Functional Servicing & Preliminary Stormwater Management Report
140 Lockhart Road
City of Barrie

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WMI File # 19-540

Prepared by

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Table of Contents

1.0 Background 1
1.1 General 1
1.2 Site Description 1
2.0 Stormwater Management 2
2.1 Development Design Criteria 2
2.2 Pre-Development Drainage 4
2.3 Soil Conditions 4
2.4 External Drainage 5
2.5 Existing Storm Drainage Plan – Welham Road Construction 5
2.6 Post-Development Drainage 6
2.7 Hydrologic Analysis 6
2.7.1 Pre-Development Condition Results 7
2.7.2 Post-Development Condition Results 7
2.8 Quantity Control 8
2.9 Quality Control 9
2.10 Total Phosphorous Removal Initiatives 11
2.11 Water Balance Initiatives 12
3.0 Site Grading 13
4.0 Sanitary Servicing 13
5.0 Water Servicing 14
6.0 Utilities 14
7.0 Sediment and Erosion Controls 15
8.0 Summary 15

Appendices

Appendix A – Figures/Drawings
Appendix B – Stormwater Management, Sanitary & Water Calculations
Appendix C – City of Barrie Plan & Profiles and Drainage Plans
Appendix D – Hydrologic Modelling (SWMHYMO)
Appendix E – Geotechnical Supporting Information

1.0 Background

1.1 General

WMI & Associates Limited has been retained by the owner of the lands through Innovative Planning Solutions (IPS) to prepare a Functional Servicing and Preliminary Stormwater Management Report in support of a proposed Industrial Subdivision located at 140 Lockhart Road, in the City of Barrie.

This report presents an investigation of existing services and drainage patterns, and conceptual designs for proposed services and stormwater management controls in support of planning level applications for the subject lands. Fundamental servicing and drainage objectives as detailed in this report are based on drainage and servicing constraints referenced from Rawson Avenue Construction Drawings, Lockhart Road Watermain Construction Drawings, Welham Road Construction drawings and the City of Barrie Master Plans as discussed with the Engineering Department.

1.2 Site Description

The subject site comprises 37.1ha and is located at 140 Lockhart Drive and consists of 0.60 ha of wetland which dissects the site from Bayview Drive to the rail crossing on Lockhart Road. This report is based upon a Conceptual Site Plan prepared by Innovative Planning Solutions (IPS) dated November 2020. The Conceptual Site Plan and the Site Location Plan are contained in **Appendix A** for reference.

The existing site has one single family residential dwelling and associated outbuildings. The subject site is bound by industrial development to the north and west, agricultural lands to the south and the east side is railway and additional industrial lands. The development proposed comprises 37 individual industrial sized lots and one large block which is proposed for industrial purposes. The proposed road network will include a 27.0m Arterial Road Allowance for Welham Road extension and the new street internal to the site is proposed to be a 20.0 m Local Road Allowance for Industrial Subdivisions per the City of Barrie Transportation Design Manual (2020).

This report demonstrates how the proposed industrial subdivision could be serviced by existing municipal infrastructure and how storm drainage will function. The level of detail presented is sufficient to support planning level approvals and could serve as a basis for detailed design. The conceptual designs described herein are based on City of Barrie, Ontario Ministry of the Environment, Conservation and Parks (MECP), Ontario Building Code (OBC), and Lake Simcoe Region Conservation Authority (LSRCA) policies and design guidelines. Refer to concept Site Servicing and Grading Plans contained in **Appendix A** for pertinent conceptual design details which are discussed throughout this report.

The subject site has two distinct areas in regard to servicing and stormwater management. The plans indicate a Block 1 (which is between Welham Road extension

and the railway) and we do not indicate servicing or stormwater management for this Block. However, please note that servicing designs have taken this area into account and that this report does speak to the specifics of this area in regard to stormwater management. We understand that Block 1 will be subject to Site Plan approval and at that time the preliminary designs and detailed designs will be further described and explained.

2.0 Stormwater Management

2.1 Development Design Criteria

The stormwater management design for the site will incorporate the policies and criteria of a number of agencies, including the Ministry of the Environment, Conservation and Parks (MECP), Lake Simcoe Region Conservation Authority (LSRCA) and the City of Barrie (City). Considering the size and type of development proposed, and the desire to provide both water balance and stormwater quality control for the site runoff, additional design guidance has been provided based on the Low Impact Development Stormwater Management Planning & Design Guide (LID Manual) prepared by the Credit Valley Conservation (CVC) and the Toronto and Region Conservation Authority (TRCA), Version 1.0, dated 2010. The above noted agencies stormwater design criteria for the proposed development are summarized below:

- The Welham Road Construction Storm Drainage Plan, STM1, Drawing No. 2005-27, (City of Barrie Approved August 9th, 2005) provided by the City of Barrie, indicates that a 7.3ha (runoff coefficient 0.75) portion of the site has been accounted for within the existing downstream stormwater management design. The post-development grading of the site includes 7.3ha of land (POST2A – 6.3ha, POST2B – 1.0ha) which will be directed to the existing drainage feature along the site's eastern property line. Due to the existing accounting of this area within the downstream stormwater management design, stormwater quantity control and quality control are already provided and are not required on-site (for this area only). The supporting report and figure are included in **Appendix C**.
- Stormwater quality controls will be provided based on the guidelines described in the Ministry of the Environment, Stormwater Management Planning and Design Manual dated March 2003 and the LID Manual. Following the MECP and LID Guidelines noted above, the stormwater management design utilized for the site will provide water quality control at an Enhanced Level of Protection (minimum of 80% Total Suspended Solids removal efficiency).
- Stormwater quantity control will be provided for each catchment (POST1A & POST1B) not accounted for in the Welham Road Construction Storm Drainage Plan (POST2A & POST2B). Quantity control will be provided via the use of two (2) individual dry detention basins (servicing two (2) individual site drainage areas) to attenuate the post-development peak flows for each of the analyzed design storm events to below their respective pre-development target rates. An outlet structure for each dry detention basin will be designed during the detailed design stage.

