≤ 400	0.00059267
Gross Grit:	0 - 20	400 < x ≤ 4000	0.00550333

2. Length Calculation Based on Flow Dispersion Length

Q =	0.20	m^3/s	inlet flow rate
d =	1.2	*m*	depth of permanent pool in forebay
V_f =	0.50	*m/s*	desired velocity in forebay (typical value ≤ 0.50 *m/s*)
L =	2.6	m	required length of dispersion

Equation 4.6: Dispersion Length

3. Required Forebay Length

L =	**2.6**	***m***	**design length**
r =	0.43		design length-to-width ratio (typical minimum of 2.0)

NOTE: LENGTH TO WIDTH RATIO IS LESS THAN THE TYPICAL MINIMUM

4. Scour Velocity

v_s =	0.15	*m/s*	scour velocity (typical value = 0.15 *m/s*)
v =	**0.027**	***m/s***	**actual velocity**

OK The actual velocity through the forebay is less than the scour velocity.

5. Weir Flow From Forebay

L =	1	*m*	length of crest of weir
α =	1.65		coefficient
H =	0.5	*m*	head
Q =	**0.58**	***m^3/s***	**discharge**

Equation 4.4: Weir Flow

OK The weir flow from the forebay exceeds the flow entering the forebay

6. Estimated Cleanout Frequencies

a) Forebay

Forebay volume	218	m^3
Estimated TSS removal efficiency	80%	
Impervious level	65%	
Estimated annual sediment loading	2.5	m^3/ha
Contributing area	1.20	*ha*
Annual sediment volume	2	m^3/yr
Cleanout frequency for 33% volume reduction	**29.5**	***years***

Table 2: Annual sediment loading

Impervious Level	Annual Loading
%	m^3/ha
35%	0.6
55%	1.9
70%	2.8
85%	3.8

Arkell Road
STORMWATER MANAGEMENT
Guelph, Ontario

Project Number:	42063-104
Date:	October 8, 2021
Design By:	AJC
File:	Q:\42063\104\SWM\September 2021\42063-104 Master SWM Facility Design Sheet.xlsx

FALLING HEAD DRAWDOWN CALCULATION (25mm4hr)
MOE SWM Planning and Design Manual, 2003

$$t = \frac{0.66C_2h^{1.5} + 2C_3h^{0.5}}{2.75A_O}$$ Equation 4.11

where

t =	80969.7	*s*	
	22.5	*hr*	drawdown time
A_p =	506.99	m^2	surface area of the pond
C =	0.63		discharge coefficient
d =	50	*mm*	diameter of the orifice
A_O =	0.00196	m^2	cross-sectional area of the orifice
g =	9.81	m/s^2	gravitational acceleration constant
h_1 =	334.67	*m*	starting water elevation above the orifice
h_2 =	334.40	*m*	ending water elevation above the orifice
h =	0.27	*m*	maximum water elevation above the orifice
C_2 =	477		slope coefficient from the area-depth linear regression
C_3 =	378.2		intercept from the area-depth linear regression

	ELEVATION *m*	STAGE *m*	AREA m^2	COMMENTS
1	334.400	0	380	Permanent pool
2	334.500	0.1	425	
3	334.600	0.2	472	
4	334.700	0.3	520	
5	334.800	0.4	571	

DRAWDOWN TIME: 80970 *s*
22.5 *hr*

Regression Output:

m_1 =	477.00	slope coefficient from the area-depth linear regression
b =	378.20	intercept from the area-depth linear regression
se_1 =	6.40	standard error for coefficient m_1
se_b =	1.57	standard error for constant b
R^2 =	0.9995	coefficient of determination
se_y =	2.02	standard error of the *y* estimate
F =	5549.49	F statistic
df =	3	degrees of freedom
ss_{reg} =	22753	regression sum of squares
ss_{resid} =	12	residual sum of squares

Arkell Road
STORMWATER MANAGEMENT
Guelph, Ontario

Project Number:	42063-104
Date:	October 8, 2021
Design By:	AJC
File:	Q:\42063\104\SWM\September 2021\42063-104 Master SWM Facility Design Sheet.xlsx

FALLING HEAD DRAWDOWN CALCULATION (MOE EXT DET)
MOE SWM Planning and Design Manual, 2003

$$t = \frac{0.66C_2h^{1.5} + 2C_3h^{0.5}}{2.75A_O}$$ Equation 4.11

where

t =	50950.2	*s*	
	14.2	*hr*	drawdown time
A_p =	435.44	m^2	surface area of the pond
C =	0.63		discharge coefficient
d =	50	*mm*	diameter of the orifice
A_O =	0.00196	m^2	cross-sectional area of the orifice
g =	9.81	m/s^2	gravitational acceleration constant
h_1 =	334.52	*m*	starting water elevation above the orifice
h_2 =	334.40	*m*	ending water elevation above the orifice
h =	0.12	*m*	maximum water elevation above the orifice
C_2 =	477		slope coefficient from the area-depth linear regression
C_3 =	378.2		intercept from the area-depth linear regression

	ELEVATION *m*	STAGE *m*	AREA m^2	COMMENTS
1	334.400	0	380	Permanent pool
2	334.500	0.1	425	
3	334.600	0.2	472	
4	334.700	0.3	520	
5	334.800	0.4	571	

DRAWDOWN TIME: 50950 *s*
14.2 *hr*

Regression Output:

m_1 =	477.00	slope coefficient from the area-depth linear regression
b =	378.20	intercept from the area-depth linear regression
se_1 =	6.40	standard error for coefficient m_1
se_b =	1.57	standard error for constant b
R^2 =	0.9995	coefficient of determination
se_y =	2.02	standard error of the *y* estimate
F =	5549.49	F statistic
df =	3	degrees of freedom
ss_{reg} =	22753	regression sum of squares
ss_{resid} =	12	residual sum of squares

Arkell Road Subdivision
STORMWATER MANAGEMENT
Guelph, Ontario

Project Number: 42063-104
Date: October 8, 2021
Design By: AJC
File: Q:\42063\104\SWM\September 2021\42063-104 Roof Infiltration Galleries.xlsx

ROOF INFILTRATION GALLERIES

	25mm
Rainfall Depth (mm)*	25

Soil	
hydraulic conductivity k (cm/s)=	1X10^(-3)
Percolation Rate (mm/h)	35.0
Porosity	0.4

Retention Time (h)	24

	Block Area	Roof Area	Volume of 25mm Rainfall	Required Trench Bottom Area
	(ha)	*(m^2)*	*(m^3)*	*(m^2)*
Block 1		648	16	48
Block 2		324	8	24
Block 3 + Block 4		920	23	68

Notes:
* from MIDUSS, 3h-100yr Chicago Storm
Approximate Potential Dimensions

	Depth	Width	Length	Volume of Stone	Volume of Water Stored
	(m)	*(m)*	*(m)*	*(m^3)*	*(m^3)*
Block 1	1.0	5.0	10.0	50	20
Block 2	1.0	5.0	5.0	25	10
Block 3 + Block 4	1.0	1.0	60.0	60	24

Stormceptor®

FORTERRA

Stormceptor® EF Sizing Report

STORMCEPTOR®
ESTIMATED NET ANNUAL SEDIMENT (TSS) LOAD REDUCTION

12/01/2021

Province:	Ontario
City:	Guelph
Nearest Rainfall Station:	WATERLOO WELLINGTON AP
Climate Station Id:	6149387
Years of Rainfall Data:	34

Site Name:	190-216 Arkell

Drainage Area (ha):	1.201
% Imperviousness:	64.70

Runoff Coefficient 'c': 0.68

Particle Size Distribution:	CA ETV
Target TSS Removal (%):	60.0

Required Water Quality Runoff Volume Capture (%):	
Estimated Water Quality Flow Rate (L/s):	32.90
Oil / Fuel Spill Risk Site?	No
Upstream Flow Control?	No
Peak Conveyance (maximum) Flow Rate (L/s):	
Site Sediment Transport Rate (kg/ha/yr):	

Project Name:	190-216 Arkell
Project Number:	42063-104
Designer Name:	Alex Cressman
Designer Company:	MTE Consultants Inc.
Designer Email:	acressman@mte85.com
Designer Phone:	519-743-6500
EOR Name:	
EOR Company:	
EOR Email:	
EOR Phone:	

Net Annual Sediment (TSS) Load Reduction Sizing Summary

Stormceptor Model	TSS Removal Provided (%)
EF4	49
EF6	56
EF8	61
EF10	64
EF12	66

Recommended Stormceptor EF Model: EF8

Estimated Net Annual Sediment (TSS) Load Reduction (%): 61

Water Quality Runoff Volume Capture (%): > 90

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THIRD-PARTY TESTING AND VERIFICATION

►**Stormceptor® EF and Stormceptor® EFO** are the latest evolutions in the Stormceptor® oil-grit separator (OGS) technology series, and are designed to remove a wide variety of pollutants from stormwater and snowmelt runoff. These technologies have been third-party tested in accordance with the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators** and performance has been third-party verified in accordance with the **ISO 14034 Environmental Technology Verification (ETV)** protocol.

PERFORMANCE

►**Stormceptor® EF and EFO** remove stormwater pollutants through gravity separation and floatation, and feature a patent-pending design that generates positive removal of total suspended solids (TSS) throughout each storm event, including high-intensity storms. Captured pollutants include sediment, free oils, and sediment-bound pollutants such as nutrients, heavy metals, and petroleum hydrocarbons. Stormceptor is sized to remove a high level of TSS from the frequent rainfall events that contribute the vast majority of annual runoff volume and pollutant load. The technology incorporates an internal bypass to convey excessive stormwater flows from high-intensity storms through the device without resuspension and washout (scour) of previously captured pollutants. Proper routine maintenance ensures high pollutant removal performance and protection of downstream waterwavs.

PARTICLE SIZE DISTRIBUTION (PSD)

►The **Canadian ETV PSD** shown in the table below was used, or in part, for this sizing. This is the identical PSD that is referenced in the Canadian ETV ***Procedure for Laboratory Testing of Oil-Grit Separators*** for both sediment removal testing and scour testing. The Canadian ETV PSD contains a wide range of particle sizes in the sand and silt fractions, and is considered reasonably representative of the particle size fractions found in typical urban stormwater runoff.

Particle Size (µm)	Percent Less Than	Particle Size Fraction (µm)	Percent
1000	100	500-1000	5
500	95	250-500	5
250	90	150-250	15
150	75	100-150	15
100	60	75-100	10
75	50	50-75	5
50	45	20-50	10
20	35	8-20	15
8	20	5-8	10
5	10	2-5	5
2	5	<2	5

Stormceptor® EF Sizing Report

Rainfall Intensity (mm / hr)	Percent Rainfall Volume (%)	Cumulative Rainfall Volume (%)	Flow Rate (L/s)	Flow Rate (L/min)	Surface Loading Rate (L/min/m²)	Removal Efficiency (%)	Incremental Removal (%)	Cumulative Removal (%)
1	20.0	20.0	2.30	138.0	29.0	70	14.1	14.1
2	15.8	35.8	4.60	276.0	59.0	69	10.9	24.9
3	11.2	47.0	6.89	414.0	88.0	64	7.1	32.1
4	8.7	55.7	9.19	551.0	117.0	62	5.4	37.5
5	7.6	63.3	11.49	689.0	147.0	59	4.5	41.9
6	6.4	69.7	13.79	827.0	176.0	57	3.6	45.6
7	4.1	73.8	16.08	965.0	205.0	54	2.2	47.8
8	2.8	76.7	18.38	1103.0	235.0	53	1.5	49.3
9	2.7	79.4	20.68	1241.0	264.0	52	1.4	50.7
10	2.4	81.7	22.98	1379.0	293.0	51	1.2	51.9
11	2.7	84.5	25.28	1517.0	323.0	50	1.4	53.3
12	2.2	86.7	27.57	1654.0	352.0	50	1.1	54.4
13	1.8	88.4	29.87	1792.0	381.0	49	0.9	55.2
14	1.0	89.5	32.17	1930.0	411.0	48	0.5	55.7
15	1.7	91.2	34.47	2068.0	440.0	48	0.8	56.6
16	1.2	92.3	36.76	2206.0	469.0	47	0.6	57.1
17	1.1	93.5	39.06	2344.0	499.0	47	0.5	57.7
18	0.6	94.1	41.36	2482.0	528.0	47	0.3	57.9
19	0.3	94.3	43.66	2619.0	557.0	47	0.1	58.1
20	0.7	95.0	45.95	2757.0	587.0	46	0.3	58.4
21	0.7	95.7	48.25	2895.0	616.0	46	0.3	58.7
22	0.3	96.0	50.55	3033.0	645.0	46	0.1	58.8
23	0.9	96.9	52.85	3171.0	675.0	46	0.4	59.2
24	0.5	97.4	55.15	3309.0	704.0	46	0.2	59.5
25	0.2	97.6	57.44	3447.0	733.0	45	0.1	59.5
30	0.9	98.5	68.93	4136.0	880.0	45	0.4	60.0
35	0.9	99.4	80.42	4825.0	1027.0	44	0.4	60.4
40	0.3	99.7	91.91	5515.0	1173.0	46	0.1	60.5
45	0.3	100.0	103.40	6204.0	1320.0	48	0.1	60.6
50	0.0	100.0	114.89	6893.0	1467.0	47	0.0	60.6
Estimated Net Annual Sediment (TSS) Load Reduction =								**61 %**

Climate Station ID: 6149387 *Years of Rainfall Data*: 34

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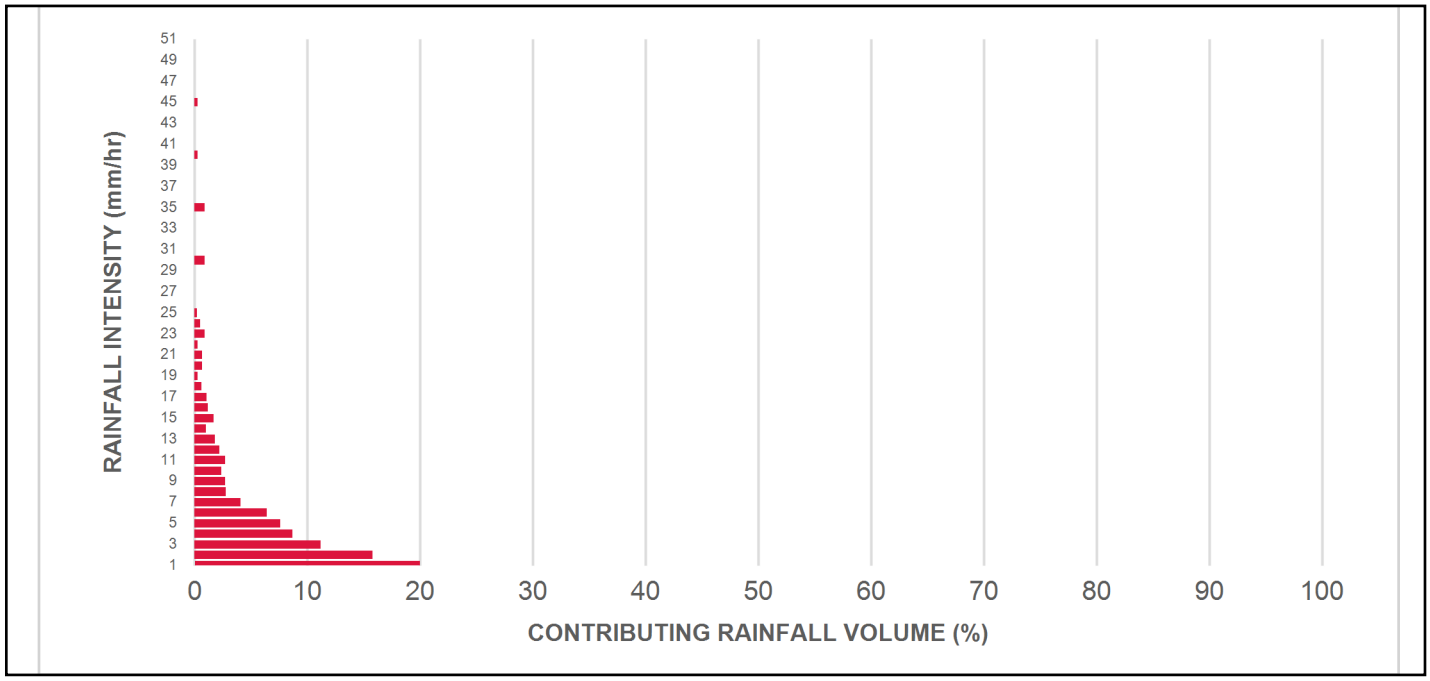
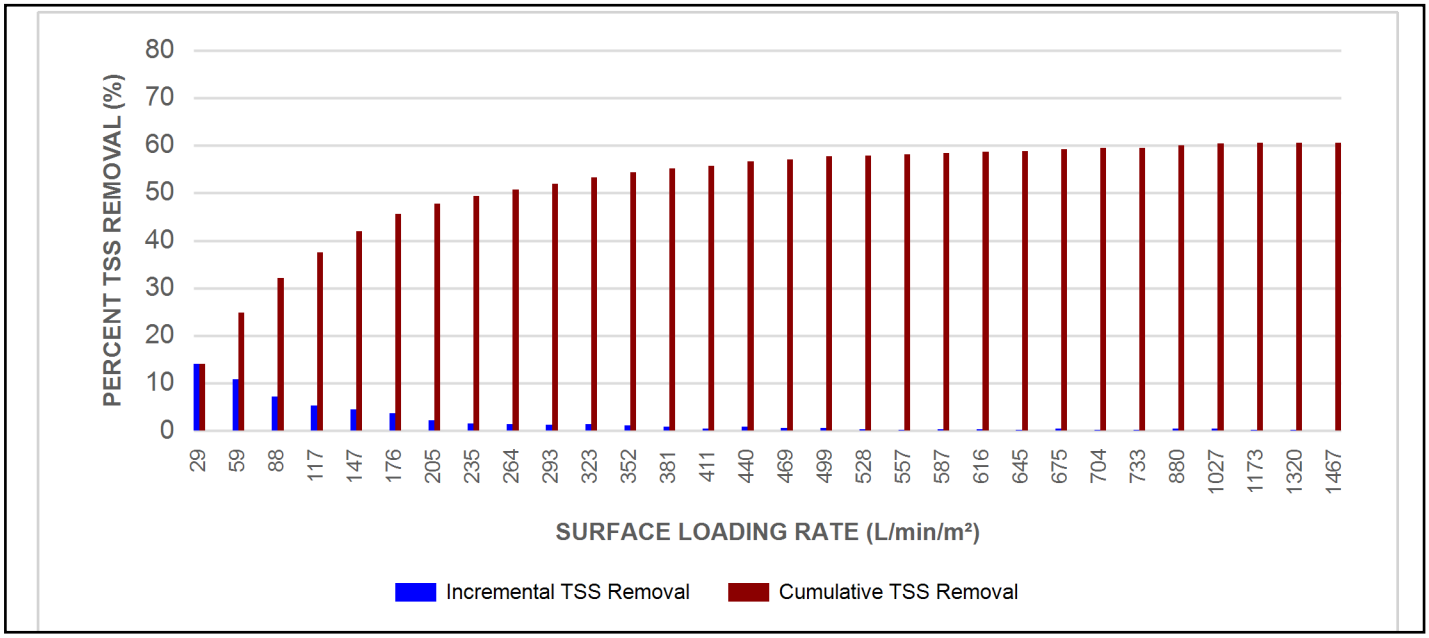
RAINFALL DATA FROM WATERLOO WELLINGTON AP RAINFALL STATION



INCREMENTAL AND CUMULATIVE TSS REMOVAL FOR THE RECOMMENDED STORMCEPTOR® MODEL



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Maximum Pipe Diameter / Peak Conveyance

Stormceptor EF / EFO	Model Diameter		Min Angle Inlet / Outlet Pipes	Max Inlet Pipe Diameter		Max Outlet Pipe Diameter		Peak Conveyance Flow Rate	
	(m)	(ft)		(mm)	(in)	(mm)	(in)	(L/s)	(cfs)
EF4 / EFO4	1.2	4	90	609	24	609	24	425	15
EF6 / EFO6	1.8	6	90	914	36	914	36	990	35
EF8 / EFO8	2.4	8	90	1219	48	1219	48	1700	60
EF10 / EFO10	3.0	10	90	1828	72	1828	72	2830	100
EF12 / EFO12	3.6	12	90	1828	72	1828	72	2830	100

SCOUR PREVENTION AND ONLINE CONFIGURATION

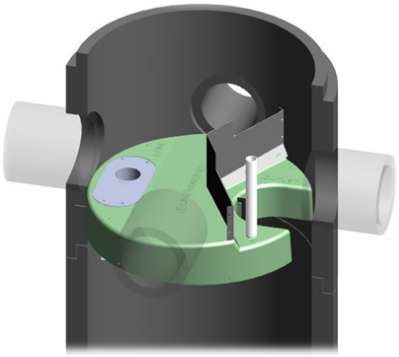
►**Stormceptor® EF and EFO** feature an internal bypass and superior scour prevention technology that have been demonstrated in third-party testing according to the scour testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**, and the exceptional scour test performance has been third-party verified in accordance with the ISO 14034 ETV protocol. As a result, Stormceptor EF and EFO are approved for online installation, eliminating the need for costly additional bypass structures, piping, and installation expense.