- Stormwater quality control will be provided for each catchment (POST1A & POST1B) not accounted for in the Welham Road Construction Storm Drainage Plan (POST2A & POST2B). An integrated treatment train approach will include the storm sewer to be equipped with inlet protection features (deep sumps & Nyloplast Envirohoods), and an oil-grit separator (OGS) for pre-treatment in conjunction with a downstream dry detention basin. This proposed treatment train approach is premised on the removal of suspended solids and floating contaminants upstream of the dry detention basin which will provide infiltration, filtration, nutrient uptake, and evapotranspiration benefits.
- Water balance will be achieved on-site through various LID features. Soakaway pits sized to infiltrate the 25mm runoff volume of clean runoff generated by the proposed building rooftop area of each lot are proposed. As indicated in the Preliminary Geotechnical Investigation Report (December 4, 2020) prepared by Cambium Inc., the soils observed in the respective boreholes located on-site revealed favourable soil conditions and a low ground water elevation (3.7mbgs). A Hydrogeological Study and Water Balance Analysis will be prepared during the detailed design stage to confirm seasonally high ground water elevations, as well as the infiltration rates of the native soils.
- Runoff volume control will be provided by the proposed dry detention basins on-site. It is proposed to drawdown the 25mm runoff volume between 24-48hours in each dry detention basin. An outlet structure for each dry detention basin will be designed during the detailed design stage.
- Phosphorus removal will be maximized on-site to target 80% post-development loading removal. The proposed integrated treatment train will be such that the 25mm storm event will be fully infiltrated through soakaway pits and the base of the dry detention basin, therefore no additional phosphorus loading will be discharged from the site.
- Storm Drainage and Stormwater Management Policies and Design Guidelines, City of Barrie (Updated October 22, 2020).
- The City of Barrie's Water Pollution Control Centre (WPCC) Station rainfall Intensity-Duration-Frequency (IDF) data, adjusted to account for climate change, will be used to determine the peak design flows and runoff volumes for each of the design storm events analyzed.
- LSRCA Technical Guidelines for Stormwater Management Submissions (September 1, 2016).
- Lake Simcoe Phosphorus Offsetting Policy, LSRCA, (Updated May 2019).
- Site layout and stormwater management design are based on the guidelines described in the South Georgian Bay Lake Simcoe Source Protection Plan amended on May 14, 2015.
- Erosion and sediment control measures will be implemented prior to and during the construction of the development and maintained until the site is stabilized.

2.2 Pre-Development Drainage

Currently the site consists mainly of cropland with some dense tree cover surrounding the perimeter of the property.

A topographic survey reveals that the site has two (2) pre-development drainage catchments (PRE1, PRE2) which both drain via overland sheet flow towards two separate existing drainage features. The site has an existing topographic relief of approximately 23.0m.

There is an existing watercourse that bisects the southern portion of the site flowing in a southeast direction towards Lockhart Road, where it crosses underneath the existing railway. Catchment PRE1 (29.8ha) drains centrally into this existing watercourse.

Catchment PRE2 (7.3ha) drains from west to east towards the existing railway where and existing drainage feature captures flows and conveys them further east through the neighbouring industrial development.

Refer to **FIG2** in **Appendix A** for the Pre-Development Drainage Plan.

2.3 Soil Conditions

According to the Soils Map of Simcoe County, Ontario, South Sheet, Soil Survey Report No. 29, prepared for the Department of Agriculture, the site consists of Tioga sandy loam (belonging to Hydrologic Soil Group ‘A’). These soils have good drainage characteristics. The Runoff Coefficients and Curve Numbers associated with the site were computed by calculating weighted values based on corresponding land uses and soil types. The hydrologic soil groups were determined in accordance with the Ontario Ministry of Transportation (MTO) Soil Classification System.

A Preliminary Geotechnical Investigation Report (December 4, 2020) prepared by Cambium Inc., included the advancement of seven (7) boreholes in September 2020. The report indicates that boreholes revealed a soil profile including topsoil, earth fill, sand/silty sand, clayey silt, and glacial till. A groundwater monitoring well installed on-site revealed a ground water elevation of 3.7m below ground surface (mbgs) equivalent to 273.5m above sea level. All other boreholes remained dry upon completion. Based on these observations, the findings of the report suggest favourable soil conditions for infiltration-based LID features.

It is noted that a Hydrogeological Study and Water Balance Analysis will need to be prepared during the detailed design stage to confirm seasonally high ground water elevations, as well as the infiltration rates of the native soils on-site which will be used to confirm the feasibility of infiltration-based LID features and facilitate their design.

Refer to **Appendix E** for the Preliminary Geotechnical Investigation Report (December 4, 2020) prepared by Cambium Incorporated.

2.4 External Drainage

After studying the topography of the site, aerial imagery, and a site visit, it was unclear how effectively the neighbouring properties contain their runoff from draining onto the site along its northern and western property lines. For this reason, bypass swales located along the northern and western property lines will be proposed to capture and convey any external runoff into their respective existing drainage features. With the construction of the proposed bypass swales, no external drainage is considered to enter the site or impact the overall stormwater management. As these areas are fully developed, no consideration of future development in these areas is required to be included in the design of the proposed stormwater management features.

2.5 Existing Storm Drainage Plan – Welham Road Construction

As indicated on the Welham Road Construction Storm Drainage Plan, STM1, Drawing No. 2005-27, (City of Barrie Approved August 9th, 2005) provided by the City of Barrie, approximately 7.3ha of the northeast portion of the site is accounted for in the existing downstream stormwater management design. Drawing No. 2005-27 indicates that sub-catchment areas 1 (0.1ha, 0.75 Runoff Coefficient), 5 (3.71ha, 0.75 Runoff Coefficient), and 6 (4.32ha, 0.75 Runoff Coefficient) are dedicated to be captured and conveyed by existing drainage features located along the site's eastern property line.

A portion of these sub-catchments are in the neighbouring lands to the east. To confirm the total area of the site accounted for within these sub-catchments, the sub-catchment boundaries were traced using the current topographic survey provided by Rudy Mak Surveying Ltd. Ontario Land Surveyors (May 14, 2019). The total site area accounted for within these subcatchment areas was determined to be 7.3ha.

Since 7.3ha were assigned a conservative runoff coefficient of 0.75 (the proposed industrial development on-site is considered to have a runoff coefficient of 0.70 – runoff coefficient methodology described in the Post-Development Drainage section of this report), this area meets the original design criteria for stormwater management as originally intended. No additional stormwater quantity or quality control for this 7.3ha of site area is required in the post-development condition.