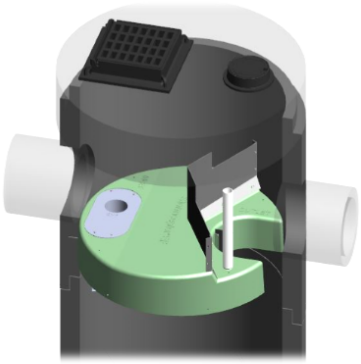
DESIGN FLEXIBILITY

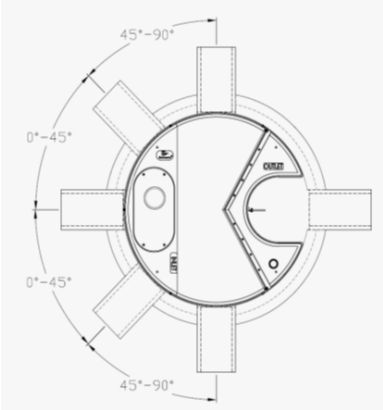
►**Stormceptor® EF** and **EFO** offers design flexibility in one simplified platform, accepting stormwater flow from a single inlet pipe or multiple inlet pipes, and/or surface runoff through an inlet grate. The device can also serve as a junction structure, accommodate a 90-degree inlet-to-outlet bend angle, and can be modified to ensure performance in submerged conditions.

OIL CAPTURE AND RETENTION

►While Stormceptor® EF will capture and retain oil from dry weather spills and low intensity runoff, **Stormceptor® EFO** has demonstrated superior oil capture and greater than 99% oil retention in third-party testing according to the light liquid re-entrainment testing provisions of the Canadian ETV **Procedure for Laboratory Testing of Oil-Grit Separators**. Stormceptor EFO is recommended for sites where oil capture and retention is a requirement.







INLET-TO-OUTLET DROP

Elevation differential between inlet and outlet pipe inverts is dictated by the angle at which the inlet pipe(s) enters the unit.

0° - 45° : The inlet pipe is 1-inch (25mm) higher than the outlet pipe.

45° - 90° : The inlet pipe is 2-inches (50mm) higher than the outlet pipe.

HEAD LOSS

The head loss through Stormceptor EF is similar to that of a 60-degree bend structure. The applicable K value for calculating minor losses through the unit is 1.1. For submerged conditions the applicable K value is 3.0.

Pollutant Capacity

Stormceptor EF / EFO	Model Diameter		Depth (Outlet Pipe Invert to Sump Floor)		Oil Volume		Recommended Sediment Maintenance Depth *		Maximum Sediment Volume *		Maximum Sediment Mass **	
	(m)	(ft)	(m)	(ft)	(L)	(Gal)	(mm)	(in)	(L)	(ft^3)	(kg)	(lb)
EF4 / EFO4	1.2	4	1.52	5.0	265	70	203	8	1190	42	1904	5250
EF6 / EFO6	1.8	6	1.93	6.3	610	160	305	12	3470	123	5552	15375
EF8 / EFO8	2.4	8	2.59	8.5	1070	280	610	24	8780	310	14048	38750
EF10 / EFO10	3.0	10	3.25	10.7	1670	440	610	24	17790	628	28464	78500
EF12 / EFO12	3.6	12	3.89	12.8	2475	655	610	24	31220	1103	49952	137875

*Increased sump depth may be added to increase sediment storage capacity

** Average density of wet packed sediment in sump = 1.6 kg/L (100 lb/ft^3)

Feature	Benefit	Feature Appeals To
Patent-pending enhanced flow treatment and scour prevention technology	Superior, verified third-party performance	Regulator, Specifying & Design Engineer
Third-party verified light liquid capture and retention for EFO version	Proven performance for fuel/oil hotspot locations	Regulator, Specifying & Design Engineer, Site Owner
Functions as bend, junction or inlet structure	Design flexibility	Specifying & Design Engineer
Minimal drop between inlet and outlet	Site installation ease	Contractor
Large diameter outlet riser for inspection and maintenance	Easy maintenance access from grade	Maintenance Contractor & Site Owner

STANDARD STORMCEPTOR EF/EFO DRAWINGS

For standard details, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

STANDARD STORMCEPTOR EF/EFO SPECIFICATION

For specifications, please visit http://www.imbriumsystems.com/stormwater-treatment-solutions/stormceptor-ef

Table of TSS Removal vs Surface Loading Rate Based on Third-Party Test Results Stormceptor® EF

SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL	SLR (L/min/m²)	TSS % REMOVAL
1	70	660	46	1320	48	1980	35
30	70	690	46	1350	48	2010	34
60	67	720	45	1380	49	2040	34
90	63	750	45	1410	49	2070	33
120	61	780	45	1440	48	2100	33
150	58	810	45	1470	47	2130	32
180	56	840	45	1500	46	2160	32
210	54	870	45	1530	45	2190	31
240	53	900	45	1560	44	2220	31
270	52	930	44	1590	43	2250	30
300	51	960	44	1620	42	2280	30
330	50	990	44	1650	42	2310	30
360	49	1020	44	1680	41	2340	29
390	48	1050	45	1710	40	2370	29
420	48	1080	45	1740	39	2400	29
450	48	1110	45	1770	39	2430	28
480	47	1140	46	1800	38	2460	28
510	47	1170	46	1830	37	2490	28
540	47	1200	47	1860	37	2520	27
570	46	1230	47	1890	36	2550	27
600	46	1260	47	1920	36	2580	27
630	46	1290	48	1950	35		

STANDARD PERFORMANCE SPECIFICATION FOR "OIL GRIT SEPARATOR" (OGS) STORMWATER QUALITY TREATMENT DEVICE

PART 1 – GENERAL

1.1 WORK INCLUDED

This section specifies requirements for selecting, sizing, and designing an underground Oil Grit Separator (OGS) device for stormwater quality treatment, with third-party testing results and a Statement of Verification in accordance with ISO 14034 Environmental Management – Environmental Technology Verification (ETV).

1.2 REFERENCE STANDARDS & PROCEDURES

ISO 14034:2016 Environmental management – Environmental technology verification (ETV)

Canadian Environmental Technology Verification (ETV) Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

1.3 SUBMITTALS

1.3.1 All submittals, including sizing reports & shop drawings, shall be submitted upon request with each order to the contractor then forwarded to the Engineer of Record for review and acceptance. Shop drawings shall detail all OGS components, elevations, and sequence of construction.

1.3.2 Alternative devices shall have features identical to or greater than the specified device, including: treatment chamber diameter, treatment chamber wet volume, sediment storage volume, and oil storage volume.

1.3.3 Unless directed otherwise by the Engineer of Record, OGS stormwater quality treatment product substitutions or alternatives submitted within ten days prior to project bid shall not be accepted. All alternatives or substitutions submitted shall be signed and sealed by a local registered Professional Engineer, based on the exact same criteria detailed in Section 3, in entirety, subject to review and approval by the Engineer of Record.

PART 2 – PRODUCTS

2.1 OGS POLLUTANT STORAGE

The OGS device shall include a sump for sediment storage, and a protected volume for the capture and storage of petroleum hydrocarbons and buoyant gross pollutants. The **minimum** sediment & petroleum hydrocarbon storage capacity shall be as follows:

2.1.1

4 ft (1219 mm) Diameter OGS Units:	1.19 m^3 sediment / 265 L oil
6 ft (1829 mm) Diameter OGS Units:	3.48 m^3 sediment / 609 L oil
8 ft (2438 mm) Diameter OGS Units:	8.78 m^3 sediment / 1,071 L oil
10 ft (3048 mm) Diameter OGS Units:	17.78 m^3 sediment / 1,673 L oil
12 ft (3657 mm) Diameter OGS Units:	31.23 m^3 sediment / 2,476 L oil

PART 3 – PERFORMANCE & DESIGN

3.1 GENERAL

The OGS stormwater quality treatment device shall be verified in accordance with ISO 14034:2016 Environmental management – Environmental technology verification (ETV). The OGS stormwater quality treatment device shall remove oil, sediment and gross pollutants from stormwater runoff during frequent wet weather events, and retain these pollutants during less frequent high flow wet weather events below the insert within the OGS for later removal during maintenance. The Manufacturer shall have at least ten (10) years of local experience, history and success in engineering design, manufacturing and production and supply of OGS stormwater quality treatment device systems, acceptable to the Engineer of Record.

3.2 SIZING METHODOLOGY

The OGS device shall be engineered, designed and sized to provide stormwater quality treatment based on treating a minimum of 90 percent of the average annual runoff volume and a minimum removal of an annual average 60% of the sediment (TSS) load based on the Particle Size Distribution (PSD) specified in the sizing report for the specified device. Sizing shall be determined using historical rainfall data and a sediment removal performance curve derived from the actual third-party verified laboratory testing data. The OGS device shall also have sufficient annual sediment storage capacity as specified and calculated in Section 2.1.

3.3 CANADIAN ETV or ISO 14034 ETV VERIFICATION OF SCOUR TESTING

The OGS device shall have Canadian ETV or ISO 14034 ETV Verification of third-party scour testing conducted in accordance with the Canadian ETV Program's **Procedure for Laboratory Testing of Oil-Grit Separators.**

3.3.1 To be acceptable for on-line installation, the OGS device must demonstrate an average scour test effluent concentration less than 10 mg/L at each surface loading rate tested, up to and including 2600 L/min/m^2.

Appendix E

Monthly Water Balance Calculations

190-216 Arkell Road
SITE WATER BUDGET (INFILTRATION) ANALYSIS
Guelph, Ontario

Project Number: 42063-104
Date: September 29, 2021
Design By: YXX/JNJ
File: Q:\42063\104\SWM\September 2021\42063-104 Water Balance (Thornthwaite-Mather) Oct 2021.xlsx

PRE-DEVELOPMENT CONDITION

Contributing Catchments: 101, 102, 103, 104, 105
Contributing Areas: 3.11 ha
Percent Impervious 11.5 %
Weather Station: Guelph Arboretum
Soil Type: Silt,Sand
Vegetation: Majorly Grass
Topography: Flat Land
Soil Moisture Retention Capacity: 75 mm
Runoff Factor: 0.42
Evapotranspiration Factor for Impervious Surfaces: 0.33

Month	Daily Average Temperature (C°)	Monthly Heat Index	Unadjusted Daily PE (mm)	Correction Factor	Adjusted PE (mm)	Average Precipitation (mm)	P-PE (mm)	Accum. Pot. Water Loss (mm)	Storage (mm)	ΔS (mm)	Pervious ET (mm)	Actual ET (mm)	Moisture Surplus (mm)	Water Runoff (mm)	Snow Melt Runoff (mm)	Total Recharge & Runoff (mm)	Total Recharge & Runoff (m^3)	Total Infiltration Depth (mm)	Total Infiltration Volume (m^3)	Actual Runoff (mm)	Runoff Volume (m^3)
Jan	-7.6	0.00	0.0	24.3	0.0	56.4	56.4	0.0	209.1	0.0	0.0	0.0	0.0	10.4	0.0	10.4	324	6.0	186	4.4	138
Feb	-6.9	0.00	0.0	24.5	0.0	50.8	50.8	0.0	259.9	0.0	0.0	0.0	0.0	5.2	0.0	5.2	162	3.0	93	2.2	69
Mar	-1.3	0.00	0.0	30.6	0.0	72.1	72.1	0.0	332.0	0.0	0.0	0.0	0.0	2.6	0.0	2.6	81	1.5	47	1.1	34
Apr	5.9	1.28	0.9	33.6	31.8	78.3	46.5	0.0	75.0	0.0	31.8	29.4	48.9	25.8	25.6	51.4	1,597	29.6	919	21.8	678
May	12.3	3.91	2.0	38.0	77.2	79.9	2.7	0.0	75.0	0.0	77.2	71.2	8.7	17.2	115.3	132.5	4,119	76.2	2,370	56.3	1,749
Jun	16.9	6.32	2.8	38.6	109.0	76	-33.0	-33.0	47.0	-28.0	104.0	96.0	8.0	12.6	57.6	70.3	2,184	40.4	1,256	29.8	927
Jul	19.7	7.97	3.3	38.9	128.8	88.5	-40.3	-73.3	27.0	-20.0	108.5	100.1	8.4	10.5	28.8	39.3	1,222	22.6	703	16.7	519
Aug	18.6	7.31	3.1	36.0	112.3	95.9	-16.4	-89.7	22.0	-5.0	100.9	93.1	7.8	9.1	14.4	23.5	731	13.5	421	10.0	311
Sep	14.1	4.80	2.3	31.2	73.0	92.1	19.1	0.0	41.1	19.1	73.0	67.4	5.6	7.4	7.2	14.6	453	8.4	261	6.2	192
Oct	7.9	2.00	1.3	28.5	36.5	69.2	32.7	0.0	73.8	32.7	36.5	33.7	2.8	5.1	3.6	8.7	270	5.0	155	3.7	115
Nov	2.4	0.33	0.4	24.2	9.0	86.3	77.3	0.0	75.0	1.2	9.0	8.3	76.7	40.9	1.8	42.7	1,328	24.6	764	18.1	564
Dec	-4	0.00	0.0	23.0	0.0	77.7	77.7	0.0	152.7	0.0	0.0	0.0	0.0	20.9	1.8	22.7	704	13.0	405	9.6	299
Total		33.9	16.2		577.6	**923.2**	**345.6**					**499.3**	**166.9**	**167.7**	**256.2**	**423.9**	**13,174**	**243.9**	**7,580**	**180.0**	**5,595**

Note: P - Precipitation, PE - Potential Evapotranspiration, ΔS- Change in Soil Moisture Storage, ET - Evapotranspiration

190-216 Arkell Road
SITE WATER BUDGET (INFILTRATION) ANALYSIS
Guelph, Ontario

Project Number: 42063-104
Date: September 29, 2021
Design By: YXX/JNJ
File: Q:\42063\104\SWM\September 2021\42063-104 Water Balance (Thornthwaite-Mather) Oct 2021.xlsx

POST-DEVELOPMENT CONDITION

Contributing Catchments: 201,202,203,204,205-1, 205-2,206,207
Contributing Areas: 3.11 ha
Percent Impervious 34.3 %
Weather Station: Guelph Arboretum
Soil Type: Silt,Sand
Vegetation: Urban Lawn
Topography: Flat Land
Soil Moisture Retention Capacity 75 mm
Runoff Factor 0.57
Evapotranspiration Factor for Impervious Surfaces 0.33

Month	Daily Average Temperature (C°)	Monthly Heat Index	Unadjusted Daily PE (mm)	Correction Factor	Adjusted PE (mm)	Average Precipitation (mm)	P-PE (mm)	Accum. Pot. Water Loss (mm)	Storage (mm)	ΔS (mm)	Pervious ET (mm)	Actual ET (mm)	Moisture Surplus (mm)	Water Runoff (mm)	Snow Melt Runoff (mm)	Total Recharge & Runoff (mm)	Total Recharge & Runoff (m^3)	Runoff before Enhanced Infiltration (mm)	Runoff before Enhanced Infiltration (m^3)	Total Enhanced Recharge* (m^3)	Total Enhanced Recharge (mm)	Recharge Pervious (m^3)	Recharge Pervious (mm)	Total Recharge (m^3)	Total Recharge (mm)	Acutal Runoff Volume (m^3)	Acutal Runoff (mm)
Jan	-7.6	0.00	0.0	24.3	0.0	56.4	56.4	0.0	209.1	0.0	0.0	0.0	0.0	12.6	0.0	12.6	392	7.2	225	0	0	168	5.4	168	5.4	225	7.2
Feb	-6.9	0.00	0.0	24.5	0.0	50.8	50.8	0.0	259.9	0.0	0.0	0.0	0.0	6.3	0.0	6.3	196	3.6	112	0	0	84	2.7	84	2.7	112	3.6
Mar	-1.3	0.00	0.0	30.6	0.0	72.1	72.1	0.0	332.0	0.0	0.0	0.0	0.0	3.2	0.0	3.2	98	1.8	56	0	0	42	1.3	42	1.3	56	1.8
Apr	5.9	1.28	0.9	33.6	31.8	78.3	46.5	0.0	75.0	0.0	31.8	24.5	53.8	28.5	25.3	53.7	1,670	30.8	957	129	4	713	22.9	842	27.1	828	26.6
May	12.3	3.91	2.0	38.0	77.2	79.9	2.7	0.0	75.0	0.0	77.2	59.4	20.5	24.5	113.7	138.2	4,294	79.2	2,461	123	4	1,834	59.0	1,956	63.0	2,338	75.2
Jun	16.9	6.32	2.8	38.6	109.0	76	-33.0	-33.0	47.0	-28.0	104.0	80.1	23.9	24.2	56.9	81.1	2,518	46.4	1,443	136	4	1,075	34.6	1,211	39.0	1,307	42.1
Jul	19.7	7.97	3.3	38.9	128.8	88.5	-40.3	-73.3	27.0	-20.0	108.5	83.6	24.9	24.6	28.4	53.0	1,647	30.4	944	145	5	703	22.6	848	27.3	799	25.7
Aug	18.6	7.31	3.1	36.0	112.3	95.9	-16.4	-89.7	22.0	-5.0	100.9	77.7	23.2	23.9	14.2	38.1	1,184	21.8	678	138	4	505	16.3	643	20.7	541	17.4
Sep	14.1	4.80	2.3	31.2	73.0	92.1	19.1	0.0	41.1	19.1	73.0	56.2	16.8	20.3	7.1	27.4	853	15.7	489	140	4	364	11.7	504	16.2	349	11.2
Oct	7.9	2.00	1.3	28.5	36.5	69.2	32.7	0.0	73.8	32.7	36.5	28.1	8.4	14.4	3.6	17.9	557	10.3	319	122	4	238	7.7	360	11.6	197	6.3
Nov	2.4	0.33	0.4	24.2	9.0	86.3	77.3	0.0	75.0	1.2	9.0	6.9	78.1	46.2	1.8	48.0	1,492	27.5	855	159	5	637	20.5	796	25.6	696	22.4
Dec	-4	0.00	0.0	23.0	0.0	77.7	77.7	0.0	152.7	0.0	0.0	0.0	0.0	25.3	1.8	27.0	840	15.5	481	5	0	359	11.5	363	11.7	477	15.3
Total		33.9	16.2		577.6	**923.2**	**345.6**					**416.6**	**249.6**	**253.9**	**252.7**	**506.6**	**15,740**	**290.3**	**9,019**	**1,095**	**35**	**6,721**	**216.3**	**7,816**	**251.6**	**7,924**	**255.0**

Note: P - Precipitation, PE - Potential Evapotranspiration, ΔS- Change in Soil Moisture Storage, ET - Evapotranspiration
* Enhanced recharge volume was estimated by a continuous hydrologic model, based on the design of infiltration facility and condition of its contributing area:

190-216 Arkell Road
WETLAND WATER BUDGET (RUNOFF) ANALYSIS
Guelph, Ontario

Project Number: 42063-104
Date: September 29, 2021
Design By: YXX/JNJ
File: Q:\42063\104\SWM\September 2021\42063-104 Water Balance (Thornthwaite-Mather) Oct 2021.xlsx

POST-DEVELOPMENT CONDITION (Area Draining to Wetland)

Contributing Catchments:	201,202,203,204,205-2,206,207	Soil Type:	Silt,Sand	Runoff Factor	0.57
Contributing Areas:	2.90 ha	Vegetation:	Urban Lawn	Evapotranspiration	
Percent Impervious	34.4 %	Topography:	Flat Land	Factor for Impervious	
Weather Station:	Guelph Arboretum	Soil Moisture Retention Capacity	75 mm	Surfaces	0.33