The Welham Road Construction Storm Drainage Plan, STM1, Drawing No. 2005-27, (City of Barrie Approved August 9th, 2005) is included in **Appendix C**.

2.6 Post-Development Drainage

Drainage patterns in the post-development condition will strive to match pre-development conditions as closely as possible, in particular with regard to maintaining the site's natural split drainage characteristic and pre-development catchment areas as described previously.

The post development condition for the site is classified as industrial development. In accordance with Table 3.2 of the City of Barrie's Storm Drainage and Stormwater Management Policies and Design Guidelines (Updated October 22, 2020), an average runoff coefficient of 0.70 (Industrial – Heavy, A-B Soils) was conservatively assumed for the purposes of stormwater management design.

Runoff generated by catchment areas POST1A (14.7ha) and POST1B (10.5ha) will be collected and conveyed to individual dry detention basins within each catchment. Both catchments will ultimately discharge to the existing watercourse that bisects the site, as in the pre-development condition.

Catchment POST2A (6.3ha) and POST2B (1.0ha) have been delineated to suit post-development grading constraints to match the total pre-development area (7.3ha) which drains existing drainage feature along the railway. This existing drainage feature captures flows and conveys them further east through the neighbouring industrial development.

In the post-development condition, minor flows will be collected and conveyed by a network of storm sewers, while major flows will be conveyed overland within the proposed right-of-way.

2.7 Hydrologic Analysis

The SWMHYMO Stormwater Management Hydrologic Model was used to calculate peak flows and storage volumes for the site and its external drainage areas. The City of Barrie's Water Pollution Control Centre (WPCC) Station rainfall Intensity-Duration-Frequency (IDF) data, adjusted to account for climate change, will be used to determine the peak design flows and runoff volumes for each of the design storm events analyzed.

A 'Sensitivity Analysis' was conducted to compare the 2, 5, 25, and 100-year peak flows of the 4hr Chicago, 6hr SCS Type II, 12hr SCS Type II, and 24hr SCS Type II design storms. Additionally, the storage volumes required to attenuate the post-development flows to pre-development levels or less for each design storm was compared.

The Sensitivity Analysis modelling outputs of the pre-development and post-development conditions for each design storm have been tabulated and are included as a Sensitivity Analysis Comparison Chart spreadsheet in **Appendix D**.

Comparing the modelling results of the Sensitivity Analysis indicates that the 6hr SCS Type II design storm governs over the other models for both peak flows and required storage volumes, thus it was used as the basis for the site's SWM design. All further SWMHYMO modelling was done using this 'Governing Model'.

2.7.1 Pre-Development Condition Results

Using the site drainage areas as illustrated on **FIG 2** and the SWMHYMO model, the total flows were determined for the 2, 5, 25, & 100-year 6hr SCS Type II design storm events. These flows are summarized in **Table 1**.

The stormwater management design calculations can be found in **Appendix B** and the SWMHYMO model in **Appendix D**.

Table 1: Pre-Development Peak Flows

Catchment	Area (ha)	Pre-Development Peak Flows			
		2 yr. m^3/s	5 yr. m^3/s	25 yr. m^3/s	100 yr. m^3/s
PRE1	29.8	0.178	0.391	0.829	1.283
PRE2	7.3	0.099	0.211	0.432	0.654

Note that in the post-development condition, catchments POST1A (14.7ha) & POST1B (10.5ha) are smaller than catchment PRE1 (29.8ha). For this reason, **Table 2** includes pro-rated target rates have been calculated for these catchments (PRE1A – 14.7ha, & PRE1B – 10.5ha) so that a direct comparison of peak flows can be made.

Table 2: Pre-Development Peak Flow Targets

Catchment	Area (ha)	Pre-Development Peak Flow Targets (Pro-rated based on Post-Development Catchment Areas)			
		2 yr. m^3/s	5 yr. m^3/s	25 yr. m^3/s	100 yr. m^3/s
PRE1A	**14.7**	**0.088**	**0.193**	**0.409**	**0.633**
PRE1B	**10.5**	**0.063**	**0.138**	**0.292**	**0.452**

2.7.2 Post-Development Condition Results

The post-development peak flows are summarized in **Table 3** below.

Table 3: Post-Development Uncontrolled Peak Flows

Catchment	Area (ha)	Post-Development Uncontrolled Peak Flows			
		2 yr. m^3/s	5 yr. m^3/s	25 yr. m^3/s	100 yr. m^3/s
POST1A	**14.7**	**1.849**	**2.711**	**4.067**	**5.209**
POST1B	**10.5**	**1.321**	**1.937**	**2.905**	**3.721**
POST2A	6.3	0.792	1.162	1.743	2.233
POST2B	1.0	0.126	0.185	0.277	0.354
POST2AB (TOTAL)	7.3	0.918	1.347	2.020	2.587

By comparing **Tables 2 and 3** for the site drainage areas it is evident that the post-development peak flows exceed the pre-development levels for each catchment. However, the post-development peak flows for POST2A & POST2B are already accounted for within the existing downstream stormwater management design and do not require quantity control. For this reason, quantity control will only be required for flows discharged from catchments POST1A & POST1B.

2.8 Quantity Control

The tables below (**Table 4 & Table 5)** summarize the storage volume requirements for each stormwater management facility (dry detention basin) and the corresponding post-development peak flow rates (controlled to pre-development target rates). The controlled flows and corresponding storage volumes were determined using the SWMHYMO Model for the 2, 5, 25, & 100-year 6hr SCS Type II design storm events which can be found in **Appendix D**.

Table 4: POST1A Dry Detention Basin Characteristics (SWM1A)

Design Storm Event (Year)	Dry Detention Basin SWM1A Post-Development Controlled Peak Flows (m^3/s) & Storage Volumes (m^3)			
	Drainage Area (ha)	Inflow (m^3/s) (Table 3)	Outflow (m^3/s)	Storage Provided (m^3)
2	14.7	1.849	0.088	3831
5		2.711	0.193	5224
25		4.067	0.409	7281
100		5.209	0.633	8982

Table 5: POST1B Dry Detention Basin Characteristics (SWM1B)

Design Storm Event (Year)	Dry Detention Basin SWM1B Post-Development Controlled Peak Flows (m^3/s) & Storage Volumes (m^3)			
	Drainage Area (ha)	Inflow (m^3/s) (Table 3)	Outflow (m^3/s)	Storage Provided (m^3)
2	10.5	1.321	0.063	2735
5		1.937	0.138	3730
25		2.905	0.292	5201
100		3.721	0.452	6415

Table 6 summarizes the controlled post-development peak flow rates for each catchment for comparison with the pre-development target rates shown in **Table 2**.