Month	Daily Average Temperature (C°)	Monthly Heat Index	Unadjusted Daily PE (mm)	Correction Factor	Adjusted PE (mm)	Average Precipitation (mm)	P-PE (mm)	Accum. Pot. Water Loss (mm)	Storage (mm)	ΔS (mm)	Pervious ET (mm)	Actual ET (mm)	Moisture Surplus (mm)	Water Runoff (mm)	Snow Melt Runoff (mm)	Total Recharge & Runoff (mm)	Total Recharge & Runoff (m^3)	Runoff before Enhanced Infiltration (mm)	Runoff before Enhanced Infiltration (m^3)	Total Enhanced Recharge* (m^3)	Total Enhanced Recharge (mm)	Recharge Pervious (m^3)	Recharge Pervious (mm)	Total Recharge (m^3)	Total Recharge (mm)	Acutal Runoff Volume (m^3)	Acutal Runoff (mm)
Jan	-7.6	0.00	0.0	24.3	0.0	56.4	56.4	0.0	209.1	0.0	0.0	0.0	0.0	12.7	0.0	12.7	370	7.3	212	0	0	158	5.4	158	5.4	212	7.3
Feb	-6.9	0.00	0.0	24.5	0.0	50.8	50.8	0.0	259.9	0.0	0.0	0.0	0.0	6.4	0.0	6.4	185	3.7	106	0	0	79	2.7	79	2.7	106	3.7
Mar	-1.3	0.00	0.0	30.6	0.0	72.1	72.1	0.0	332.0	0.0	0.0	0.0	0.0	3.2	0.0	3.2	92	1.8	53	0	0	39	1.4	39	1.4	53	1.8
Apr	5.9	1.28	0.9	33.6	31.8	78.3	46.5	0.0	75.0	0.0	31.8	24.5	53.8	28.5	25.2	53.7	1,559	30.8	895	129	4	665	22.9	794	27.4	765	26.4
May	12.3	3.91	2.0	38.0	77.2	79.9	2.7	0.0	75.0	0.0	77.2	59.4	20.5	24.5	113.5	138.1	4,006	79.2	2,299	123	4	1,708	58.8	1,831	63.1	2,176	75.0
Jun	16.9	6.32	2.8	38.6	109.0	76	-33.0	-33.0	47.0	-28.0	104.0	80.0	24.0	24.3	56.8	81.0	2,351	46.5	1,349	136	5	1,002	34.5	1,138	39.2	1,213	41.8
Jul	19.7	7.97	3.3	38.9	128.8	88.5	-40.3	-73.3	27.0	-20.0	108.5	83.5	25.0	24.6	28.4	53.0	1,539	30.4	883	145	5	656	22.6	801	27.6	738	25.4
Aug	18.6	7.31	3.1	36.0	112.3	95.9	-16.4	-89.7	22.0	-5.0	100.9	77.6	23.3	24.0	14.2	38.1	1,107	21.9	635	138	5	472	16.3	610	21.0	497	17.1
Sep	14.1	4.80	2.3	31.2	73.0	92.1	19.1	0.0	41.1	19.1	73.0	56.2	16.8	20.4	7.1	27.5	798	15.8	458	140	5	340	11.7	480	16.5	318	11.0
Oct	7.9	2.00	1.3	28.5	36.5	69.2	32.7	0.0	73.8	32.7	36.5	28.1	8.4	14.4	3.5	18.0	521	10.3	299	122	4	222	7.7	344	11.9	177	6.1
Nov	2.4	0.33	0.4	24.2	9.0	86.3	77.3	0.0	75.0	1.2	9.0	6.9	78.1	46.3	1.8	48.0	1,394	27.6	800	159	5	594	20.5	753	26.0	641	22.1
Dec	-4	0.00	0.0	23.0	0.0	77.7	77.7	0.0	152.7	0.0	0.0	0.0	0.0	25.5	1.8	27.3	791	15.6	454	5	0	337	11.6	342	11.8	449	15.5
Total		33.9	16.2		577.6	**923.2**	**345.6**					**416.2**	**250.0**	**254.7**	**252.3**	**507.0**	**14,714**	**290.9**	**8,442**	**1,095**	**38**	**6,272**	**216.1**	**7,367**	**253.9**	**7,347**	**253.2**

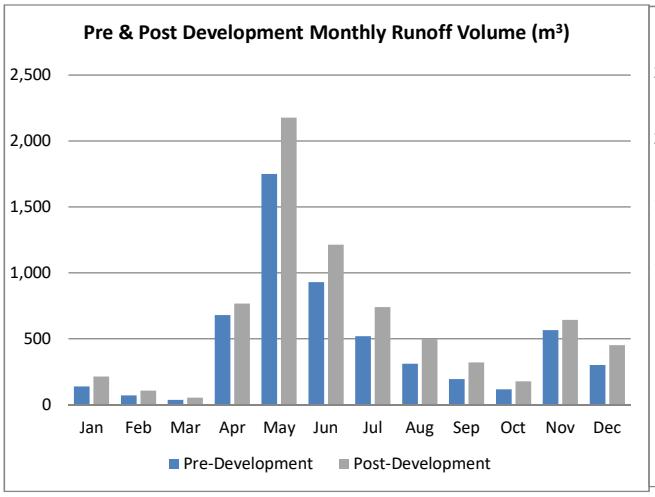
Note: P - Precipitation, PE - Potential Evapotranspiration, ΔS- Change in Soil Moisture Storage, ET - Evapotranspiration
* Enhanced recharge volume was estimated by a continuous hydrologic model, based on the design of infiltration facility and condition of its contributing area:

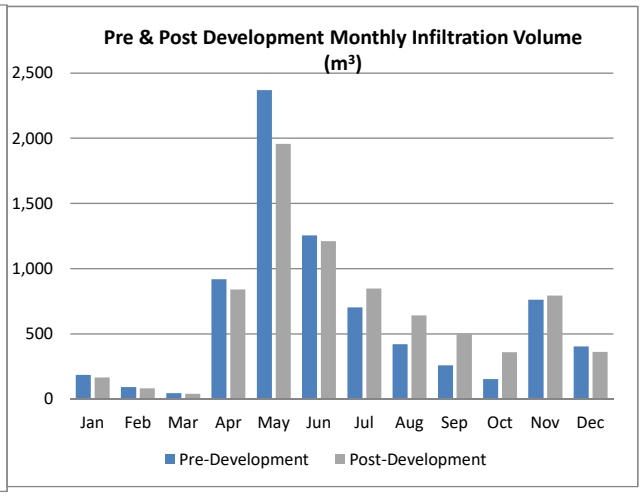
190-216 Arkell Road
SITE WATER BUDGET ANALYSIS
Guelph, Ontario

Project Number: 42063-104
Date: September 29, 2021
Design By: YXX/JNJ
File: 104 Water Balance (Thornthwaite-Mather) Oct 2021.xlsx

Month	Total Runoff Volume to Weland (m^3)			Total Infiltration Volume (m^3)		
	Pre-development	Post-development	Difference	Pre-development	Post-development	Difference
Jan	138	212	74	186	168	-19
Feb	69	106	37	93	84	-9
Mar	34	53	19	47	42	-5
Apr	678	765	87	919	842	-76
May	1,749	2,176	427	2,370	1,956	-413
Jun	927	1,213	286	1,256	1,211	-45
Jul	519	738	219	703	848	145
Aug	311	497	187	421	643	222
Sep	192	318	126	261	504	243
Oct	115	177	62	155	360	204
Nov	564	641	77	764	796	32
Dec	299	449	150	405	363	-42
Total	5,595	7,347	1,752	7,580	7,816	236

Note: Negative sign indicate a decrease under post-development conditions.





Appendix F

Geotechnical Report

Peto MacCallum Ltd.
CONSULTING ENGINEERS

GEOTECHNICAL INVESTIGATION
PROPOSED ARKELL ROAD SUBDIVISION
GUELPH, ONTARIO

for

CRESCENT HOMES INC.
c/o MTE CONSULTANTS INC.

PETO MacCALLUM LTD.
16 FRANKLIN STREET SOUTH
KITCHENER, ONTARIO
N2C 1R4
PHONE: (519) 893-7500
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Distribution:
1 cc: Crescent Homes Inc.
(+email - njnits@gmail.com)
2 cc: MTE Consultants Inc. (+email - jcabral@mte85.com)
1 cc: PML Kitchener

PML Ref.: 17KF002
Report: 1
September 28, 2018

Peto MacCallum Ltd.
CONSULTING ENGINEERS

September 28, 2018

PML Ref.: 17KF002
Report: 1

Mr. Nitin Jain
Crescent Homes
c/o Mr. Jason Cabral, C.E.T.
MTE Consultants Inc.
520 Bingemans Centre Drive,
Kitchener, Ontario
N2B 3X9

Dear Mr. Jain

Geotechnical Investigation
Proposed Arkell Road Subdivision
Guelph, Ontario

Peto MacCallum Ltd. (PML) is pleased to report the results of the geotechnical investigation recently completed at the above noted project site. Authorization to proceed with this assignment was provided verbally from Mr. Nitin Jain of Crescent Homes Inc., with a signed Engineering Services Agreement to be returned.

The project involves the proposed development of a residential subdivision on the north side of Arkell Road (at Summerfield Drive), in Guelph, Ontario. It is understood that the proposed development site is currently comprised of several residential dwellings, which will be demolished as part of the project. The site is approximately 2.54 ha in size, however, the northern third of the site will not be developed. The development will include 74, three storey town-house units, with associated parked areas as well as one roadway.

The purpose of the geotechnical investigation was to explore the subsurface soil and ground water conditions at the site. Based on the findings, we have prepared an engineering report with geotechnical recommendations pertaining to design and construction of the proposed residential subdivision. Specific considerations to be addressed in this report include:

- A description of the site and the field investigation procedure;
- A summary of the subsurface soil and ground water conditions encountered, including the presence of any topsoil, organic, fill or other anomalous features below grade;
- Log of borehole sheets, a borehole location plan drawing, and geotechnical laboratory test results;

- Foundation design options, including shallow foundation recommendations, bearing resistances, settlement projections and site class for seismic design;
- Slab-on-grade floor recommendations, including compaction requirements, perimeter and underfloor drainage requirements, and geotechnical suitability of onsite soils for re-use;
- Excavation recommendations, including safe side slopes and dewatering requirements,
- Pipe bedding, cover and backfill requirements, including material and compaction requirements, suitability of excavated soils for reuse as backfill;
- Ground water infiltration; and,
- Pavement design recommendations, including component thicknesses, compaction requirements, and drainage requirements.

The comments and recommendations provided in this report are based on the site conditions at the time of the investigation, and are for preliminary design purposes only. Any changes in plans will require review by PML to assess the applicability of the report, and may require modified recommendations, additional analysis and / or investigation. When the project design is complete, the general recommendations given in this report should be reviewed to ensure their applicability.

A limited chemical testing program of select soil samples was also completed. It should be noted that the scope of work did not include a Phase One or Phase Two Environmental Site Assessment (ESA), and the chemical testing program might not have identified all potential or actual occurrences of soil or ground water impairment at the site.

Investigation Procedure

The field work for the geotechnical investigation was completed on February 13 and March 21, 2017. Boreholes were drilled at six locations (BH1 to BH6) as shown on the appended Borehole Location Plan, Drawing 1. The field work included the installation of a total of four monitoring wells in BH2, BH3, BH4 and BH5.

The boreholes were advanced using a Diedrich D50 track mounted drillrig equipped with an automatic hammer and continuous flight hollow stem augers. The drilling equipment was supplied and operated by specialist contractors working under subcontract to PML.

Representative samples of the overburden were recovered at regular intervals throughout the depths explored. Standard penetration tests (SPT) were carried out during sampling operations of the boreholes using conventional split spoon equipment. Ground water observations were made in the boreholes during and upon completion of drilling. The boreholes were backfilled and compacted in accordance with O.Reg.903 upon completion of drilling.

The field work was supervised throughout by a member of PML's engineering staff who directed the drilling and sampling operation, prepared the stratigraphic logs, monitored ground water conditions, and processed the recovered samples.

The borehole and monitoring well locations were established in the field by Peto MacCallum Ltd. The ground surface elevations were surveyed by MTE Consultants Inc., and provided to PML on a borehole location plan.

All soil samples collected during the investigation were returned to PML's laboratory for detailed visual examination and testing. The geotechnical testing program included natural moisture content determinations on all recovered samples and two particle size distribution analyses carried out on samples of the major soil types encountered.

Summarized Site and Subsurface Conditions

The site is currently comprised of several residential dwellings, which will be demolished as part of the project. However, the northern third of the site will not be developed. The total area of the site is approximately 2.54 ha in size and relatively flat, with a gentle slope to the north, to the wetland area adjacent to the site. It is noted that the adjacent development to the east is approximately 5 m higher that the subject site.

Subsurface Conditions

Reference is made to the appended Log of Borehole sheets for details of the field work including soil descriptions, inferred stratigraphy, standard penetration test (SPT) N values, ground water observations and laboratory moisture content determinations.

Due to the soil sampling procedures and the limited size of samples, the depth/elevation demarcations on the borehole logs must be viewed as "transitional" zones, and cannot be construed as exact geologic boundaries between layers.

In general, the subsurface stratigraphy encountered at the borehole locations consists of surficial topsoil and localized fill overlying cohesionless native deposits.

Topsoil / Topsoil Fill

Between 100 and 300 mm (average thickness of 220 mm) of dark brown silt topsoil or topsoil fill was contacted from the surface in all of the boreholes. The topsoil was typically described as damp to moist, dark brown silt, trace sand with rootlets.

Fill

Below the topsoil / topsoil fill in BH1 and BH6, fill was penetrated, extending to depths of 0.46 m to 0.69 m below existing grades. The fill was variable in composition, comprising either sand and gravel or silt. Occasional rootlets were observed within the fill deposits in BH6.

Within the fill, SPT N values typically between 7 and 18 blows per 0.30 m penetration of the split spoon sampler indicate that a variable degree of compaction was used to place the fill soils. The fill soils were described as damp and moist, as demonstrated by laboratory moisture contents in the range of 5 to 20%.

Native Deposits

Native cohesionless deposits encountered below the surficial topsoil and fill were variable and generally comprised silt / sand / sand and gravel extending to the borehole termination depths. A deposit of silt till was also contacted in BH6, extending from 5.8 to 6.6 m. Generally, the encountered native cohesionless soil deposits were compact to very dense, with typical SPT N values ranging from 10 to greater than 50 blows per 0.3 m penetration of the split spoon sampler. Localized loose / very loose zones were contacted in BH1 (between 0.46 to 0.69 m), BH2

(between 0.25 to 0.69 m) and BH3 (between 0.2 to 1.4 m). Moisture contents typically ranging between 3 and 20% were indicative of variable damp to saturated conditions, with depth.

Two soil samples of the sand / sand and gravel were collected and analyzed for particle size distribution analysis, with results presented on Figure 1 and Figure 2 attached. Based on the results, the soil classification was generally consistent with those observed during the field work as included on the appended Log of Borehole sheets.

Ground Water Conditions

Ground water observations carried out during and upon completion of drilling are fully summarized on the appended Log of Borehole Sheets.

Ground water was first contacted at depths of 0.7 to 2.9 m below grade in the boreholes, corresponding to elevations of 333.4 to 331.7 (metric, geodetic), respectively.

An initial water level was also taken within the monitoring wells once installed. Ground water was measured at depths of 0.75 to 3.4 m below grade in the monitoring wells, corresponding to elevations of between 333.38 and 331.8 (metric, geodetic), respectively. Follow up ground water levels by MTE Consultants Inc., completed between March, 2017 and June, 2018 measured ground water at depths of surface level (MW4) to 3.65 m below grade (MW2), corresponding to an elevation range of between 330.38 (MW2 and MW5) to 333.99 (MW4) (metric, geodetic).

Based on the ground water observations, the ground water level appears to generally slope down from north to south, away from the wetland area.

The ground water levels at the site are subject to seasonal fluctuations and precipitation patterns.

Discussion and Recommendations

The site is an approximately 2.54 ha, rectangular shaped piece of land which is relatively flat located on the north side of Arkell Road at Summerfield Drive, Guelph, Ontario.

It is understood that the proposed development site is currently comprised of several residential dwellings, which will be demolished as part of the project. The development will include 74, three storey town-house units, with associated parked areas as well as one roadway. However, the northern third of the site will not be developed.

Once the design details for the proposed development are finalized, the recommendations in this report should be revisited to confirm that they remain applicable.

In general, the subsurface stratigraphy encountered at the borehole locations consist of surficial topsoil and localized fill overlying cohesionless native deposits.

Site Grading

As noted, the site is relatively flat with a total relief of approximately 1 m. The adjacent development to the east is approximately 5 m higher than the subject site. Consideration is being given to infilling the site.

Due to the inherent variability of the existing fill materials and the lack of consistent compactive effort utilized during fill placement, these materials are not considered suitable for support of building foundations, floor slabs, pavements, or other settlement sensitive structures. Also, the loose to very loose native materials (BH1, BH2 and BH3) are not considered suitable for the support of building foundations. In this regard, all existing fill and localized very loose / loose materials should be completely subexcavated from beneath any settlement sensitive structures (i.e., building envelopes, pavements, etc.) and replaced with well compacted, suitable engineered fill materials.

Following the stripping / removal of all surficial topsoil and any other deleterious material, and approval of the subgrade, the grades may then be raised where required. Surficial topsoil / organic thicknesses across the site were typically between 100 and 300 mm. In calculating the approximate quantity of topsoil to be stripped, we recommend that the topsoil thickness shown on the individual borehole logs be increased by 50 mm to account for variations and some stripping of the mineral soil below.

Prior to any fill placement, the subgrade surface should be proofrolled with a heavy vibratory compactor under the full time supervision of qualified geotechnical personnel. Any soft spots encountered during the proofrolling process should be subexcavated to the level of competent soils.

Fill used to raise grades should comprise either on site native inorganic cut soils or approved imported material. All engineered fill materials should be pre-approved by the geotechnical consultant prior to placement. Engineered fill material should be placed in maximum 300 mm thick lifts and compacted to at least 98% standard Proctor maximum dry density (SPMDD) below footings and 95% SPMDD below floors and pavements. Further, generic recommendations for fill subgrade preparation and engineered fill construction are provided in Appendix A.

It is noted that materials generated from grade cuts will generally consist of native cohesionless soil deposits. In general, the native on site cohesionless soils will be suitable for reuse as engineered fill, subject to geotechnical verification during construction, providing all organic, wet or saturated soils, and otherwise deleterious soils are discarded. Silty soils described as wet or saturated on the borehole logs should be dried prior to reuse.

The silty soils (i.e. silt) are frost susceptible and highly susceptible to moisture content variations, and are not well suited for engineering fill construction. Compaction to 98% SPMDD may be difficult to achieve; however, these insitu soils should be acceptable for use as engineered fill where compaction to 95% SPMDD is specified.

Foundations

For preliminary design purposes, conventional strip / spread footings founded at least 0.30 m into the competent compact to dense native deposits, or on engineered structural fill compacted to 98% SPMDD, may be designed for a net bearing resistance of 150 kPa at the serviceability limit state (SLS) and a factored bearing resistance of 225 kPa at the ultimate limit state (ULS). If very loose / loose soils are contacted at the proposed footing level, the loose soils should be subexcavated to the level of competent founding soils.

Accordingly, footings designed in accordance with the Ontario Building Code for residential housing will be satisfactory. The following table summarizes the minimum foundation depths based on the borehole findings:

LOCATION	MINIMUM FOUNDATION DEPTH (m)	CORRESPONDING ELEVATION (METRIC, GEODETIC)
BH1	1.0	333.50
BH2	1.0	334.10
BH3	1.7	332.70
BH4	0.6	333.50
BH5	0.6	334.30
BH6	0.7	333.30

Although in general, footings are anticipated to be placed on native insitu soils, where required the footings may be supported on engineered structural fill, placed in accordance with the generic recommendations for engineered fill construction provided in Appendix A. Prior to placement of engineered fill, all existing fill must be removed and the soils should be subexcavated to the level of competent native overburden soils noted in the table above. For engineered fill supporting footing loads, compaction to a minimum 98% of the materials SPMDD, should be specified as per recommendations outlined in the preceding 'Site Grading' section of this report and in Appendix B.

Footings supported on the structural fill may also be designed using the values for a net factored resistance at ULS and SLS of 225 and 150 kPa, respectively. Full time inspection of any structural fill placement by PML personnel is recommended to approve subgrade conditions, fill materials and to verify that the specified compaction levels are being achieved. Prior to concrete placement, all founding surfaces should be examined by PML personnel to check the competency of the founding surfaces.

Total settlements of footings founded on the approved engineered fill or compact to dense native overburden deposits, designed as outlined above are not expected to exceed 25 mm, with differential settlements between footings being no more than 50% of this value.

All exterior footings should be provided with a minimum 1.2 m of earth cover or the thermal insulation equivalent to provide adequate insulation against potential frost damage. A 25 mm thick layer of polystyrene insulation is thermally equivalent to 600 mm of soil cover.

Prior to concrete placement, all founding surfaces should be examined by PML personnel to check the competency of the founding surfaces.