Table 6: Post-Development Controlled Peak Flows

Catchment	Area (ha)	Post-Development Controlled Peak Flows			
		2 yr. m^3/s	5 yr. m^3/s	25 yr. m^3/s	100 yr. m^3/s
POST1A (SWM1A)	**14.7**	**0.088**	**0.193**	**0.409**	**0.633**
POST1B (SWM1B)	**10.5**	**0.063**	**0.138**	**0.292**	**0.452**

The proposed dry detention basins will be designed to incorporate stormwater quantity control as well as provide additional quality control, runoff volume control, water balance and phosphorus loading reduction benefits prior to releasing the site runoff to the existing watercourse that bisects site. All runoff from these catchments will be attenuated within the dry detention basins prior to being released off-site.

Refer to **Drawing LGR** (Conceptual Grading Plan) and **FIG3** located in **Appendix A**, to the supporting calculations provided in **Appendix B,** and to the SWMHYMO Model provided in **Appendix D** for additional details.

2.9 Quality Control

In determining the best approach to provide quality control for the proposed development, various factors were considered, as follows:

- Existing land characteristics and uses (soils, topography, treatment area, location, etc.);
- Local requirements and maintenance considerations with regard to quality control;

- Facility feasibility & proximity to a suitable stormwater outlet and the receiving watercourse/body of water (Lover's Creek and Lake Simcoe).
- Utilizing an 'integrated treatment train' approach to treat stormwater runoff;
- Ability to utilize landscaped areas and providing water balance and nutrient uptake benefits;
- The proposed on-site stormwater management features will provide quality control for drainage area's POST1A, POST1B (drainage area POST2A & POST2B are accounted for within the Welham Road Construction stormwater management design, and runoff from these areas is directed east of the site).

Based on the above noted factors, the application of a storm sewer equipped with pre-treatment features, and an oil-grit-separator (OGS) in conjunction with a downstream dry detention basin have been chosen as the preferred means of providing a complete treatment train approach for the treatment of contaminated stormwater runoff generated on-site. The integrated treatment train concept will be identical for catchments POST1A and POST1B (with each feature being sized according to its catchment). Additionally, the implementation of soakaway pits sized to infiltrate the 25mm rainfall event's clean runoff volume generated by the building rooftop area proposed on each individual lot will aid in achieving the desired water balance and runoff volume control requirements.

The site grading is such that minor flows generated by contaminated impervious area will be captured by the proposed storm sewer. Pre-treatment BMPs will be incorporated into the proposed storm sewer system including deep sumps within all storm structures and Nyloplast Envirohoods in all inlet structures. Deep sumps will allow suspended solids to settle in the base of the structure while stormwater is being captured. In contrast, Nyloplast Envirohoods will prevent any floating debris and oil from entering the storm sewer pipes. This combination of contaminate removal will provide complete pre-treatment of runoff generated on the site and increase the effectiveness of the downstream OGS. The storm sewer network for each respective drainage area converge upstream of the proposed OGS, directing the first flush (25mm rainfall event) of runoff through the OGS prior to entering the dry detention basin.

The sizing and design of each dry detention basin will be similar to that of a large enhanced grass swale. Enhanced grass swale design parameters are based upon guidance from the LID Manual. The dry detention basin will be trapezoidal in shape and consist of a large flat bottom width (greater than the minimum 0.75m required), 3:1 (H:V) side slopes (minimum), and the majority of longitudinal slopes being set at 1.0% or less which will provide additional opportunity for infiltration, filtration, nutrient uptake, and evapotranspiration prior to discharge.

Based on the information provided in the LID Guide, the median pollutant mass removal rates of enhanced grass swales are considered to be 76% for total suspended solids, 55%

for total phosphorus and 50% for total nitrogen based on available performance studies. Considering the above and noting that the grass swales exhibit most (if not all) of the design recommendations for enhanced grass swales, it is reasonable to assume that 80% Total Suspended Solids (TSS) removal efficiency is considered to be achievable on-site via the use of the proposed treatment train approach. The supporting treatment train calculation is shown below:

$$(\text{25mm Runoff Volume}) \times (\text{OGS}_{\text{TSS Removal Efficiency}})$$
$$+$$
$$(\text{25mm Runoff Volume}_{\text{Untreated by OGS}}) \times (\text{Dry Detention Basin}_{\text{TSS Removal Efficiency}})$$
$$=$$
$$\text{TOTAL\% TSS Removal}$$

$$(100\%_{\text{25mm Runoff Volume}})(0.50) + (50\%_{\text{25mm Runoff Volume}})(0.76)$$
$$=$$
$$(50\%) + (38\%)$$
$$=$$
$$88\% \text{ TSS Removal (TOTAL)}$$

Considering the above, and that the proposed dry detention basin is proposed to fully infiltrate the runoff volume generated by the 25mm rainfall event prior to discharging any runoff downstream to the existing drainage course, a minimum of 80% Total Suspended Solids (TSS) removal efficiency is considered to be achievable on-site via the use of the proposed treatment train.

Refer to **Drawing LGR** (Conceptual Grading Plan) and **Drawing GEN** (Conceptual Servicing Plan) located in **Appendix A** and to the supporting calculations provided in **Appendix B**.

2.10 Total Phosphorous Removal Initiatives

Phosphorus removal initiatives are also proposed for the subject site, in accordance with the requirements of the Lake Simcoe Protection Plan.

Given site layout constraints, and the nature of contaminated industrial runoff, the preferred mechanism for providing phosphorus control of stormwater runoff is by way of infiltration into the native soils. Because the proposed development is classified as industrial, a high amount of impervious area is anticipated during development of the individual lots. Industrial area is known to generate a significant amount of contaminated runoff which cannot be directly infiltrated into the native soils (pre-treatment is required). To achieve sufficient pre-treatment prior to infiltration, a proposed OGS will be located just upstream of each respective dry detention basin.

The proposed soakaway pits and dry detention basins will be designed to infiltrate the full runoff volume of the 25mm rainfall event (first flush) into the native soils, resulting

in no additional phosphorus loading to the existing drainage feature. Considering this, the “first flush” of any rainfall event, which consists of the vast majority of pollutants and contaminants including phosphorus, will be captured, conveyed and retained on-site via infiltration into the in-situ soils.