For earthquake design, a site Class D seismic response classification may be assumed, in accordance with the 2012 Ontario Building Code.

Basement / Slab-on-Grade Floor Slabs

In general, the ground water level at the site was first contacted below depths of 0.7 to 2.9 m (Elevation 333.4 to 331.7) with follow up ground water monitoring showing ground water depths of surface level to 3.65 m below grade (Elevation 330.38 to 333.99). Basements, if any, must be located at least 1.0 m above the high ground water level. Conventional slab-on-grade construction of basement floor slabs is feasible on compact to dense native soil deposits, or on engineered structural fill compacted to 95% SPMDD.

Preparation of the floor slab subgrade should include stripping of the topsoil, and other deleterious material followed by proofrolling of the exposed subgrade with a heavy roller to ensure uniform adequate support. Excessively loose, soft or compressible materials revealed during the proofrolling operations should be subexcavated and replaced with well compacted approved material.

Fill placed under the floor slab to achieve finished subgrade levels or as foundation excavation backfill should comprise approved inorganic material having a moisture content within 3% of the optimum value, placed in maximum 200 mm thick lifts, and compacted to at least 95% of SPMDD.

A minimum 150 mm thick layer of well compacted clear stone (or equivalent) is recommended directly beneath the slab-on-grade. A polyethylene vapour barrier should be placed at the surface of the stone if a moisture sensitive finish is to be placed on the floor.

For slab-on-grade (basement less) structures, exterior grades should be maintained at least 150 mm below the finished floor slab-on-grade level and sloped to promote drainage away from the building.

Foundation Drainage and Earth Pressure Parameters

Foundation drainage measures should be taken for units with basements. Perforated drainage pipe should be laid around the outside edge of the footings, and connected to a frost free sump system. It is recommended that the drainage pipes be surrounded with a granular filter protected with filter fabric, or alternatively wrapped with filter cloth and surrounded by concrete sand.

A “free draining” granular material, or an equivalent, approved drainage board product must be provided for the basement walls, in accordance with the Ontario Building Code. The onsite native cohesionless deposits may be suitable for use as basement wall backfill. However, it should be noted that soils with high silt content (i.e. silt) are not suitable for use as basement wall backfill unless a drainage board product is provided. Backfilling should not take place until the ground floor has been constructed, in order to provide lateral support for the wall.

In conjunction with the granular material, a weeping tile system should be installed to minimize the build-up of hydrostatic pressure behind the wall. The weeping tile should be surrounded by a properly designed graded granular filter or wrapped with approved geotextile to prevent migration of fines into the system. The drainage pipe should be placed on a positive grade and lead to a frost-free sump or outlet.

The following earth pressure design parameters may be assumed for calculation of backfill materials compacted to 95% SPMDD:

PARAMETER	OPS GRANULAR B	Onsite SAND / SAND AND GRAVEL
Angle of Internal Friction (degrees)	32	30
Unit Weight (kN/m^3)	21	20
Coefficient of Active Earth Pressure (K_a)	0.30	0.33
Coefficient of Earth Pressure At Rest (K_o)	0.47	0.50
Coefficient of Passive Earth Pressure (K_p)	3.23	2.77

Note: Earth pressure coefficients assume Rankin analysis (wall friction ignored, non-sloping backfill)

It is assumed that basement floors will be more than 1.0 m above the ground water table and as such, underfloor drainage systems will not be required.

Excavation and Dewatering

It is assumed that excavations for site grading, footings and service trenches will extend through the surficial topsoil and into the native cohesionless soils, which are classified as Type 3 materials as defined in the Occupational Health and Safety Act (OHSA). Subject to inspection and providing adequate ground water control is achieved, excavations within Type 3 soils that are to be entered by workers should be inclined from the base of the excavation at one horizontal to one vertical (1H:1V) or flatter.

Ground water was first contacted at depths of 0.7 to 2.9 m below grade in the boreholes, corresponding to elevations of 333.4 to 331.7 (metric, geodetic), respectively.

An initial water level was also taken within the monitoring wells once installed. Ground water was measured at depths of 0.75 to 3.4 m below grade in the monitoring wells, corresponding to elevations of between 333.38 and 331.8 (metric, geodetic), respectively. Follow up ground water levels by MTE Consultants Inc., completed between March 2017 and June 2018 showed ground water depths of surface level to 3.65 m below grade (Elevation 330.38 to 333.99). The extent of ground water control will depend on the depth of excavation below the ground water level.

Shallow excavations extending less than 0.5 m below the ground water level can be dewatered using conventional sump pumping techniques. Deeper excavations, extending more than 0.5 m below the ground water level may require extensive ground water control measures such as keg wells or well point dewatering. The actual dewatering methods should be established at the contractor's discretion within the context of a performance specification for the project. Regardless of the dewatering method chosen, the hydraulic head and ground water inflow must be properly controlled to ensure a stable and safe excavation and to facilitate construction. The design of the dewatering system should be specified to maintain and control ground water at least 0.30 m below the excavation base level, in order to provide a stable excavation base throughout construction.

It should be noted that under the Ontario Water Resources Act, the Water Taking and Transfer Regulation 387/04, and in compliance with the Ministry of Environment and Climate Change's (MOECC) policy and Permit to Take Water (PTTW) Manual (April 2005), an application should be filed to the MOECC for the subject project construction dewatering PTTW, if the dewatering discharge is greater than 400,000 L/day, or about 4.6 L/s. If the dewatering discharge is between 50,000 L/day (or about 0.6 L/s) and 400,000 L/day (or about 4.6 L/s), dewatering activities need to be registered on the Environmental Activity and Sector Registry (EASR). Reference is made to the hydrological report by MTE Consultants Inc. for further details.

At the time of tendering, test pits should be excavated on site to allow prospective Contractors to judge the ground water conditions and to determine the appropriate control methods required closer to the time of construction. Ground water conditions are subject to seasonal variations. In this regard, a later summer construction schedule would be preferable.

Pipe Bedding and Backfilling

No bearing problems are anticipated for pipes founded in the native cohesionless soils or structural fill. On stable subgrade, a minimum 150 mm thick bedding course of Granular A material compacted to 95% SPMDD is recommended beneath the pipes. The Granular A material should extend around the pipe to at least 300 mm above the pipe obvert or as set out by Ontario Provincial Standards (OPS), or the local authority.

Backfill below pavements, floor slabs and other settlement sensitive features should be similarly compacted to 95% SPMDD. Backfill should be placed in 300 mm maximum lifts. Material that is too wet for compaction to a minimum of 95% SPMDD should be allocated for use in landscaped / non settlement sensitive locations, and compacted to at least 90% SPMDD.

The trenching and backfilling operations should be carried out in a manner which minimizes the length of trench left open yet accommodates efficient pipe laying and compaction activities.

Pavement Construction

Prior to the construction of the new pavements, surficial topsoil, fill and loose to very loose deposits should be removed. If some settlement is acceptable, the loose to very loose soils can remain in place. Based on the anticipated traffic patterns, frost susceptibility, and strength of the expected subgrade soils, the following pavement component thicknesses are considered suitable for local residential and parking lot traffic categories (no truck / heavy vehicle use).

PAVEMENT COMPONENT	**THICKNESS (mm)**
Asphalt	80
Granular A Base	150
Granular B Subbase	350

The flexible pavement designs provided above consider that construction will be carried out during the drier time of the year and the subgrade is stable, as determined by proofrolling inspected by PML personnel. If the subgrade is wet and unstable, additional granular subbase will be required.

The pavement materials should conform to current OPS specifications. The Granular A base and Granular B subbase courses should be placed in thin lifts and compacted to a minimum of 100% SPMDD, and asphalt should be placed to a minimum of 92% of the material's maximum relative density (MRD). Reference is made to OPS Specification 310, as revised.

During construction, testing should be conducted to confirm the gradation and compactibility characteristics of the granular base and subbase materials and the mix design properties of the asphalt.

Proofrolling procedures and the placement and compaction of all the fill and granular materials and asphalt for the pavement construction and backfilling at the site should be inspected on a continuous basis by PML technicians.

If relatively impermeable silty soils are present at a shallow depth beneath the pavement structure, pavement subdrains should be provided to prevent water accumulation on the pavement subgrade surface. The subgrade should be graded so that water is directed to the catch basin structures or to the pavement edge. Subdrains should be discharged in to the catch basins. The subdrains may consist of filter wrapped, 100 mm diameter perforated plastic pipe, set within the subbase layer at the subgrade surface.

Soil Infiltration

Soil infiltration rates for storm water management (SWM) and roof water infiltration systems were determined for the major near surface soil units and are as follows:

SOIL TYPE	ESTIMATED COEFFICIENT OF PERMEABILITY (cm/sec)	INFILTRATION RATE (mm/hr)
Sand / Sand and Gravel	1×10^{-3}	30

Any SWM ponds should be inspected by PML personnel during construction to verify the presence of a suitable subgrade. In general, the slopes of the storm water management pond should be constructed at 5H:1V or shallower and be provided with vegetation cover to minimize the potential for erosion and sloughing of the side slopes.

Limited Chemical Testing Program

As noted, a limited chemical testing program was completed on samples recovered during geotechnical investigation. PML understands that excess soil may be generated during construction, the volume of which is unknown at this time. The chemical testing program was completed to check the geoenvironmental quality of the site soils at selected sampling locations in order to provide commentary regarding on site or off site re-use and / or disposal options of potentially excess soils.

The soil sampling and testing was conducted as a limited testing program. A Phase One Environmental Site Assessment (ESA) was not within the scope of work for this assignment. Accordingly, soil and ground water impairment that has not been identified by the limited chemical testing program may exist elsewhere at the site. The limited chemical testing program does not constitute an ESA as defined under the Environmental Protection Act and O. Reg. 153/04, as amended.

Chemical Testing Protocol

Representative samples collected during the geotechnical investigation were returned to our laboratory for detailed visual examination. Soil samples were submitted for chemical analysis to AGAT Laboratories Limited (AGAT), a Canadian Association for Laboratory Accreditation Inc. (CALA) accredited laboratory in Mississauga, Ontario. The chemical analyses conducted by AGAT were in accordance with the O. Reg. 153/04, as amended Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act dated March 9, 2004, amended as of July 1, 2011.

As part of the geoenvironmental procedural protocol, all recovered soil samples were examined for visual and olfactory evidence of potential contamination. In addition, soil vapour concentrations (SVCs) were measured in the headspace of the recovered samples. The measured SVCs were typically 0 to 5 parts per million, which are not considered significant.

Five soil samples were submitted for chemical analysis for metals and inorganic parameters, and two samples were submitted for analysis for organochlorine (OC) pesticides. Selection of samples was based on visual and olfactory indications of contamination, SVCs and for general coverage. Details of the samples submitted for chemical testing are as follows:

SAMPLE ID	BOREHOLE	SAMPLE NUMBER	DEPTH (m)	SOIL TYPE	PARAMETERS TESTED
BH4 SS1	1	1	0 to 0.6	Topsoil	M&I and OC pesticides
BH5 SS1	5	1	0 to 0.6	Topsoil	M&I
BH5 SS4	5	4	2.3 to 2.7	Native	M&I
BH6 SS1	6	1	0 to 0.6	Topsoil / Fill	M&I and OC pesticides
BH6 SS3	6	3	1.5 to 2.1	Native	M&I

Site Condition Standards

The Ministry of the Environment, Conservation and Parks (MECP) has developed a set of Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act (April 15, 2011) and O.Reg. 153/04, as amended. The standards consist of nine tables (Table 1 through Table 9) that provide criteria for maximum concentrations of various contaminants. In general, the applicable Table and corresponding Site Condition Standards (SCSs) depend on the site location, land use, soil texture, bedrock depth, soil pH and source of potable water at the site.

The site is currently comprised of several residential dwellings and it is to be developed into a residential subdivision. The site is bordered by the Torrance Creek Wetland Complex to the north, which is a provincially significant wetland as identified by the Ministry of Natural Resources. Based on review of the above factors, PML selected the Generic Criteria of the O.Reg. 153/04, Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act dated April 15, 2011. In particular, the Table 1 (T1) Full Depth Background Site Condition Standards for Residential / Parkland / Institutional / Industrial / Commercial / Community (RPI/ICC) property use would likely apply to the site; however a full evaluation of applicable SCSs in accordance with Sections 41 and 43.1 of O.Reg. 153/04, as amended, was not within the scope of this assignment and further environmental work would be required to confirm this.

For off site re-use with minimal environmental restrictions, the O.Reg. 153/04, as amended, Full Depth Background Table 1 (T1) SCSs for RPI/ICC property uses were utilized. In addition, the Full Depth Generic SCSs (T2) in a Portable Ground Water Condition for ICC property use are also examined.

It is noted that a comparison to the Table 3 SCSs for full depth generic condition, Tables 4 and 5 SCSs for stratified site condition, Tables 6 and 7 SCSs for shallow bedrock condition and Table 8 and Table 9 for use within 30 m of a water body for a non-potable ground water condition were not conducted as part of this assignment. If the potential receiving site for excess soil falls within one of these categories, additional evaluation by PML will be required to confirm conformance.

Analytical Findings and Conclusions

Laboratory certificates of analysis compared to the Table 1 and 2 SCSs are included in Appendix C. The measured values and corresponding Standards (labelled as G/S for Guideline / Standard) are shown on the certificates of analysis. In the event of an exceedance of the SCSs, the level is shown in **bold** text, where applicable.

On Site Re-use

Based on the results of chemical testing, the measured concentrations of the tested parameters met the T1 RPI/ICC SCSs, with the exception of zinc in two samples (BH5 SS1 and BH6 SS3).

It is noted that there is no legal imperative to remove or treat the soil that exceeds the applicable SCSs, provided it is demonstrated that there is no off site impact or adverse effect. However, if contaminated soil is left on site, the landowner assumes liability associated with the contamination. The liability concerns could include potential scrutiny from the MECP, neighbouring property owners and the public; potential for decreased value of the land and issues during potential divesting of the property due to environmental liability concerns on the part of future owners or their financiers/insurers.

Off Site Re-use

As noted, the measured concentrations of the tested parameters met the T1 RPI/ICC SCSs, with the exception of zinc in two samples (BH5 SS1 and BH6 SS3). When compared to the T2 ICC Standards, one sample (BH6 SS3) exceeded the SCS for zinc.

If the soil is to be removed from the site for off site re-use, the following conditions must be met:

- The extent of the material that exceeds the applicable SCSs is delineated;
- All analytical results and environmental assessment reports must be fully disclosed to the receiving site owners / authorities and they have agreed to receive the material;
- The work must be completed in accordance with local by-laws governing soil movement and/or placement at other sites;
- The applicable SCSs for the receiving site have been determined, as confirmed by the environmental consultant and the SCSs are consistent with the chemical quality of the soil originating at the source site;
- Transportation and placement of the excess soil is monitored by the environmental consultant to check the material is appropriately placed at the pre-approved site;
- The excess soil cannot be taken to a property for which a RSC is being filed as outlined in O.Reg. 153/04, as amended, unless the chemical testing program is completed in accordance with the regulation;
- The excess soil cannot be taken to a property for which a RSC has been previously filed unless the soil quality meets the SCSs contained in the RSC;
- The receiving site must be arranged and/or approved well in advance of excavation in order to avoid delays during construction. As well, it is noted the chemical testing requirements for various receiving sites is site-specific and additional testing may be required, beyond that provided in this report; and

- The excavation work should be conducted in accordance with a Soil Management Plan prepared by a qualified professional to ensure that all surplus excavated material is tested and managed appropriately, and that imported fill material is of suitable quality and meets the SCSs applicable to the site. Re-use of excess excavated soil on site is also subject to acceptance for re-use by the geotechnical consultant at the time of construction based on geotechnical considerations.

If landfill disposal of excess soils is considered, PML recommends toxicity characteristic leaching procedure (TCLP) testing be completed in accordance with O. Reg. 347/558, Schedule 4, as amended.

It is recommended that transportation of fill material from the Source Site(s) to the Receiving Site(s) be carried out in accordance with the MECP document Management of Excess Soil – A guideline for Best Management Practices dated January, 2014.

Additional sampling and chemical testing should be carried out during construction to verify the chemical quality of the excess soil to assess the appropriate management/disposal options for the soil leaving the site.

It should be noted that the soil conditions may differ from those encountered during this assignment. PML should be contacted if impacted soil conditions become apparent to further assess and appropriately handle the materials, if any, and to evaluate whether modifications to the conclusions documented in this report are necessary.

Geotechnical Review and Construction Inspection and Testing

It is recommended that the design drawings be submitted to PML for general geotechnical review for compatibility with the site conditions and recommendations of this report.

Earthworks operations should be carried out under the supervision of PML to approve subgrade preparation, backfill materials, placement and compaction procedures, and verify the specified degree of compaction is achieved uniformly throughout fill materials.

The comments and preliminary recommendations provided in this report are based on the information revealed in the boreholes. Conditions away from and between boreholes may vary. Geotechnical review during construction should be on going to confirm the subsurface conditions are substantially similar to those encountered in the boreholes, which may otherwise require modification to the original recommendations.

Closure

This assignment is subject to the Statement of Limitations that is included in Appendix B and must be read in conjunction with this report.

We trust this report has been completed within our terms of reference, and is sufficient for your immediate requirements. If you have any questions or require further information, please do not hesitate to contact our office.

Sincerely

Peto MacCallum Ltd.

Hassen Shinwary, BASc
Project Supervisor
Geotechnical and Geoenvironmental Services

Ken Hanes, P.Eng.
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Gerry Mitchell, MEng, P.Eng.
Vice President

HS/KH:sh

Enclosures:
Figures 1 to 2 – Particle Size Distribution Charts
List of Abbreviations
Log of Boreholes 1 to 6
Drawing 1 – Borehole Location Plan
Appendix A – Engineered Fill
Appendix B – Statement of Limitations
Appendix C – AGAT Certificates of Analysis

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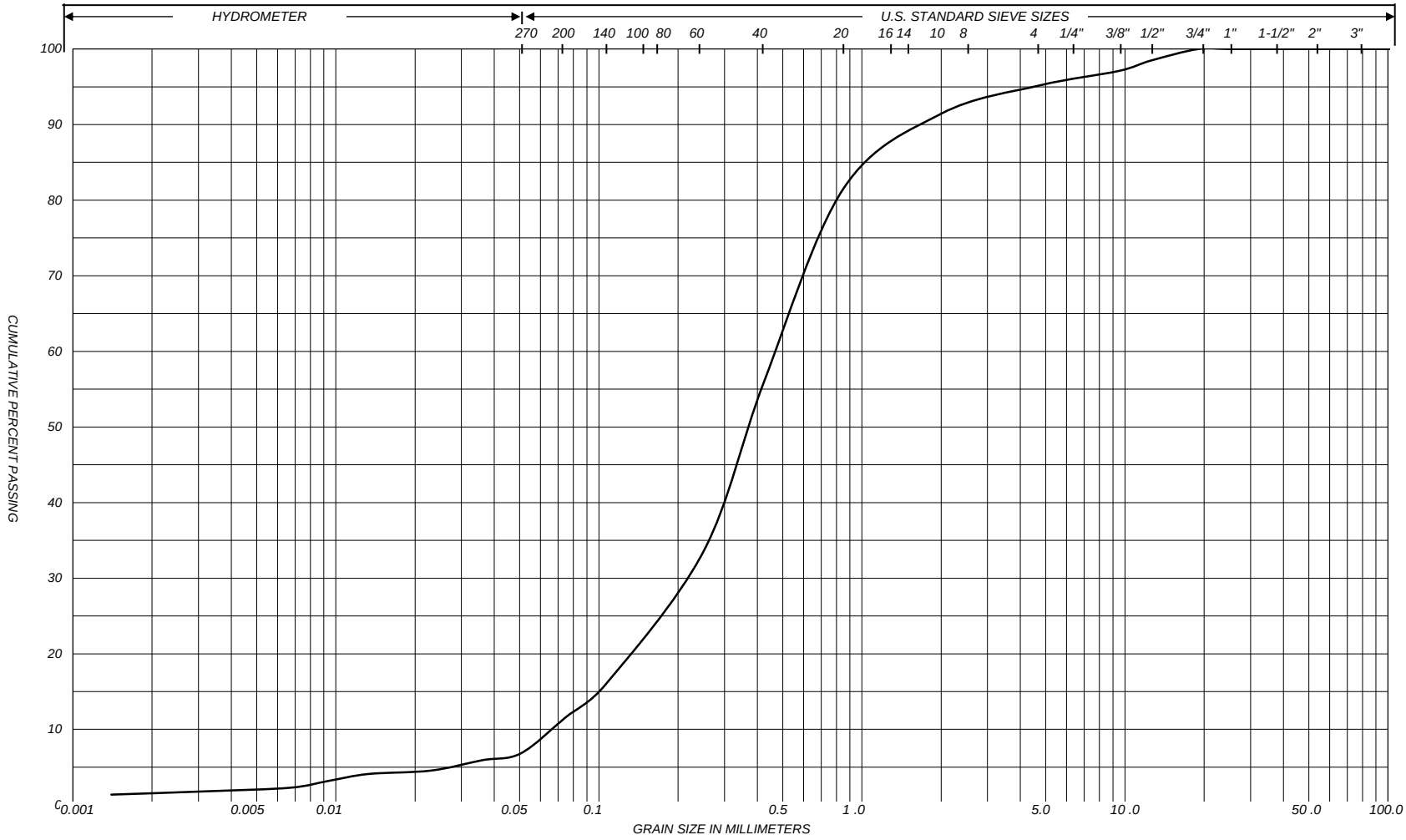
PML REF. 17KF002
REPORT NO. 1
FIGURE. 1