Based on statistical data provided by Environment Canada (refer to Canadian Climate Normals 1981-2010 Station Data – Barrie WPCC in **Appendix B**), 96% of all rainfall events in this area are 25mm or less which suggests that throughout the course of any given year, a maximum of 4% of rainfall events will result in runoff discharging from the site considering that the soak-away pits and dry detention basin have been designed to infiltrate the contributing 25mm runoff volume directed to each feature. Considering this, the first 25mm of rainfall will never be discharged from the site.

During the detailed design stage, a phosphorus loading analysis will be prepared to demonstrate the efficiency of the proposed integrated treatment train.

2.11 Water Balance Initiatives

Water Balance Controls are also proposed in accordance with City of Barrie requirements, which is to provide post-to-pre stormwater retention for infiltration purposes, where soil and groundwater conditions permit. It is noted that the soils present in the area are generally characterized as having good permeability, with groundwater being observed in only one borehole on-site (3.7mbgs), so it is expected that infiltration-based water balance measures can be implemented.

The conceptual design proposes a number of Low Impact Development (LID) measures to promote infiltration, namely two (2) large dry detention basins as well as soakaway pits on each individual lot. The soakaway pits will be sized to infiltrate 25mm clean runoff volume generated by the proposed building rooftops on each lot. Other runoff generated on the lots will be collected by the proposed storm sewer and conveyed to one of the dry detention basins. Prior to reaching the dry detention basins, an oil-grit-separator will provide treatment prior to infiltrating into the native soils. The large grass covered base area of each dry detention basin will allow pre-treated runoff to infiltrate into the native soils. The grass will also act as a filter promoting nutrient uptake and evapotranspiration which further facilitates water balance and supporting the overall integrated treatment train approach for stormwater management.

LID facilities will be constructed within this development to the greatest extent that is possible and practical, to ensure that the requirements of the City are satisfied. Specific details with regard to facility sizing will be provided at the detailed design stage, including a Hydrogeological Evaluation that will confirm seasonally high-water levels and the design infiltration rate of the site’s native soils.

3.0 Site Grading

The conceptual grading for the proposed development will meet the requirements of the site layout and stormwater management strategy.

Generally, the preliminary grading design is generally consistent with the existing drainage characteristics of the site. The preliminary design concept, includes proposed retaining walls along the west and north property limits. The proposed retaining walls will enable relatively flat industrial lots while not creating a significant change to the existing site drainage patterns and characteristics.

The following are some highlights the proposed preliminary grading design:

- Internal road grades will generally slopes in the order of 0.5% to 3.0%; with some localized road slopes of 0.5% to 1.0% to facilitate ponding within the internal roads; however there are some slopes in the order of 2.0% to 3.0% as required to assist the existing elevations along the north and west property lines in creating flat lots.
- All perimeter elevations will be maintained, however there are some retaining walls along the property lines, and some 3:1 slopes along perimeter property lines while still maintaining the existing boundary elevations.

Refer to **Figure 3** for the Conceptual Grading Plan, contained in **Appendix A**.

4.0 Sanitary Servicing

Based on the background information collected, the Rawson Avenue Construction External Sanitary Drainage Plan (dated August 2, 2005) this site is split into two sanitary catchment drainage areas. According to that plan, Area 1 is 16.8 ha and Area 7 is 23.8 ha (please note that Area 7 includes a portion of land from an adjacent property) and each of these areas have different outlet locations. Area 1 discharges to the existing Welham Road and Area 7 is proposed to discharge to a future sanitary sewer on Lockhart Road.

The Rawson Drainage Area Plan notes that downstream servicing constraints limits the sanitary flow from this site to 55 L/s.

We are proposing to match the above noted site sanitary drainage area characteristics with a modified approach in the aforementioned areas. Our proposed modified approach supports the maximum amount of area which can be serviced by a gravity sanitary sewer to the existing Welham Road sewer (this is important because the Lockhart Road sanitary sewer has not yet been constructed). The City of Barrie Engineering Department has mentioned an estimated 2031 construction schedule for Lockhart Road sanitary sewer.

Our proposed approach is that 25.27 ha of the site be directed to the Welham Road sanitary sewer and 1.48 ha be directed to the future Lockhart Road sewer. This proposed approach is supported by site elevations and how much area can drain by gravity to the

existing Welham Road sanitary sewer. Using the City of Barrie General Industrial sewage flow, this proposed 25.27 ha area discharging to the Welham Road sewer will generate a peak flow of 38.29 L/s, which is less than the 55L/s as noted on the Rawson Drainage Area Plan.

It should be noted that Block 1 is included in this area, but based on preliminary site grading Block 1 it will require a lift station to discharge into the gravity sewer.

As mentioned, the remaining area of 1.48 ha is proposed to discharge to Lockhart Road. For the preliminary design in this report, we have assumed future Lockhart road sanitary sewer invert of 2.5m deep. This will need to be established and coordinated during the design of the Lockhart Road sanitary sewer.

Refer to **Appendix B** for the preliminary sanitary sewer spreadsheet.

5.0 Water Servicing

There is existing municipal watermain on Welham Road and Lockhart Road and it is proposed to extend the Welham Road watermain and connect to Lockhart Road watermain; this will provide for the opportunity for Street a to complete internal looping.

It is proposed that each industrial lot be serviced with a fire connection and a domestic service.

We understand that during detailed design that a fire hydrant flow test on Welham and Lockhart may be required to confirm pressures which will help size the watermain connecting Welham and Lockhart mains. At this stage, the preliminary layout/ design demonstrates how the existing municipal system can be routed to provide municipal water to all the proposed lots.

6.0 Utilities

Existing hydro, gas and telecom infrastructure is present along both Welham Road and Lockhart Road. In order to confirm that each of these services are available and that service is available, the various utilities have been circulated a copy of the Conceptual Site Plan.

Based on the utility services that service the adjacent industrial subdivisions, it is not anticipated that there will be issues with providing utility servicing for the proposed development. Specific utility servicing requirements will be confirmed at the detailed design stage.

7.0 Sediment and Erosion Controls

Effective erosion and sediment control must be established prior to construction commencement and maintained until the site has been stabilized. Pro-active measures will be required to limit the amount of sediment travelling downstream. Where site grading is required, exposure of the soil during construction should be minimized to avoid erosion and sedimentation.

Silt Fence: Silt fence will be placed on the down slope of all excavated material to prevent sediment transport onto adjacent properties and the municipal roadways. Periodic inspections and repairs to the silt fence should be performed regularly, as well as after every rainfall event.

Storm Sewer Inlets: Filter cloth complete with clear stone cover at storm sewer inlet structures (i.e. catchbasins), will ensure sediment laden overland runoff during construction is cleansed before entering the municipal storm sewer system.

Mud Mat: Mud tracking from construction traffic must be controlled through the use of a mud-mat consisting of large diameter rip-rap located at the construction site entrance/exit.

Vegetated Buffers: Existing grassland vegetation/woodlot areas along the development limits are to be maintained wherever possible. These areas will provide a natural barrier to filter potentially sediment-laden overland flow.

Monitoring & Inspection: Erosion monitoring and sediment removal should be undertaken every week, and after every rainfall event. All damaged or clogged control devices or fencing must be repaired immediately.

8.0 Summary

This Functional Servicing and Stormwater Management Report demonstrates how the site can be serviced by existing municipal services, and how runoff from the proposed industrial subdivision would not have adverse effects on the surrounding environment.

Specifically:

- Fire and potable water servicing will be provided by the existing municipal watermains on Welham Road and Lockhart Road.
- Sanitary sewer servicing will be provided by an internal sanitary sewer system connecting to the existing municipal sanitary sewer on Welham Road, with future phase discharging to the future Lockhart Road sewer.
- Stormwater quantity control will be provided via two dry detention basins (servicing the two site drainage areas) to attenuate the post-development peak flows for each of the analyzed design storm events to below their respective pre-development target rates.

- Stormwater quality controls will provide an Enhanced Level of Protection (minimum of 80% Total Suspended Solids removal efficiency). An integrated treatment train approach for each catchment will be designed with inlet protection features and an oil-grit separator (OGS).
- Water balance will be achieved on-site through soakaway pits and dry detention basins which will be sized to infiltrate the runoff volume generated by the 25mm rainfall event.
- Runoff volume control will be provided by the proposed dry detention basins on-site. It is proposed to drawdown the 25mm runoff volume between 24-48hours in each dry detention basin.
- Phosphorus removal will be maximized on-site to target 80% post-development loading removal. The proposed integrated treatment train will be such that the 25mm storm event will be fully infiltrated through soakaway pits and the base of the dry detention basin, therefore no additional phosphorus loading will be discharged from the site.
- The use of silt fence, clear stone & filter cloth inlet protection, a construction mud mat, and vegetated buffers will provide adequate sediment and erosion controls during construction.

Should you have any questions, or require additional information, please contact the undersigned.

Prepared by:
WMI & Associates Limited

Benjamin Daniels, P. Eng. Dean A. Ives, P. Eng.

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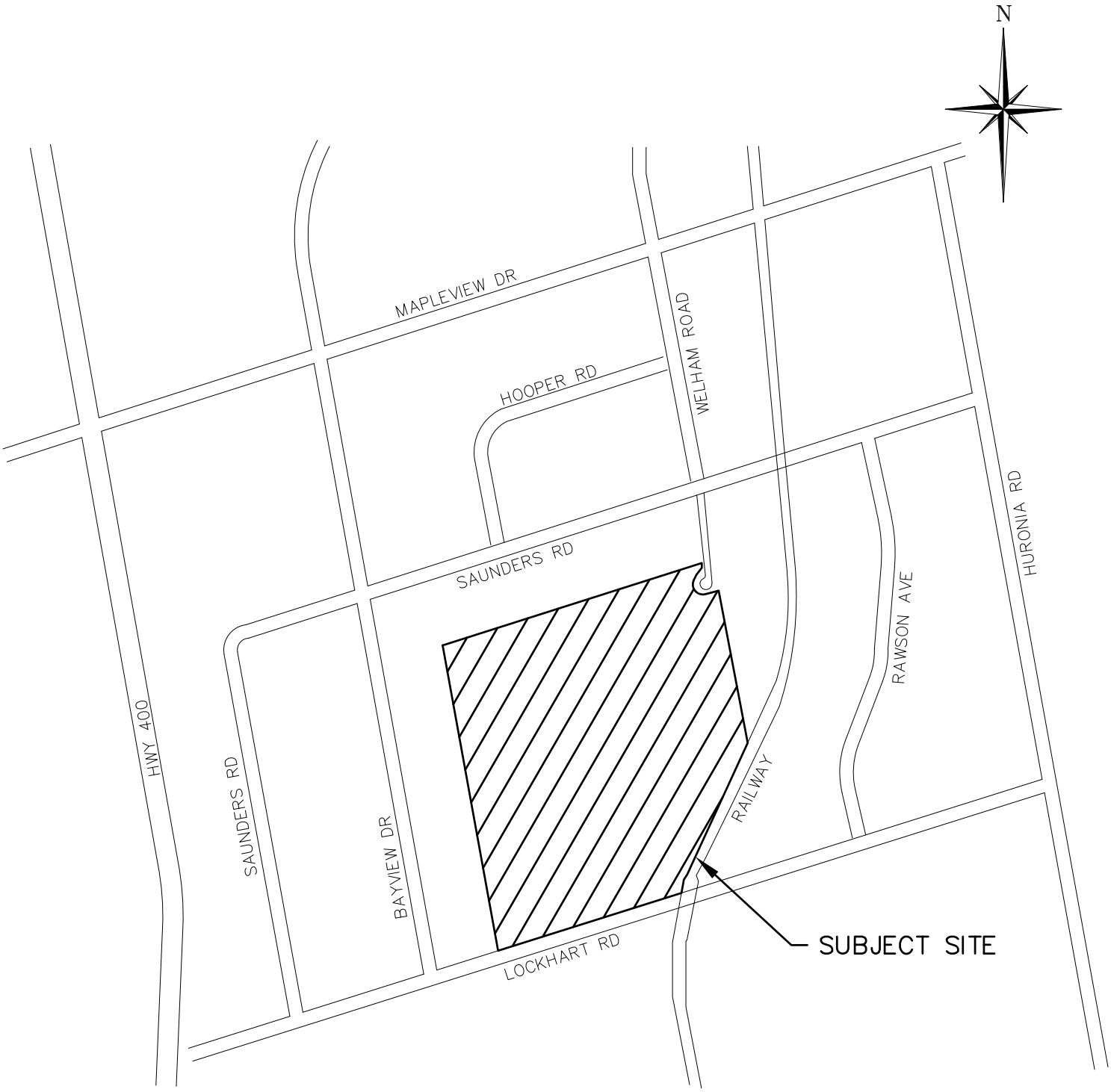
APPENDIX A