PARTICLE SIZE DISTRIBUTION CHART



SILT & CLAY			FINE	MEDIUM	COARSE	GRAVEL	COBBLES	UNIFIED
			SAND					
CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	GRAVEL	COBBLES	M.I.T.
	SILT			SAND					
CLAY	SILT		VERY FINE	FINE	MEDIUM	COARSE	GRAVEL		U.S. BUREAU
			SAND						

REMARKS Borehole 1, Sample SS6, Depth 4.5 to 5.0 m

SAND, SOME SILT, TRACE GRAVEL

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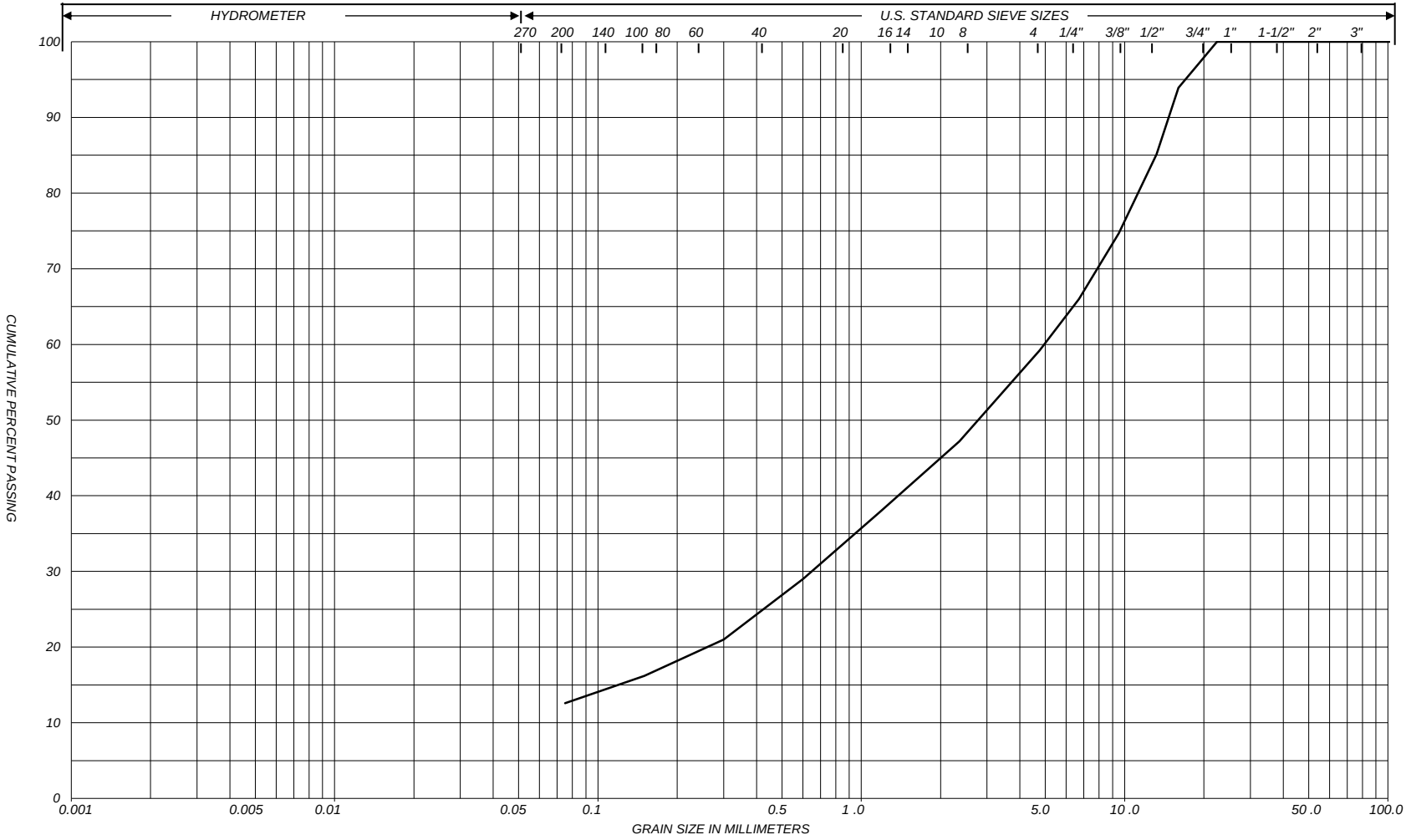
CONSULTING ENGINEERS

PML REF. 17KF002
REPORT NO. 1
FIGURE. 2

PARTICLE SIZE DISTRIBUTION CHART



SILT & CLAY			FINE	MEDIUM	COARSE	GRAVEL		COBBLES	UNIFIED		
			SAND								
CLAY	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	GRAVEL		COBBLES	M.I.T.	
	SILT			SAND							
CLAY	SILT		VERY FINE	FINE	MEDIUM	COARSE	GRAVEL			U.S. BUREAU	
			SAND								

REMARKS Borehole 2, Sample SS2, Depth 0.7 to 1.2 m

SAND AND GRAVEL, SOME SILT

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. - Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		

WTPL	Wetter Than Plastic Limit
APL	About Plastic Limit
DTPL	Drier Than Plastic Limit

TYPE OF SAMPLE

SS	Split Spoon	TW	Thinwall Open
WS	Washed Sample	TP	Thinwall Piston
SB	Scraper Bucket Sample	OS	Oesterberg Sample
AS	Auger Sample	FS	Foil Sample
CS	Chunk Sample	RC	Rock Core
ST	Slotted Tube Sample	USS	Undisturbed Shear Strength
PH	Sample Advanced Hydraulically	RSS	Remoulded Shear Strength
PM	Sample Advanced Manually		

SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		

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LOG OF BOREHOLE NO. 1

PROJECT Proposed Arkell Road Subdivision
LOCATION Arkell Road, Guelph, Ontario
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE: 2017 02 13
PML REF.: 17KF002
ENGINEER K. Hanes
TECHNICIAN H. Shinwary

GROUND ELEVATION 334.56

DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	GROUND WATER OBSERVATIONS AND REMARKS
0.10	TOPSOIL: Dark brown silt, trace sand, numerous rootlets, damp	1	SS	7			GR SA SI&CL
0.46							
0.69	FILL: Brown sand and gravel, trace silt, moist						
333.87	SILT: Loose brown silt, trace sand, occasional rootlets, damp	2	SS	42	334		
	SAND AND GRAVEL: Dense to very dense brown sand and gravel, trace to some silt, numerous cobbles, damp	3	SS	50/150mm	333		
2.1							
332.5	becoming moist	4	SS	39	332		
2.9							
331.7	becoming compact, no cobbles, saturated, contains saturated silt layers	5	SS	23	331		Sampler wet from SS5
4.0							
330.6	SAND: Compact brown sand, trace to some silt, trace gravel, saturated	6	SS	12	330		
					329		
6.6		7	SS	16	328		
328.0	BOREHOLE TERMINATED AT 6.6 m						Upon completion of augering Wet cave to 3.1 m

SHEAR STRENGTH C_u (kPa) 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

NOTES: Headspace: SS1 0ppm, SS2 0ppm, SS3 0ppm, SS4 0ppm, SS5 0ppm, SS6 0ppm, SS7 0ppm

WATER LEVEL OBSERVED DURING / UPON COMPLETION OF DRILLING
WATER LEVEL MEASURED IN MONITORING WELL

UNDISTURBED FIELD VANE
REMOLDED FIELD VANE
LAB SHEAR TEST
POCKET PENETROMETER
POCKET TORVANE

CHECKED BY KH

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

PROJECT Proposed Arkell Road Subdivision
LOCATION Arkell Road, Guelph, Ontario
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE: 2017 02 13
PML REF.: 17KF002
ENGINEER K. Hanes
TECHNICIAN H. Shinwary

DEPTH in METRES	DESCRIPTION	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	ELEVATION SCALE
	GROUND ELEVATION 335.16					
0.25 (334.91)	TOPSOIL: Dark brown silt, trace sand, numerous rootlets, damp		1	SS	3	335
0.69 (334.47)	SILT: Loose dark brown silt, some sand, trace gravel, occasional rootlets, damp		2	SS	57	334
	SAND AND GRAVEL: Very dense sand and gravel, trace to some silt, numerous cobbles, damp		3	SS	64	333
2.1 (333.1)	SAND: Compact to dense brown sand, trace to some silt, trace gravel, occasional cobbles, saturated		4	SS	34	332
			5	SS	31	331
			6	SS	30	330
			7	SS	26	329
7.7						328
8.1 (327.1)	SILT: Dense brown silt, trace sand, trace gravel, wet		8	SS	39	
	BOREHOLE TERMINATED AT 8.1 m					

SHEAR STRENGTH C_u (kPa) 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT _____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

UNIT WEIGHT γ kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

Stick up
GR SA SI&CL
Concrete
Sampler wet from SS4
Bentonite Seal
50 mm Plastic Riser
FIlter Sand
Screen

Water Level Readings:
Initial: 3.40 m
Elevation: 331.76

2017-04: 2.51 m
Elevation: 332.45

NOTES: Headspace: SS1 0ppm, SS2 0ppm, SS3 0ppm, SS4 0ppm, SS5 5ppm, SS6 0ppm, SS7 0ppm, SS8 0ppm

WATER LEVEL OBSERVED DURING / UPON COMPLETION OF DRILLING
WATER LEVEL MEASURED IN MONITORING WELL

+ UNDISTURBED FIELD VANE
⊕ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER
◆ POCKET TORVANE

CHECKED BY KH

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

PROJECT Proposed Arkell Road Subdivision
LOCATION Arkell Road, Guelph, Ontario
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE: 2017 02 13
PML REF.: 17KF002
ENGINEER K. Hanes
TECHNICIAN H. Shinwary

DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	ELEVATION SCALE
	GROUND ELEVATION 334.42				
0.20	TOPSOIL: Dark brown silt, trace sand, numerous rootlets, moist	1	SS	5	334
0.51 / 333.91	SILT: Loose dark brown silt, some sand, occasional rootlets	2	SS	3	
1.4 / 333.1	SAND AND GRAVEL: Very loose brown sand and gravel, trace to some silt, occasional cobbles, damp	3	SS	35	333
	becoming compact, saturated	4	SS	31	332
2.9 / 331.5	SAND: Compact to dense brown sand, trace to some silt, trace gravel, occasional cobbles, saturated	5	SS	24	331
		6	SS	42	330
		7	SS	27	329
7.8 / 8.0 / 326.4	SILT: Compact brown silt, trace sand, trace gravel, wet	8	SS	21	328
	BOREHOLE TERMINATED AT 8.0 m				327

SHEAR STRENGTH C_u (kPa) 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

UNIT WEIGHT γ kN/m^3

GROUND WATER OBSERVATIONS AND REMARKS

Stick up
Concrete
Sampler wet from SS3
Bentonite Seal
50 mm Plastic Riser
FIlter Sand
Screen

Water Level Readings:
Initial: 1.95 m
Elevation: 332.47

2017-04: 1.86 m
Elevation: 332.56

NOTES: Headspace: SS1 0ppm, SS2 0ppm, SS3 0ppm, SS4 0ppm, SS5 5ppm, SS6 0ppm, SS7 5ppm, SS8 0ppm

WATER LEVEL OBSERVED DURING / UPON COMPLETION OF DRILLING
WATER LEVEL MEASURED IN MONITORING WELL

+ UNDISTURBED FIELD VANE
⊕ REMOLDED FIELD VANE
⊛ LAB SHEAR TEST
▲ POCKET PENETROMETER
◆ POCKET TORVANE

CHECKED BY KH

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 4

PROJECT Proposed Arkell Road Subdivision
LOCATION Arkell Road, Guelph, Ontario
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE: 2017 03 21
PML REF.: 17KF002
ENGINEER K. Hanes
TECHNICIAN H. Shinwary

GROUND ELEVATION 334.13

DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES
0.30	TOPSOIL: Dark brown silt, trace sand, numerous rootlets, moist	1	SS	6
0.69 / 333.44	SAND AND GRAVEL: Compact brown sand and gravel, trace to some silt, occasional cobbles, moist	2	SS	13
1.5	becoming saturated			
332.7	SAND: Compact brown sand, trace to some silt, trace gravel, saturated	3	SS	14
		4	SS	11
		5	SS	12
		6	SS	18
		7	SS	10
8.1		8	SS	25
326.0	BOREHOLE TERMINATED AT 8.1 m			

SHEAR STRENGTH C_u (kPa) 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

UNIT WEIGHT γ kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

Stick up
GR SA SI&CL
Concrete
Sampler wet from SS2
Bentonite Seal
FIlter Sand
Screen

Water Level Readings:
Initial: 0.75 m
Elevation: 333.38

2017-04: 0.44 m
Elevation: 333.55

NOTES: Headspace: SS1 0ppm, SS2 5ppm, SS3 0ppm, SS4 5ppm, SS5 0ppm, SS6 0ppm, SS7 0ppm, SS8 0ppm

WATER LEVEL OBSERVED DURING / UPON COMPLETION OF DRILLING
WATER LEVEL MEASURED IN MONITORING WELL

UNDISTURBED FIELD VANE
REMOLDED FIELD VANE
LAB SHEAR TEST
POCKET PENETROMETER
POCKET TORVANE

CHECKED BY KH

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 5

PROJECT Proposed Arkell Road Subdivision
LOCATION Arkell Road, Guelph, Ontario
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE: 2017 03 21
PML REF.: 17KF002
ENGINEER K. Hanes
TECHNICIAN H. Shinwary

DEPTH in METRES	DESCRIPTION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	ELEVATION SCALE
	GROUND ELEVATION 334.97				
0.25 / 334.72	TOPSOIL: Dark brown silt, trace sand, trace gravel, numerous rootlets, damp	1	SS	13	
	SAND AND GRAVEL: Dense brown sand and gravel, trace to some silt, numerous cobbles, damp	2	SS	49	334
		3	SS	31	
2.2 / 332.8	SAND: Compact brown sand, some gravel, trace to some silt, occasional cobbles, saturated	4	SS	24	333
		5	SS	27	332
5.6 / 329.4	becoming very dense	6	SS	14	331
		7	SS	51	330
7.1 / 327.9	SAND AND GRAVEL: Very dense brown sand and gravel, trace silt, numerous cobbles, saturated	8	SS	52	329
8.1 / 326.9	BOREHOLE TERMINATED AT 8.1 m				328 / 327

SHEAR STRENGTH C_u (kPa) 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT ____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

UNIT WEIGHT γ kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

Stick up
GR SA SI&CL
Concrete
Sampler wet from SS4
Bentonite Seal
FIlter Sand
Screen

Water Level Readings:
Initial: 2.3 m
Elevation: 332.67

2017-04: 2.18 m
Elevation: 332.65

NOTES: Headspace: SS1 0ppm, SS2 0ppm, SS3 5ppm, SS4 5ppm, SS5 0ppm, SS6 0ppm, SS7 0ppm, SS8 0ppm

WATER LEVEL OBSERVED DURING / UPON COMPLETION OF DRILLING
WATER LEVEL MEASURED IN MONITORING WELL

UNDISTURBED FIELD VANE
REMOLDED FIELD VANE
LAB SHEAR TEST
POCKET PENETROMETER
POCKET TORVANE

CHECKED BY KH

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 6

PROJECT Proposed Arkell Road Subdivision
LOCATION Arkell Road, Guelph, Ontario
BORING METHOD Continuous Flight Hollow Stem Augers
BORING DATE: 2017 03 21
PML REF.: 17KF002
ENGINEER K. Hanes
TECHNICIAN H. Shinwary

DEPTH in METRES	DESCRIPTION	LEGEND	NUMBER	TYPE	BLOWS/0.3m N - VALUES	ELEVATION SCALE
	GROUND ELEVATION 334.0					
0.20	TOPSOIL: Dark brown silt, trace sand, numerous rootlets, damp		1	SS	18	
0.41						
0.69	FILL: Dark brown silt, some sand, trace gravel, occasional rootlets, damp					
333.31			2	SS	45	333
1.5	SAND AND GRAVEL: Dense brown sand and gravel, trace to some silt, numerous cobbles, damp					
332.6	becoming moist		3	SS	36	
2.2	becoming saturated					332
331.8	SILT: Compact brown silt, trace sand, trace gravel, trace clay, wet to saturated		4	SS	12	
			5	SS	10	331
						330
			6	SS	16	
5.8						329
328.2	SILT TILL: Very dense brown silt, some sand, some gravel, occasional cobbles, damp					328
6.6			7	SS	50/75mm	
327.4	BOREHOLE TERMINATED AT 6.6 m					

SHEAR STRENGTH C_u (kPa) 50 100 150 200
DYNAMIC CONE PENETRATION ×
STANDARD PENETRATION TEST ●
BLOWS/0.3M 20 40 60 80

LIQUID LIMIT _____ W_L
PLASTIC LIMIT ____ W_P
WATER CONTENT ___ W
W_P W W_L
WATER CONTENT % 10 20 30

UNIT WEIGHT γ kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GR SA SI&CL

Sampler wet from SS3

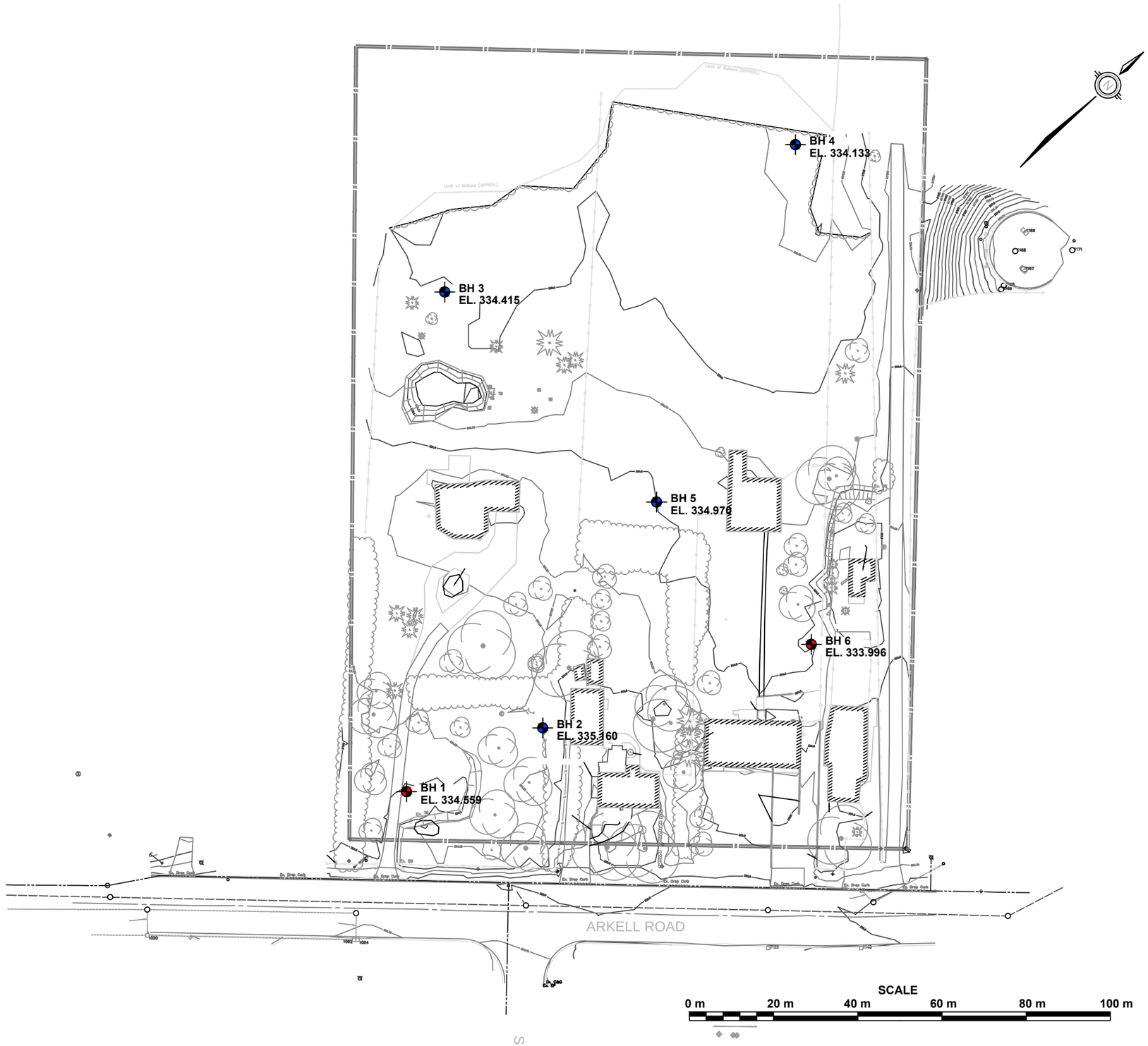
Upon completion of augering
Cave to 2.0 m
Free water at 1.83 m

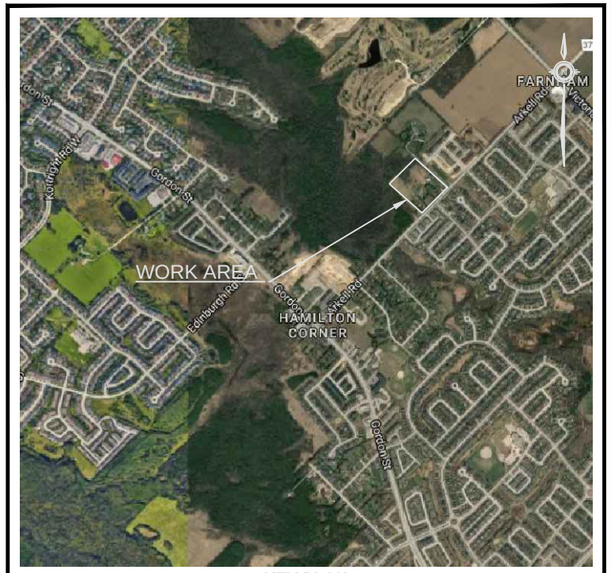
NOTES: Headspace: SS1 0ppm, SS2 0ppm, SS3 0ppm, SS4 5ppm, SS5 0ppm, SS6 0ppm, SS7 0ppm

WATER LEVEL OBSERVED DURING / UPON COMPLETION OF DRILLING
WATER LEVEL MEASURED IN MONITORING WELL

UNDISTURBED FIELD VANE
REMOLDED FIELD VANE
LAB SHEAR TEST
POCKET PENETROMETER
POCKET TORVANE

CHECKED BY KH





KEY PLAN

LEGEND:

- BOREHOLE
- BOREHOLE WITH MONITORING WELL

REFERENCE:

BOREHOLE LOCATION PLAN REPRODUCED FROM DRAWING SUPPLIED BY CLIENT.