FIGURES/DRAWINGS



Drawing Title

SITE LOCATION PLAN

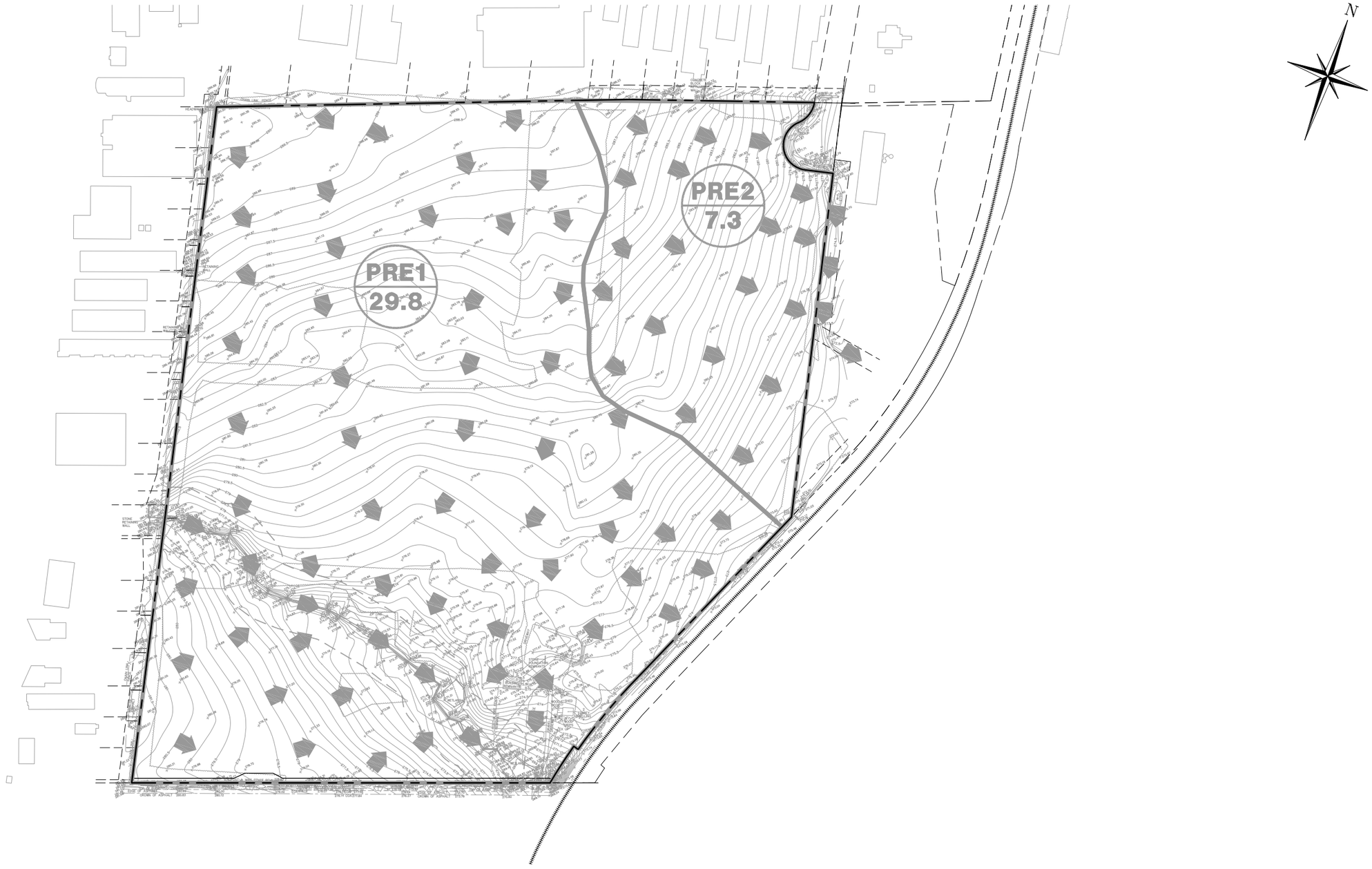
Project Title

140 LOCKHART

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Figure No.
AW	DAI	FIG1
Scale	Project No.	
N.T.S.	19-540	

C:\Users\DM\Desktop\2nd_Wave\19-540\CAD\WMI\FSR_Issue_No1\210126_19-540_Base.dwg, FIG1, 1:25.4



Legend:

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CATCHMENT IDENTIFICATION

CATCHMENT AREA (HA)

OVERLAND FLOW DIRECTION

LIMITS OF CATCHMENT AREA

Drawing Title

PRE–DEVELOPMENT SWM DRAINAGE PLAN

Project Title

140 LOCKHART ROAD

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Figure No.
AW	DAI	FIG 2
Scale 1:4000	Project No. 19–540	

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OVERLAND FLOW DIRECTION

LIMITS OF CATCHMENT AREA

Drawing Title

POST–DEVELOPMENT SWM DRAINAGE PLAN

Project Title

140 LOCKHART ROAD

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Figure No.
AW	DAI	FIG 3
Scale 1:4000	Project No. 19–540	