NOTE:

THE INFERRED STRATIGRAPHY REFERRED TO IN THE REPORT IS BASED ON THE DATA FROM THESE BOREHOLES SUPPLEMENTED BY GEOLOGICAL EVIDENCE. THE ACTUAL STRATIGRAPHY BETWEEN THE BOREHOLES MAY VARY.

CRESCENT HOMES

PROPOSED ARKELL ROAD SUBDIVISION

ARKELL ROAD

GUELPH, ONTARIO

BOREHOLE LOCATION PLAN

PML Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN	D. BRICE	DATE	SCALE	PML REF.	DWG. NO.
CHECKED	H. SHINWARY	SEPTEMBER 2018	AS SHOWN	17KF002	1
APPROVED	W. LOGHRIN				

APPENDIX A

ENGINEERED FILL

ENGINEERED FILL

The information presented in this appendix is intended for general guidance only. Site specific conditions and prevailing weather may require modification of compaction standards, backfill type or procedures. Each site must be discussed, and procedures agreed with Peto MacCallum Ltd. prior to the start of the earthworks and must be subject to ongoing review during construction. This appendix is not intended to apply to embankments. Steeply sloping ravine residential lots require special consideration.

For fill to be classified as engineered fill suitable for supporting structural loads, a number of conditions must be satisfied, including but not necessarily limited to the following:

1. Purpose

The site specific purpose of the engineered fill must be recognized. In advance of construction, all parties should discuss the project and its requirements and agree on an appropriate set of standards and procedures.

2. Minimum Extent

The engineered fill envelope must extend beyond the footprint of the structure to be supported. The minimum extent of the envelope should be defined from a geotechnical perspective by:

- at founding level, extend a minimum 1.0 m beyond the outer edge of the foundations, greater if adequate layout has not yet been completed as noted below; and
- extend downward and outward at a slope no greater than 45° to meet the subgrade

All fill within the envelope established above must meet the requirements of engineered fill in order to support the structure safely. Other considerations such as survey control, or construction methods may require an envelope that is larger, as noted in the following sections.

Once the minimum envelope has been established, structures must not be moved or extended without consultation with Peto MacCallum Ltd. Similarly, Peto MacCallum Ltd. should be consulted prior to any excavation within the minimum envelope.

3. Survey Control

Accurate survey control is essential to the success of an engineered fill project. The boundaries of the engineered fill must be laid out by a surveyor in consultation with engineering staff from Peto MacCallum Ltd. Careful consideration of the maximum building envelope is required.

During construction it is necessary to have a qualified surveyor provide total station control on the three dimensional extent of filling.

4. Subsurface Preparation

Prior to placement of fill, the subgrade must be prepared to the satisfaction of Peto MacCallum Ltd. All deleterious material must be removed and in some cases, excavation of native mineral soils may be required.

Particular attention must be paid to wet subgrades and possible additional measures required to achieve sufficient compaction. Where fill is placed against a slope, benching may be necessary and natural drainage paths must not be blocked.

5. Suitable Fill Materials

All material to be used as fill must be approved by Peto MacCallum Ltd. Such approval will be influenced by many factors and must be site and project specific. External fill sources must be sampled, tested and approved prior to material being hauled to site.

6. Test Section

In advance of the start of construction of the engineered fill pad, the Contractor should conduct a test section. The compaction criterion will be assessed in consultation with Peto MacCallum Ltd. for the various fill material types using different lift thicknesses and number of passes for the compaction equipment proposed by the Contractor.

Additional test sections may be required throughout the course of the project to reflect changes in fill sources, natural moisture content of the material and weather conditions.

The Contractor should be particularly aware of changes in the moisture content of fill material. Site review by Peto MacCallum Ltd. is required to ensure the desired lift thickness is maintained and that each lift is systematically compacted, tested and approved before a subsequent lift is commenced.

7. Inspection and Testing

Uniform, thorough compaction is crucial to the performance of the engineered fill and the supported structure. Hence, all subgrade preparation, filling and compacting must be carried out under the full time inspection by Peto MacCallum Ltd.

All founding surfaces for all buildings and residential dwellings or any part thereof (including but not limited to footings and floor slabs) on structural fill or native soils must be inspected and approved by PML engineering personnel prior to placement of the base/subbase granular material and/or concrete. The purpose of the inspection is to ensure the subgrade soils are capable of supporting the building/house foundation and floor slab loads and to confirm the building/house envelope does not extend beyond the limits of any structural fill pads.

8. Protection of Fill

Fill is generally more susceptible to the effects of weather than natural soil. Fill placed and approved to the level at which structural support is required must be protected from excessive wetting, drying, erosion or freezing. Where adequate protection has not been provided, it may be necessary to provide deeper footings or to strip and recompact some of the fill.

9. Construction Delay Time Considerations

The integrity of the fill pad can deteriorate due to the harsh effects of our Canadian weather. Hence, particular care must be taken if the fill pad is constructed over a long time period.

It is necessary therefore, that all fill sources are tested to ensure the material compactability prior to the soil arriving at site. When there has been a lengthy delay between construction periods of the fill pad, it is necessary to conduct subgrade proof rolling, test pits or boreholes to verify the adequacy of the exposed subgrade to accept new fill material.

When the fill pad will be constructed over a lengthy period of time, a field survey should be completed at the end of each construction season to verify the areal extent and the level at which the compacted fill has been brought up to, tested and approved.

In the following spring, subexcavation may be necessary if the fill pad has been softened attributable to ponded surface water or freeze/thaw cycles.

A new survey is required at the beginning of the next construction season to verify that random dumping and/or spreading of fill has not been carried out at the site.

10. Approved Fill Pad Surveillance

It should be appreciated that once the fill pad has been brought to final grade and documented by field survey, there must be ongoing surveillance to ensure that the integrity of the fill pad is not threatened.

Grading operations adjacent to fill pads can often take place several months or years after completion of the fill pad.

It is imperative that all site management and supervision staff, the staff of Contractors and earthwork operators be fully aware of the boundaries of all approved engineered fill pads.

Excavation into an approved engineered fill pad should never be contemplated without the full knowledge, approval and documentation by the geotechnical consultant.

If the fill pad is knowingly built several years in advance of ultimate construction, the areal limits of the fill pad should be substantially overbuilt laterally to allow for changes in possible structure location and elevation and other earthwork operations and competing interests on the site. The overbuilt distance required is project and/or site specified.

Iron bars should be placed at the corner/intermediate points of the fill pad as a permanent record of the approved limits of the work for record keeping purposes.

11. Unusual Working Conditions

Construction of fill pads may at times take place at night and/or during periods of freezing weather conditions because of the requirements of the project schedule. It should be appreciated therefore, that both situations present more difficult working conditions. The Owner, Contractor, Design Consultant and Geotechnical Engineer must be willing to work together to revise site construction procedures, enhance field testing and surveillance, and incorporate design modifications as necessary to suit site conditions.

When working at night there must be sufficient artificial light to properly illuminate the fill pad and borrow areas.

Placement of material to form an engineered fill pad during winter and freezing temperatures has its own special conditions that must be addressed. It is imperative that each day prior to placement of new fill, the exposed subgrade must be inspected and any overnight snow or frozen material removed. Particular attention should be given to the borrow source inspection to ensure only nonfrozen fill is brought to the site.

The Contractor must continually assess the work program and have the necessary spreading and compacting equipment to ensure that densification of the fill material takes place in a minimum amount of time. Changes may be required to the spreading methods, lift thickness, and compaction techniques to ensure the desired compaction is achieved uniformly throughout each fill lift.

The Contractor should adequately protect the subgrade at the end of each shift to minimize frost penetration overnight. Since water cannot be added to the fill material to facilitate compaction, it is imperative that densification of the fill be achieved by additional compaction effort and an appropriate reduced lift thickness. Once the fill pad has been completed, it must be properly protected from freezing temperatures and ponding of water during the spring thaw period.

If the pad is unusually thick or if the fill thickness varies dramatically across the width or length of the fill pad, Peto MacCallum Ltd. should be consulted for additional recommendations. In this case, alternative special provisions may be recommended, such as providing a surcharge preload for a limited time or increase the degree of compaction of the fill.

APPENDIX B

STATEMENT OF LIMITATIONS

STATEMENT OF LIMITATIONS

This report is prepared for and made available for the sole use of the client named. Peto MacCallum Ltd. (PML) hereby disclaims any liability or responsibility to any person or entity, other than those for whom this report is specifically issued, for any loss, damage, expenses, or penalties that may arise or result from the use of any information or recommendations contained in this report. The contents of this report may not be used or relied upon by any other person without the express written consent and authorization of PML.

This report shall not be relied upon for any purpose other than as agreed with the client named without the written consent of PML. It shall not be used to express or imply warranty as to the fitness of the property for a particular purpose. A portion of this report may not be used as a separate entity: that is to say the report is to be read in its entirety at all times.

The report is based solely on the scope of services which are specifically referred to in this report. No physical or intrusive testing has been performed, except as specifically referenced in this report. This report is not a certification of compliance with past or present regulations, codes, guidelines and policies.

The scope of services carried out by PML is based on details of the proposed development and land use to address certain issues, purposes and objectives with respect to the specific site as identified by the client. Services not expressly set forth in writing are expressly excluded from the services provided by PML. In other words, PML has not performed any observations, investigations, study analysis, engineering evaluation or testing that is not specifically listed in the scope of services in this report. PML assumes no responsibility or duty to the client for any such services and shall not be liable for failing to discover any condition, whose discovery would require the performance of services not specifically referred to in this report.

The findings an comments made by PML in this report are based on the conditions observed at the time of PML's site reconnaissance. No assurances can be made and no assurances are given with respect to any potential changes in site conditions following the time of completion of PML's field work. Furthermore, regulations, codes and guidelines may change at any time subsequent to the date of this report and these changes may effect the validity of the findings and recommendations given in this report.

STATEMENT OF LIMITATIONS

The results and conclusions with respect to site conditions are therefore in no way intended to be taken as a guarantee or representation, expressed or implied, that the site is free from any contaminants from past or current land use activities or that the conditions in all areas of the site and beneath or within structures are the same as those areas specifically sampled.

Any investigation, examination, measurements or sampling explorations at a particular location may not be representative of conditions between sampled locations. Soil, ground water, surface water, or building material conditions between and beyond the sampled locations may differ from those encountered at the sampling locations and conditions may become apparent during construction which could not be detected or anticipated at the time of the intrusive sampling investigation.

Budget estimates contained in this report are to be viewed as an engineering estimate of probable costs and provided solely for the purposes of assisting the client in its budgeting process. It is understood and agreed that PML will not in any way be held liable as a result of any budget figures provided by it.

The Client expressly waives its right to withhold PML's fees, either in whole or in part, or to make any claim or commence any action or bring any other proceedings, whether in contract, tort, or otherwise against PML in anyway connected with advice or information given by PML relating to the cost estimate or Environmental Remediation/Cleanup and Restoration or Soil and Ground Water Management Plan Cost Estimate.

APPENDIX C

AGAT CERTIFICATES OF ANALYSIS

O.Reg. 153/04, As Amended, Table 1 Standards (Soil)

(Residential / Parkland / Institutional / Industrial / Commercial / Community Property Use)

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PETO MACCALLUM LIMITED
16 FRANKLIN STREET SOUTH
KITCHENER, ON N2C1R4
(519) 893-7500

ATTENTION TO: Ken Hanes

PROJECT: 17KF002

AGAT WORK ORDER: 17T199091

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Apr 18, 2017

PAGES (INCLUDING COVER): 7

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17T199091

PROJECT: 17KF002

CLIENT NAME: PETO MACCALLUM LIMITED

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2017-03-23

DATE REPORTED: 2017-04-18

		SAMPLE DESCRIPTION:		BH4-SS1	BH5-SS1	BH6-SS1
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2017-03-21	2017-03-21	2017-03-21
Parameter	Unit	G / S	RDL	8276142	8276150	8276151
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	3	5	6
Barium	µg/g	220	2	15	45	48
Beryllium	µg/g	2.5	0.5	<0.5	<0.5	<0.5
Boron	µg/g	36	5	6	6	<5
Boron (Hot Water Soluble)	µg/g	NA	0.10	0.17	0.23	0.27
Cadmium	µg/g	1.2	0.5	<0.5	0.7	0.6
Chromium	µg/g	70	2	8	13	13
Cobalt	µg/g	21	0.5	1.9	4.4	4.9
Copper	µg/g	92	1	8	11	11
Lead	µg/g	120	1	40	62	53
Molybdenum	µg/g	2	0.5	0.6	0.9	0.5
Nickel	µg/g	82	1	5	10	10
Selenium	µg/g	1.5	0.4	<0.4	0.4	0.5
Silver	µg/g	0.5	0.2	<0.2	<0.2	<0.2
Thallium	µg/g	1	0.4	<0.4	<0.4	<0.4
Uranium	µg/g	2.5	0.5	0.5	0.5	0.5
Vanadium	µg/g	86	1	11	22	24
Zinc	µg/g	290	5	182	313	254
Chromium VI	µg/g	0.66	0.2	<0.2	<0.2	<0.2
Cyanide	µg/g	0.051	0.040	<0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10	<0.10
Electrical Conductivity	mS/cm	0.57	0.005	0.177	0.233	0.173
Sodium Adsorption Ratio	NA	2.4	NA	0.125	0.142	0.053
pH, 2:1 CaCl2 Extraction	pH Units		NA	6.74	6.90	7.07

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

8276142-8276151 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By: Amanjot Bhela

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17T199091

PROJECT: 17KF002

CLIENT NAME: PETO MACCALLUM LIMITED

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - OC Pesticides (Soil)

DATE RECEIVED: 2017-03-23

DATE REPORTED: 2017-04-18

		SAMPLE DESCRIPTION:		BH4-SS1	BH6-SS1
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2017-03-21	2017-03-21
Parameter	Unit	G / S	RDL	8276142	8276151
Hexachloroethane	µg/g	0.01	0.01	<0.01	<0.01
Gamma-Hexachlorocyclohexane	µg/g	0.01	0.005	<0.005	<0.005
Heptachlor	µg/g	0.05	0.005	<0.005	<0.005
Aldrin	µg/g	0.05	0.005	<0.005	<0.005
Heptachlor Epoxide	µg/g	0.05	0.005	<0.005	<0.005
Endosulfan	µg/g	0.04	0.005	<0.005	<0.005
Chlordane	µg/g	0.05	0.007	<0.007	<0.007
DDE	µg/g	0.05	0.007	<0.007	<0.007
DDD	µg/g	0.05	0.007	<0.007	<0.007
DDT	µg/g	1.4	0.007	<0.007	<0.007
Dieldrin	µg/g	0.05	0.005	<0.005	<0.005
Endrin	µg/g	0.04	0.005	<0.005	<0.005
Methoxychlor	µg/g	0.05	0.005	<0.005	<0.005
Hexachlorobenzene	µg/g	0.01	0.005	<0.005	<0.005
Hexachlorobutadiene	µg/g	0.01	0.01	<0.01	<0.01
Moisture Content	%		0.1	33.0	6.7
Surrogate	Unit	Acceptable Limits			
TCMX	%	50-140		70	66
Decachlorobiphenyl	%	60-130		72	88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

8276142-8276151 Results are based on the dry weight of the soil.
Note: DDT applies to the total of op'DDT and pp'DDT, DDD applies to the total of op'DDD and pp'DDD and DDE applies to the total of op'DDE and pp'DDE. Endosulfan applies to the total of Endosulfan I and Endosulfan II.
Chlordane applies to the total of Alpha-Chlordane and Gamma-Chlordane.

Certified By: N Popnikolof

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 17T199091

PROJECT: 17KF002

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CLIENT NAME: PETO MACCALLUM LIMITED

ATTENTION TO: Ken Hanes

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
8276150	BH5-SS1	ON T1 S RPI/ICC	O. Reg. 153(511) - Metals & Inorganics (Soil)	Zinc	µg/g	290	313

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Quality Assurance

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 17T199091

PROJECT: 17KF002

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Apr 18, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	8272855		3.6	3.6	NA	< 0.8	126%	70%	130%	105%	80%	120%	96%	70%	130%
Arsenic	8272855		9	7	25.0%	< 1	108%	70%	130%	105%	80%	120%	103%	70%	130%
Barium	8272855		76	75	1.3%	< 2	101%	70%	130%	98%	80%	120%	101%	70%	130%
Beryllium	8272855		<0.5	<0.5	NA	< 0.5	83%	70%	130%	105%	80%	120%	89%	70%	130%
Boron	8272855		6	6	NA	< 5	82%	70%	130%	107%	80%	120%	93%	70%	130%
Boron (Hot Water Soluble)	8272855		0.41	0.42	NA	< 0.10	112%	60%	140%	103%	70%	130%	99%	60%	140%
Cadmium	8272855		0.8	0.8	NA	< 0.5	110%	70%	130%	106%	80%	120%	105%	70%	130%
Chromium	8272855		18	18	0.0%	< 2	96%	70%	130%	114%	80%	120%	112%	70%	130%
Cobalt	8272855		5.5	5.5	0.0%	< 0.5	102%	70%	130%	110%	80%	120%	99%	70%	130%
Copper	8272855		63	62	1.6%	< 1	101%	70%	130%	117%	80%	120%	85%	70%	130%
Lead	8272855		190	197	3.6%	< 1	105%	70%	130%	101%	80%	120%	70%	70%	130%
Molybdenum	8272855		1.3	1.3	NA	< 0.5	107%	70%	130%	103%	80%	120%	105%	70%	130%
Nickel	8272855		24	25	4.1%	< 1	103%	70%	130%	112%	80%	120%	100%	70%	130%
Selenium	8272855		0.9	1.0	NA	< 0.4	128%	70%	130%	99%	80%	120%	106%	70%	130%
Silver	8272855		<0.2	<0.2	NA	< 0.2	98%	70%	130%	115%	80%	120%	110%	70%	130%
Thallium	8272855		<0.4	<0.4	NA	< 0.4	103%	70%	130%	104%	80%	120%	98%	70%	130%
Uranium	8272855		<0.5	<0.5	NA	< 0.5	98%	70%	130%	93%	80%	120%	95%	70%	130%
Vanadium	8272855		20	20	0.0%	< 1	99%	70%	130%	109%	80%	120%	109%	70%	130%
Zinc	8272855		205	199	3.0%	< 5	102%	70%	130%	117%	80%	120%	84%	70%	130%
Chromium VI	8277762		<0.2	<0.2	NA	< 0.2	93%	70%	130%	98%	80%	120%	100%	70%	130%
Cyanide	8278916		<0.040	<0.040	NA	< 0.040	102%	70%	130%	108%	80%	120%	94%	70%	130%
Mercury	8272855		0.15	0.17	NA	< 0.10	100%	70%	130%	88%	80%	120%	93%	70%	130%
Electrical Conductivity	8277893		0.376	0.369	1.9%	< 0.005	93%	90%	110%	NA			NA		
Sodium Adsorption Ratio	8276363		0.057	0.053	7.3%	NA	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	8277854		7.37	7.42	0.7%	NA	101%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By: Amanjot Bhela

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Quality Assurance

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 17T199091

PROJECT: 17KF002

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Apr 18, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - OC Pesticides (Soil)															
Hexachloroethane	8267227		< 0.01	< 0.01	NA	< 0.01	82%	50%	140%	96%	50%	140%	64%	50%	140%
Gamma-Hexachlorocyclohexane	8267227		< 0.005	< 0.005	NA	< 0.005	92%	50%	140%	78%	50%	140%	66%	50%	140%
Heptachlor	8267227		< 0.005	< 0.005	NA	< 0.005	80%	50%	140%	90%	50%	140%	80%	50%	140%
Aldrin	8267227		< 0.005	< 0.005	NA	< 0.005	109%	50%	140%	94%	50%	140%	68%	50%	140%
Heptachlor Epoxide	8267227		< 0.005	< 0.005	NA	< 0.005	90%	50%	140%	96%	50%	140%	82%	50%	140%
Endosulfan	8267227		< 0.005	< 0.005	NA	< 0.005	89%	50%	140%	88%	50%	140%	69%	50%	140%
Chlordane	8267227		< 0.007	< 0.007	NA	< 0.007	87%	50%	140%	91%	50%	140%	78%	50%	140%
DDE	8267227		< 0.007	< 0.007	NA	< 0.007	88%	50%	140%	98%	50%	140%	78%	50%	140%
DDD	8267227		< 0.007	< 0.007	NA	< 0.007	94%	50%	140%	94%	50%	140%	84%	50%	140%
DDT	8267227		< 0.007	< 0.007	NA	< 0.007	88%	50%	140%	87%	50%	140%	78%	50%	140%
Dieldrin	8267227		< 0.005	< 0.005	NA	< 0.005	84%	50%	140%	90%	50%	140%	80%	50%	140%
Endrin	8267227		< 0.005	< 0.005	NA	< 0.005	84%	50%	140%	76%	50%	140%	82%	50%	140%
Methoxychlor	8267227		< 0.005	< 0.005	NA	< 0.005	76%	50%	140%	82%	50%	140%	96%	50%	140%
Hexachlorobenzene	8267227		< 0.005	< 0.005	NA	< 0.005	92%	50%	140%	100%	50%	140%	92%	50%	140%
Hexachlorobutadiene	8267227		< 0.01	< 0.01	NA	< 0.01	93%	50%	140%	100%	50%	140%	68%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: N Popnikolof

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Method Summary

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 17T199091

PROJECT: 17KF002

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A;SM 4500 CN	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010B	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Trace Organics Analysis			
Hexachloroethane	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Gamma-Hexachlorocyclohexane	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Heptachlor	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Aldrin	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Heptachlor Epoxide	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Endosulfan	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Chlordane	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
DDE	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
DDD	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
DDT	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Dieldrin	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Endrin	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Methoxychlor	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Hexachlorobenzene	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Hexachlorobutadiene	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
TCMX	ORG-91-5112	EPA SW-846 3541,3620 & 8081	GC/ECD
Decachlorobiphenyl	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Moisture Content		MOE E3139	BALANCE

AGAT Laboratories

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CLIENT NAME: PETO MACCALLUM LIMITED
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(519) 893-7500

ATTENTION TO: Ken Hanes

PROJECT: 17KF002

AGAT WORK ORDER: 17W201248

SOIL ANALYSIS REVIEWED BY: Sofka Pehlyova, Senior Analyst

DATE REPORTED: Apr 10, 2017

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17W201248

PROJECT: 17KF002

CLIENT NAME: PETO MACCALLUM LIMITED

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:H. Shinwary

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2017-03-30

DATE REPORTED: 2017-04-10

		SAMPLE DESCRIPTION:		BH5-SS4	BH6-SS3
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2017-03-21	2017-03-21
Parameter	Unit	G / S	RDL	8288805	8288806
Antimony	µg/g	1.3	0.8	<0.8	<0.8
Arsenic	µg/g	18	1	3	4
Barium	µg/g	220	2	9	13
Beryllium	µg/g	2.5	0.5	<0.5	<0.5
Boron	µg/g	36	5	<5	<5
Boron (Hot Water Soluble)	µg/g	NA	0.10	<0.10	<0.10
Cadmium	µg/g	1.2	0.5	<0.5	0.6
Chromium	µg/g	70	2	5	8
Cobalt	µg/g	21	0.5	1.8	4.0
Copper	µg/g	92	1	8	15
Lead	µg/g	120	1	18	43
Molybdenum	µg/g	2	0.5	<0.5	0.8
Nickel	µg/g	82	1	4	8
Selenium	µg/g	1.5	0.4	<0.4	<0.4
Silver	µg/g	0.5	0.2	<0.2	<0.2
Thallium	µg/g	1	0.4	<0.4	<0.4
Uranium	µg/g	2.5	0.5	<0.5	<0.5
Vanadium	µg/g	86	1	11	19
Zinc	µg/g	290	5	180	370
Chromium VI	µg/g	0.66	0.2	<0.2	<0.2
Cyanide	µg/g	0.051	0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10
Electrical Conductivity	mS/cm	0.57	0.005	0.098	0.174
Sodium Adsorption Ratio	NA	2.4	NA	0.303	0.509
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.94	8.16

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 1: Full Depth Background Site Condition Standards - Soil - Residential/Parkland/Institutional/Industrial/Commercial/Community Property Use

8288805-8288806 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By: Sofiya Pehlyova

AGAT Laboratories

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Guideline Violation

AGAT WORK ORDER: 17W201248

PROJECT: 17KF002

CLIENT NAME: PETO MACCALLUM LIMITED

ATTENTION TO: Ken Hanes

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
8288806	BH6-SS3	ON T1 S RPI/ICC	O. Reg. 153(511) - Metals & Inorganics (Soil)	Zinc	µg/g	290	370

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Quality Assurance

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 17W201248

PROJECT: 17KF002

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:H. Shinwary

Soil Analysis

RPT Date: Apr 10, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	8287941		<0.8	<0.8	NA	< 0.8	116%	70%	130%	100%	80%	120%	92%	70%	130%
Arsenic	8287941		4	4	NA	< 1	107%	70%	130%	98%	80%	120%	104%	70%	130%
Barium	8287941		48	47	2.6%	< 2	98%	70%	130%	96%	80%	120%	101%	70%	130%
Beryllium	8287941		<0.5	<0.5	NA	< 0.5	78%	70%	130%	108%	80%	120%	89%	70%	130%
Boron	8287941		<5	<5	NA	< 5	89%	70%	130%	108%	80%	120%	91%	70%	130%
Boron (Hot Water Soluble)	8287941		0.34	0.36	NA	< 0.10	112%	60%	140%	100%	70%	130%	101%	60%	140%
Cadmium	8287941		<0.5	<0.5	NA	< 0.5	89%	70%	130%	100%	80%	120%	103%	70%	130%
Chromium	8287941		13	13	0.0%	< 2	95%	70%	130%	106%	80%	120%	120%	70%	130%
Cobalt	8287941		6.0	6.2	3.3%	< 0.5	102%	70%	130%	108%	80%	120%	108%	70%	130%
Copper	8287941		32	33	3.1%	< 1	94%	70%	130%	110%	80%	120%	115%	70%	130%
Lead	8287941		10	10	0.0%	< 1	101%	70%	130%	101%	80%	120%	99%	70%	130%
Molybdenum	8287941		<0.5	<0.5	NA	< 0.5	101%	70%	130%	103%	80%	120%	103%	70%	130%
Nickel	8287941		13	13	0.0%	< 1	105%	70%	130%	107%	80%	120%	108%	70%	130%
Selenium	8287941		<0.4	<0.4	NA	< 0.4	107%	70%	130%	103%	80%	120%	102%	70%	130%
Silver	8287941		<0.2	<0.2	NA	< 0.2	93%	70%	130%	106%	80%	120%	105%	70%	130%
Thallium	8287941		<0.4	<0.4	NA	< 0.4	86%	70%	130%	102%	80%	120%	103%	70%	130%
Uranium	8287941		<0.5	<0.5	NA	< 0.5	90%	70%	130%	92%	80%	120%	95%	70%	130%
Vanadium	8287941		22	22	0.0%	< 1	100%	70%	130%	106%	80%	120%	124%	70%	130%
Zinc	8287941		53	49	7.8%	< 5	103%	70%	130%	118%	80%	120%	116%	70%	130%
Chromium VI	8284952		<0.2	<0.2	NA	< 0.2	92%	70%	130%	96%	80%	120%	98%	70%	130%
Cyanide	8288805	8288805	<0.040	<0.040	NA	< 0.040	102%	70%	130%	103%	80%	120%	104%	70%	130%
Mercury	8287941		<0.10	<0.10	NA	< 0.10	102%	70%	130%	95%	80%	120%	102%	70%	130%
Electrical Conductivity	8291645		0.428	0.431	0.7%	< 0.005	94%	90%	110%	NA			NA		
Sodium Adsorption Ratio	8287941		0.751	0.761	1.3%	NA	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	8285504		7.26	7.23	0.4%	NA	100%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By: Sofiya Pehlyova

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Method Summary

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 17W201248

PROJECT: 17KF002

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:H. Shinwary

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A;SM 4500 CN	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010B	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER

O.Reg. 153/04, As Amended, Table 2 Standards (Soil)

(Industrial / Commercial / Community Property Use)

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CLIENT NAME: PETO MACCALLUM LIMITED
16 FRANKLIN STREET SOUTH
KITCHENER, ON N2C1R4
(519) 893-7500

ATTENTION TO: Ken Hanes

PROJECT: 17KF002

AGAT WORK ORDER: 17T199091

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: Apr 18, 2017

PAGES (INCLUDING COVER): 6

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

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Certificate of Analysis

AGAT WORK ORDER: 17T199091

PROJECT: 17KF002

CLIENT NAME: PETO MACCALLUM LIMITED

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2017-03-23

DATE REPORTED: 2017-04-18

		SAMPLE DESCRIPTION:		BH4-SS1	BH5-SS1	BH6-SS1
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2017-03-21	2017-03-21	2017-03-21
Parameter	Unit	G / S	RDL	8276142	8276150	8276151
Antimony	µg/g	40	0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	3	5	6
Barium	µg/g	670	2	15	45	48
Beryllium	µg/g	8	0.5	<0.5	<0.5	<0.5
Boron	µg/g	120	5	6	6	<5
Boron (Hot Water Soluble)	µg/g	2	0.10	0.17	0.23	0.27
Cadmium	µg/g	1.9	0.5	<0.5	0.7	0.6
Chromium	µg/g	160	2	8	13	13
Cobalt	µg/g	80	0.5	1.9	4.4	4.9
Copper	µg/g	230	1	8	11	11
Lead	µg/g	120	1	40	62	53
Molybdenum	µg/g	40	0.5	0.6	0.9	0.5
Nickel	µg/g	270	1	5	10	10
Selenium	µg/g	5.5	0.4	<0.4	0.4	0.5
Silver	µg/g	40	0.2	<0.2	<0.2	<0.2
Thallium	µg/g	3.3	0.4	<0.4	<0.4	<0.4
Uranium	µg/g	33	0.5	0.5	0.5	0.5
Vanadium	µg/g	86	1	11	22	24
Zinc	µg/g	340	5	182	313	254
Chromium VI	µg/g	8	0.2	<0.2	<0.2	<0.2
Cyanide	µg/g	0.051	0.040	<0.040	<0.040	<0.040
Mercury	µg/g	3.9	0.10	<0.10	<0.10	<0.10
Electrical Conductivity	mS/cm	1.4	0.005	0.177	0.233	0.173
Sodium Adsorption Ratio	NA	12	NA	0.125	0.142	0.053
pH, 2:1 CaCl2 Extraction	pH Units		NA	6.74	6.90	7.07

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ON T2 S ICC CT

8276142-8276151 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By: Amanjot Bhela

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Certificate of Analysis

AGAT WORK ORDER: 17T199091

PROJECT: 17KF002

CLIENT NAME: PETO MACCALLUM LIMITED

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:

O. Reg. 153(511) - OC Pesticides (Soil)

DATE RECEIVED: 2017-03-23

DATE REPORTED: 2017-04-18

		SAMPLE DESCRIPTION:		BH4-SS1	BH6-SS1
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2017-03-21	2017-03-21
Parameter	Unit	G / S	RDL	8276142	8276151
Hexachloroethane	µg/g	0.21	0.01	<0.01	<0.01
Gamma-Hexachlorocyclohexane	µg/g	0.056	0.005	<0.005	<0.005
Heptachlor	µg/g	0.19	0.005	<0.005	<0.005
Aldrin	µg/g	0.088	0.005	<0.005	<0.005
Heptachlor Epoxide	µg/g	0.05	0.005	<0.005	<0.005
Endosulfan	µg/g	0.3	0.005	<0.005	<0.005
Chlordane	µg/g	0.05	0.007	<0.007	<0.007
DDE	µg/g	0.52	0.007	<0.007	<0.007
DDD	µg/g	4.6	0.007	<0.007	<0.007
DDT	µg/g	1.4	0.007	<0.007	<0.007
Dieldrin	µg/g	0.088	0.005	<0.005	<0.005
Endrin	µg/g	0.04	0.005	<0.005	<0.005
Methoxychlor	µg/g	1.6	0.005	<0.005	<0.005
Hexachlorobenzene	µg/g	0.66	0.005	<0.005	<0.005
Hexachlorobutadiene	µg/g	0.031	0.01	<0.01	<0.01
Moisture Content	%		0.1	33.0	6.7
Surrogate	Unit	Acceptable Limits			
TCMX	%	50-140		70	66
Decachlorobiphenyl	%	60-130		72	88

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ON T2 S ICC CT

8276142-8276151 Results are based on the dry weight of the soil.
Note: DDT applies to the total of op'DDT and pp'DDT, DDD applies to the total of op'DDD and pp'DDD and DDE applies to the total of op'DDE and pp'DDE. Endosulfan applies to the total of Endosulfan I and Endosulfan II.
Chlordane applies to the total of Alpha-Chlordane and Gamma-Chlordane.

Certified By: NPopowich

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Quality Assurance

CLIENT NAME: PETO MACCALLUM LIMITED
AGAT WORK ORDER: 17T199091
PROJECT: 17KF002
ATTENTION TO: Ken Hanes
SAMPLING SITE:
SAMPLED BY:

Soil Analysis

RPT Date: Apr 18, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	8272855		3.6	3.6	NA	< 0.8	126%	70%	130%	105%	80%	120%	96%	70%	130%
Arsenic	8272855		9	7	25.0%	< 1	108%	70%	130%	105%	80%	120%	103%	70%	130%
Barium	8272855		76	75	1.3%	< 2	101%	70%	130%	98%	80%	120%	101%	70%	130%
Beryllium	8272855		<0.5	<0.5	NA	< 0.5	83%	70%	130%	105%	80%	120%	89%	70%	130%
Boron	8272855		6	6	NA	< 5	82%	70%	130%	107%	80%	120%	93%	70%	130%
Boron (Hot Water Soluble)	8272855		0.41	0.42	NA	< 0.10	112%	60%	140%	103%	70%	130%	99%	60%	140%
Cadmium	8272855		0.8	0.8	NA	< 0.5	110%	70%	130%	106%	80%	120%	105%	70%	130%
Chromium	8272855		18	18	0.0%	< 2	96%	70%	130%	114%	80%	120%	112%	70%	130%
Cobalt	8272855		5.5	5.5	0.0%	< 0.5	102%	70%	130%	110%	80%	120%	99%	70%	130%
Copper	8272855		63	62	1.6%	< 1	101%	70%	130%	117%	80%	120%	85%	70%	130%
Lead	8272855		190	197	3.6%	< 1	105%	70%	130%	101%	80%	120%	70%	70%	130%
Molybdenum	8272855		1.3	1.3	NA	< 0.5	107%	70%	130%	103%	80%	120%	105%	70%	130%
Nickel	8272855		24	25	4.1%	< 1	103%	70%	130%	112%	80%	120%	100%	70%	130%
Selenium	8272855		0.9	1.0	NA	< 0.4	128%	70%	130%	99%	80%	120%	106%	70%	130%
Silver	8272855		<0.2	<0.2	NA	< 0.2	98%	70%	130%	115%	80%	120%	110%	70%	130%
Thallium	8272855		<0.4	<0.4	NA	< 0.4	103%	70%	130%	104%	80%	120%	98%	70%	130%
Uranium	8272855		<0.5	<0.5	NA	< 0.5	98%	70%	130%	93%	80%	120%	95%	70%	130%
Vanadium	8272855		20	20	0.0%	< 1	99%	70%	130%	109%	80%	120%	109%	70%	130%
Zinc	8272855		205	199	3.0%	< 5	102%	70%	130%	117%	80%	120%	84%	70%	130%
Chromium VI	8277762		<0.2	<0.2	NA	< 0.2	93%	70%	130%	98%	80%	120%	100%	70%	130%
Cyanide	8278916		<0.040	<0.040	NA	< 0.040	102%	70%	130%	108%	80%	120%	94%	70%	130%
Mercury	8272855		0.15	0.17	NA	< 0.10	100%	70%	130%	88%	80%	120%	93%	70%	130%
Electrical Conductivity	8277893		0.376	0.369	1.9%	< 0.005	93%	90%	110%	NA			NA		
Sodium Adsorption Ratio	8276363		0.057	0.053	7.3%	NA	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	8277854		7.37	7.42	0.7%	NA	101%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By: Amanjot Bhela

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Quality Assurance

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 17T199091

PROJECT: 17KF002

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Apr 18, 2017

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - OC Pesticides (Soil)															
Hexachloroethane	8267227		< 0.01	< 0.01	NA	< 0.01	82%	50%	140%	96%	50%	140%	64%	50%	140%
Gamma-Hexachlorocyclohexane	8267227		< 0.005	< 0.005	NA	< 0.005	92%	50%	140%	78%	50%	140%	66%	50%	140%
Heptachlor	8267227		< 0.005	< 0.005	NA	< 0.005	80%	50%	140%	90%	50%	140%	80%	50%	140%
Aldrin	8267227		< 0.005	< 0.005	NA	< 0.005	109%	50%	140%	94%	50%	140%	68%	50%	140%
Heptachlor Epoxide	8267227		< 0.005	< 0.005	NA	< 0.005	90%	50%	140%	96%	50%	140%	82%	50%	140%
Endosulfan	8267227		< 0.005	< 0.005	NA	< 0.005	89%	50%	140%	88%	50%	140%	69%	50%	140%
Chlordane	8267227		< 0.007	< 0.007	NA	< 0.007	87%	50%	140%	91%	50%	140%	78%	50%	140%
DDE	8267227		< 0.007	< 0.007	NA	< 0.007	88%	50%	140%	98%	50%	140%	78%	50%	140%
DDD	8267227		< 0.007	< 0.007	NA	< 0.007	94%	50%	140%	94%	50%	140%	84%	50%	140%
DDT	8267227		< 0.007	< 0.007	NA	< 0.007	88%	50%	140%	87%	50%	140%	78%	50%	140%
Dieldrin	8267227		< 0.005	< 0.005	NA	< 0.005	84%	50%	140%	90%	50%	140%	80%	50%	140%
Endrin	8267227		< 0.005	< 0.005	NA	< 0.005	84%	50%	140%	76%	50%	140%	82%	50%	140%
Methoxychlor	8267227		< 0.005	< 0.005	NA	< 0.005	76%	50%	140%	82%	50%	140%	96%	50%	140%
Hexachlorobenzene	8267227		< 0.005	< 0.005	NA	< 0.005	92%	50%	140%	100%	50%	140%	92%	50%	140%
Hexachlorobutadiene	8267227		< 0.01	< 0.01	NA	< 0.01	93%	50%	140%	100%	50%	140%	68%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By: N Popnikolof

AGAT Laboratories

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Method Summary

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 17T199091

PROJECT: 17KF002

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A;SM 4500 CN	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010B	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Trace Organics Analysis			
Hexachloroethane	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Gamma-Hexachlorocyclohexane	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Heptachlor	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Aldrin	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Heptachlor Epoxide	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Endosulfan	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Chlordane	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
DDE	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
DDD	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
DDT	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Dieldrin	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Endrin	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Methoxychlor	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Hexachlorobenzene	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Hexachlorobutadiene	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
TCMX	ORG-91-5112	EPA SW-846 3541,3620 & 8081	GC/ECD
Decachlorobiphenyl	ORG-91-5113	EPA SW-846 3541,3620 & 8081	GC/ECD
Moisture Content		MOE E3139	BALANCE

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: PETO MACCALLUM LIMITED
16 FRANKLIN STREET SOUTH
KITCHENER, ON N2C1R4
(519) 893-7500

ATTENTION TO: Ken Hanes

PROJECT: 17KF002

AGAT WORK ORDER: 17W201248

SOIL ANALYSIS REVIEWED BY: Sofka Pehlyova, Senior Analyst

DATE REPORTED: Apr 10, 2017

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

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MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 17W201248

PROJECT: 17KF002

CLIENT NAME: PETO MACCALLUM LIMITED

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:H. Shinwary

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2017-03-30

DATE REPORTED: 2017-04-10

		SAMPLE DESCRIPTION:		BH5-SS4	BH6-SS3
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2017-03-21	2017-03-21
Parameter	Unit	G / S	RDL	8288805	8288806
Antimony	µg/g	40	0.8	<0.8	<0.8
Arsenic	µg/g	18	1	3	4
Barium	µg/g	670	2	9	13
Beryllium	µg/g	8	0.5	<0.5	<0.5
Boron	µg/g	120	5	<5	<5
Boron (Hot Water Soluble)	µg/g	2	0.10	<0.10	<0.10
Cadmium	µg/g	1.9	0.5	<0.5	0.6
Chromium	µg/g	160	2	5	8
Cobalt	µg/g	80	0.5	1.8	4.0
Copper	µg/g	230	1	8	15
Lead	µg/g	120	1	18	43
Molybdenum	µg/g	40	0.5	<0.5	0.8
Nickel	µg/g	270	1	4	8
Selenium	µg/g	5.5	0.4	<0.4	<0.4
Silver	µg/g	40	0.2	<0.2	<0.2
Thallium	µg/g	3.3	0.4	<0.4	<0.4
Uranium	µg/g	33	0.5	<0.5	<0.5
Vanadium	µg/g	86	1	11	19
Zinc	µg/g	340	5	180	370
Chromium VI	µg/g	8	0.2	<0.2	<0.2
Cyanide	µg/g	0.051	0.040	<0.040	<0.040
Mercury	µg/g	3.9	0.10	<0.10	<0.10
Electrical Conductivity	mS/cm	1.4	0.005	0.098	0.174
Sodium Adsorption Ratio	NA	12	NA	0.303	0.509
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.94	8.16

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to ON T2 S ICC CT

8288805-8288806 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By: Sofiya Pehlyova

AGAT Laboratories

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http://www.agatlabs.com

Guideline Violation

AGAT WORK ORDER: 17W201248

PROJECT: 17KF002

CLIENT NAME: PETO MACCALLUM LIMITED

ATTENTION TO: Ken Hanes

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
8288806	BH6-SS3	ON T2 S ICC CT	O. Reg. 153(511) - Metals & Inorganics (Soil)	Zinc	µg/g	340	370

AGAT Laboratories

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http://www.agatlabs.com

Quality Assurance

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 17W201248

PROJECT: 17KF002

ATTENTION TO: Ken Hanes

SAMPLING SITE:

SAMPLED BY:H. Shinwary

Soil Analysis

RPT Date: Apr 10, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	8287941		<0.8	<0.8	NA	< 0.8	116%	70%	130%	100%	80%	120%	92%	70%	130%
Arsenic	8287941		4	4	NA	< 1	107%	70%	130%	98%	80%	120%	104%	70%	130%
Barium	8287941		48	47	2.6%	< 2	98%	70%	130%	96%	80%	120%	101%	70%	130%
Beryllium	8287941		<0.5	<0.5	NA	< 0.5	78%	70%	130%	108%	80%	120%	89%	70%	130%
Boron	8287941		<5	<5	NA	< 5	89%	70%	130%	108%	80%	120%	91%	70%	130%
Boron (Hot Water Soluble)	8287941		0.34	0.36	NA	< 0.10	112%	60%	140%	100%	70%	130%	101%	60%	140%
Cadmium	8287941		<0.5	<0.5	NA	< 0.5	89%	70%	130%	100%	80%	120%	103%	70%	130%
Chromium	8287941		13	13	0.0%	< 2	95%	70%	130%	106%	80%	120%	120%	70%	130%
Cobalt	8287941		6.0	6.2	3.3%	< 0.5	102%	70%	130%	108%	80%	120%	108%	70%	130%
Copper	8287941		32	33	3.1%	< 1	94%	70%	130%	110%	80%	120%	115%	70%	130%
Lead	8287941		10	10	0.0%	< 1	101%	70%	130%	101%	80%	120%	99%	70%	130%
Molybdenum	8287941		<0.5	<0.5	NA	< 0.5	101%	70%	130%	103%	80%	120%	103%	70%	130%
Nickel	8287941		13	13	0.0%	< 1	105%	70%	130%	107%	80%	120%	108%	70%	130%
Selenium	8287941		<0.4	<0.4	NA	< 0.4	107%	70%	130%	103%	80%	120%	102%	70%	130%
Silver	8287941		<0.2	<0.2	NA	< 0.2	93%	70%	130%	106%	80%	120%	105%	70%	130%
Thallium	8287941		<0.4	<0.4	NA	< 0.4	86%	70%	130%	102%	80%	120%	103%	70%	130%
Uranium	8287941		<0.5	<0.5	NA	< 0.5	90%	70%	130%	92%	80%	120%	95%	70%	130%
Vanadium	8287941		22	22	0.0%	< 1	100%	70%	130%	106%	80%	120%	124%	70%	130%
Zinc	8287941		53	49	7.8%	< 5	103%	70%	130%	118%	80%	120%	116%	70%	130%
Chromium VI	8284952		<0.2	<0.2	NA	< 0.2	92%	70%	130%	96%	80%	120%	98%	70%	130%
Cyanide	8288805	8288805	<0.040	<0.040	NA	< 0.040	102%	70%	130%	103%	80%	120%	104%	70%	130%
Mercury	8287941		<0.10	<0.10	NA	< 0.10	102%	70%	130%	95%	80%	120%	102%	70%	130%
Electrical Conductivity	8291645		0.428	0.431	0.7%	< 0.005	94%	90%	110%	NA			NA		
Sodium Adsorption Ratio	8287941		0.751	0.761	1.3%	NA	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	8285504		7.26	7.23	0.4%	NA	100%	80%	120%	NA			NA		

Comments: NA signifies Not Applicable.
Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By: Sofiya Pehlyova

AGAT Laboratories

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Method Summary

CLIENT NAME: PETO MACCALLUM LIMITED

AGAT WORK ORDER: 17W201248

PROJECT: 17KF002

ATTENTION TO: Ken Hanes

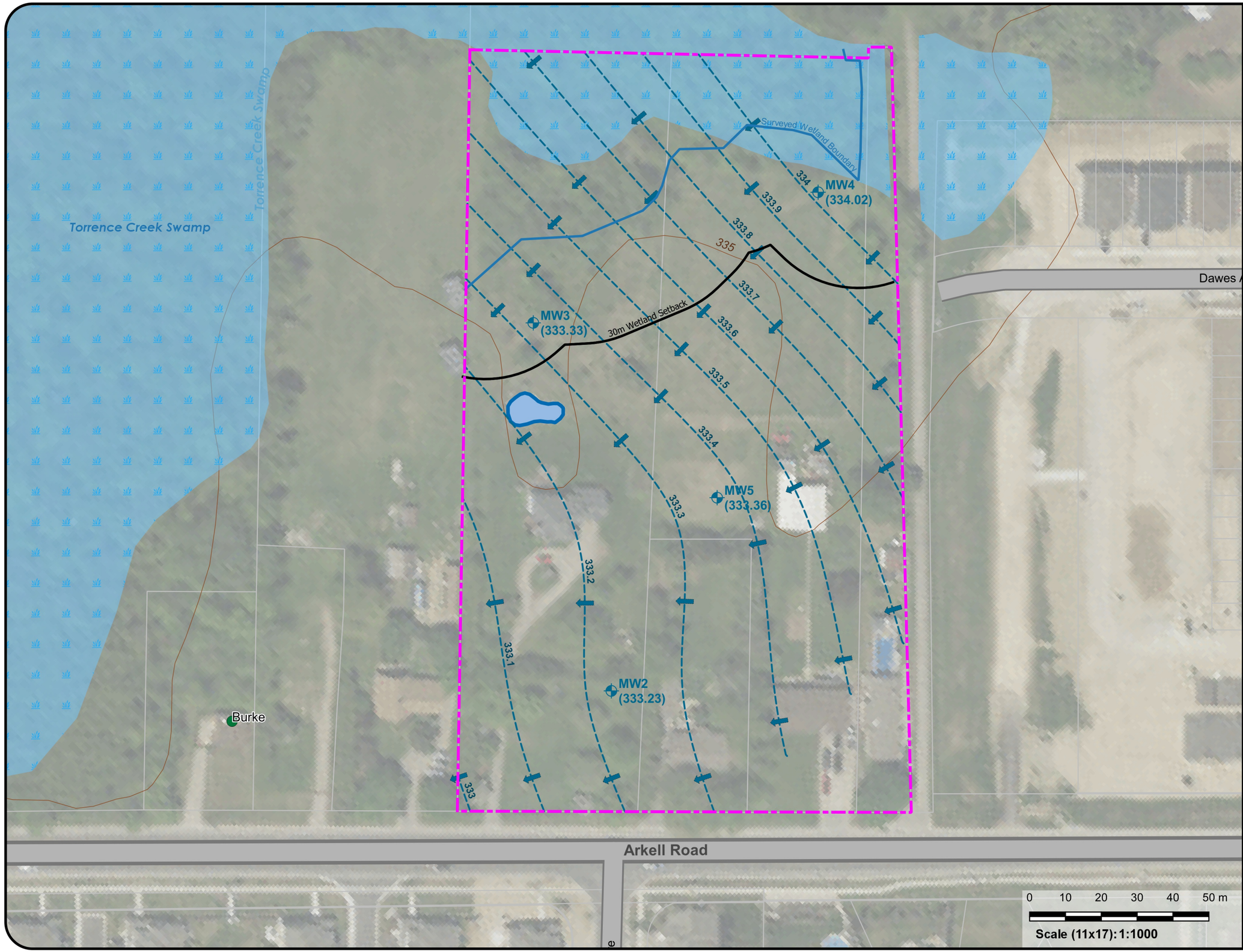
SAMPLING SITE:

SAMPLED BY:H. Shinwary

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A;SM 4500 CN	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010B	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER

Appendix G

Seasonal High GW



NORTH

PROJECT NORTH

Legend

- Subject Lands
- Study Area (500m)
- Municipal Well (GRCA)
- Monitoring Well (Groundwater Elevation (mamsl))
- Seasonal High Groundwater Elevation Contour (mamsl) & Flow Direction (May 6, 2017)

Surface Water

- Surface Water Body
- Watercourse
- Provincally Significant Wetland (GRCA)

Ground Surface Elevation Contour (mamsl)

- Major Contour (10m)
- Minor Contour (5m)

Data Sources:

Contains information licensed under the Open Government License Ontario.

Contains Information made available under Grand River Conservation Authority's Open Data Licence v2.0

South Central Ontario Orthophotography Project (2018). Source: Data provided by Ontario Ministry of Natural Resources and Forestry. ©

Project CRS: NAD83 / UTM zone 17N

MTE
Engineers,Scientists, Surveyors
Ph. (519) 743-6500

Client: Crescent Homes Ltd.

Project: Hydrogeological Assessment

Site: 190-216 Arkell Road, Guelph

Title: Seasonal High Groundwater Flow Interpretation (May 6, 2017)

Reviewed By	PAG		
Prepared By	KLW	Project No	42063-200
Drawn By	KLW	Figure No	9B
Date	November 2021		

Project No: 42063-200 Q:\42063\1041Hydrogeology\42063-104 QGIS.qgs
GWR2.9B
November 08, 2021 - 09:27 - Plotted By: KWallace

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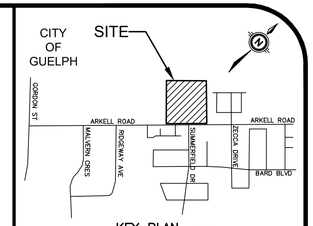
MTE FILE PATH:

December 3, 2021 - 1:53:02 PM - Plotted By: Alex Cressman

LEGEND

- SITE BOUNDARY
- WETLAND BOUNDARY
- 15m WETLAND SETBACK
- SURVEYED DRIPLINE
- 10m DRIPLINE SETBACK
- 326 — EXISTING CONTOURS
- Ex. Drop Curb — EXISTING CURB
- EXISTING DIRECTION OF DRAINAGE/SWALE
- EXISTING BUILDING
- (TOP) / (BOTTOM) — EXISTING EMBANKMENT (SLOPE AS NOTED)
- Ex. 300mmø SAN. / Ex. MH — EXISTING SANITARY SEWER
- Ex. 200mmø WTM. / Ex. HYD. SET — EXISTING WATERMAIN
- Ex. 375mmø STM. / Ex. MH — EXISTING STORM SEWER
- EXISTING RETAINING WALL
- EXISTING FENCE
- EXISTING PIEZOMETER
- EXISTING BOREHOLE/ MONITORING WELL
- EXISTING TEST PIT



KEY PLAN N.T.S.

GEODETIC BM ELEV. = 335.455m
CITY OF GUELPH
#255 BURKE WELL PUMP HOUSE

SITE BENCHMARK ELEV. = 335.455m
SEE ABOVE

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.	REISSUED FOR DRAFT PLAN APPROVAL	DFH	NOV.XX/21
1.	ISSUED FOR DRAFT PLAN APPROVAL	IXC	APR.3/20

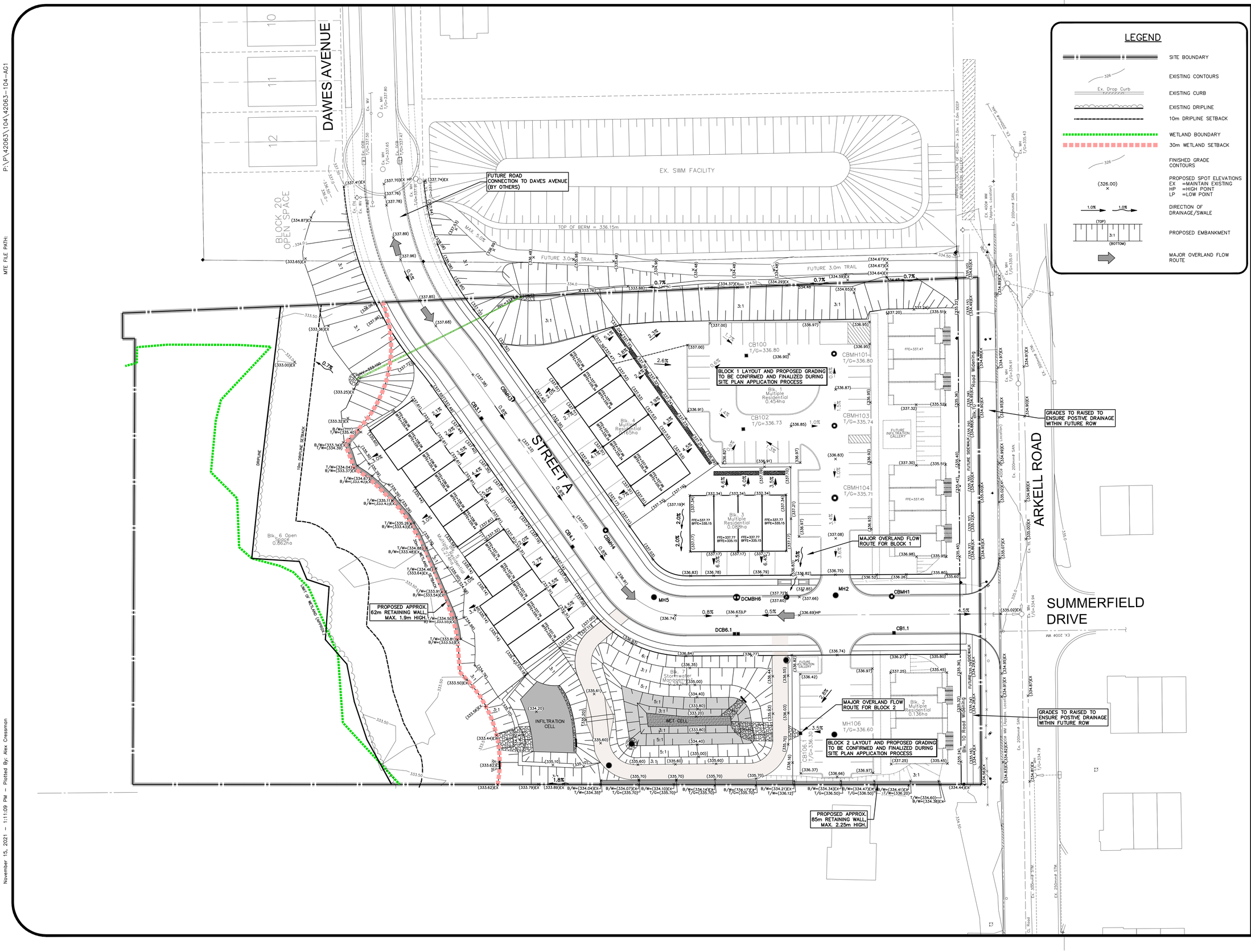
MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
CRESCENT HAVEN HOMES INC.
180 FROBISHER DRIVE UNIT 3 WATERLOO

PROJECT
ARKELL ROAD PROPERTIES
216 ARKELL ROAD GUELPH

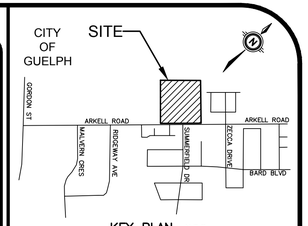
DRAWING
EXISTING CONDITIONS PLAN

Project Manager: D.HICKS	Project No.: 42063-104
Design By: CJC/AJC	Checked By: VAL
Drawn By: SXP/KAT	Checked By: AJC
Surveyed By: MTE	Drawing No.: EC1.1
Date: Dec.04/19	
Scale: 1:400	Sheet 1 of 1



LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS
- EXISTING CURB
- EXISTING DRIPLINE
- 10m DRIPLINE SETBACK
- WETLAND BOUNDARY
- 30m WETLAND SETBACK
- FINISHED GRADE CONTOURS
- PROPOSED SPOT ELEVATIONS
  EX =MAINTAIN EXISTING
  HP =HIGH POINT
  LP =LOW POINT
- DIRECTION OF DRAINAGE/SWALE
- PROPOSED EMBANKMENT
- MAJOR OVERLAND FLOW ROUTE



KEY PLAN N.T.S.

GEODETIC BM ELEV. = 335.455m
CITY OF GUELPH
#255 BURKE WELL PUMP HOUSE

SITE BENCHMARK ELEV. = 335.455m
SEE ABOVE

NOTE TO CONTRACTOR :

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No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.	REISSUED FOR DRAFT PLAN APPROVAL	DFH	NIV.XX/21
1.	ISSUED FOR DRAFT PLAN APPROVAL	IKC	JAN.10/20

MTE
Engineers, Scientists, Surveyors
519-743-6500

OWNER
CRESCENT HAVEN HOMES INC.
180 FROBISHER DRIVE UNIT 3 WATERLOO

PROJECT
ARKELL ROAD PROPERTIES
216 ARKELL ROAD GUELPH

DRAWING
AREA GRADING PLAN

Project Manager: D.HICKS	Project No.: 42063-104
Design By: AJC/BDS	Checked By: VAL
Drawn By: SXP/KAT	Checked By: AJC
Surveyed By: MTE	Drawing No.: AG1.1
Date: Mar.30/20	
Scale: 1:400	Sheet 1 of 1

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