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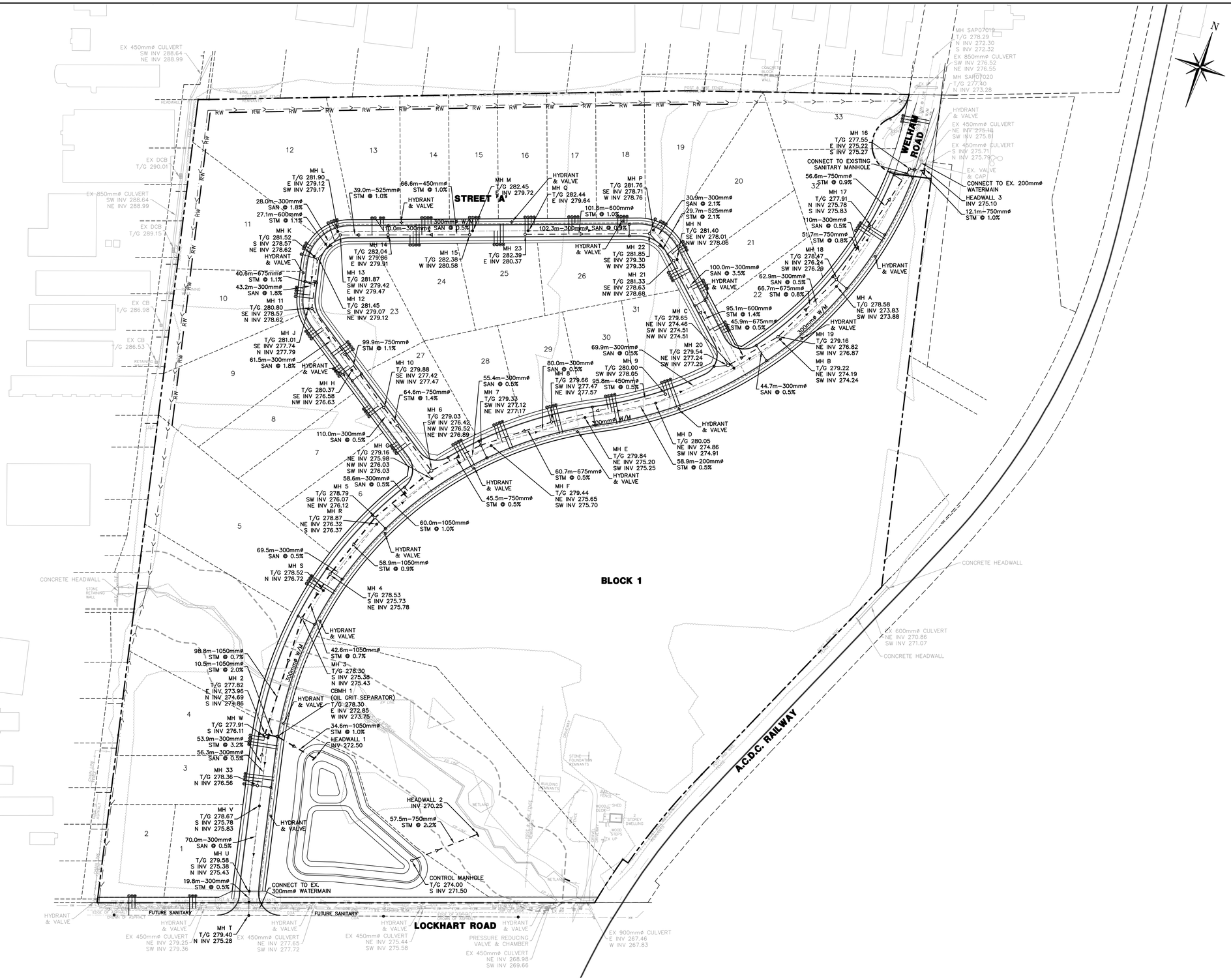

CAUTION
CONTRACTOR TO DETERMINE LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

Notes:

1. Unless noted otherwise, the measurements and distances shown on this drawing are shown in meters.
2. Do not scale drawings.
3. It is the contractor's responsibility to verify all dimensions, levels and datums on site and report any discrepancies or omissions to WMI & Associates Ltd. prior to construction.
4. This drawing is to be read and understood in conjunction with all other relevant documents applicable to this project.
5. This drawing is the exclusive property of WMI & Associates Ltd. and the reproduction of any part of this document without prior written consent is strictly prohibited.

Benchmark: 280.96m

SITE BENCHMARK IS THE TOP OF THE SIB NEAR THE SOUTHWEST CORNER OF PART 1, PLAN 51R-35905 HAVING AN ELEVATION OF 280.96.

No.	Issue / Revision	Date
1	FSR SUBMISSION	JAN. 27, 2021

140 LOCKHART ROAD

CONCEPTUAL SERVICING PLAN

Client:
2640085 Ontario Inc.
60 Ashwarren Road
Toronto, Ontario
M3J 1Z5

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
Ph 705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Drawing No.
AW	DAI	GEN
Scale 1:1500	Project No. 19-540	

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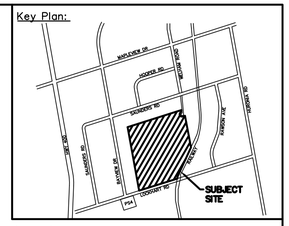
Key Plan:



Legend:

EXISTING FEATURES (EX)

- EX STD IRON BAR
- EX IRON BAR
- EX UTILITY POLE
- EX BELL PED
- EX HYDRO TRANSFORMER
- EX WATER SERVICE
- EX FIRE HYD.
- EX ST NAME SIGN
- EX STOP SIGN
- EX ELEVATION
- EX FENCE
- EX U/G GASMAIN
- EX U/G BELL
- EX U/G HYDRO
- EX WATERMAIN & VALVE
- EX 00mmø SAN @ 0.0% — EX SAN SEWER & MH
- EX 00mmø STM @ 0.0% — EX STM SEWER & MH

PROPOSED FEATURES (PR)

- PR STREET NAME SIGN
- PR STOP SIGN
- PR SILT FENCE
- PR STREET LIGHT
- PR HYDRO TRANSFORMER
- PR WATER SERVICE
- PR SANITARY SERVICE
- PR STORM SERVICE
- 00mmø W/M — PR WATERMAIN
- PR FIRE HYDRANT
- PR WATER VALVE
- 0m–00mmø SAN @ 0.0% — PR SANITARY SEWER
- MH A — PR SANITARY MANHOLE
- 0m–00mmø STM @ 0.0% — PR STORM SEWER
- CBMH 1 — PR CATCHBASIN MANHOLE
- MH 1 — PR MANHOLE
- CB 1A — PR CATCHBASIN
- 000.00 — PR ELEVATION
- (000.00) — PR MATCH EXISTING ELEVATION (INTERPOLATED)
- PR SWALE

CAUTION
CONTRACTOR TO DETERMINE LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.

Notes:

1. Unless noted otherwise, the measurements and distances shown on this drawing are shown in meters.
2. Do not scale drawings.
3. It is the contractor's responsibility to verify all dimensions, levels and datums on site and report any discrepancies or omissions to WMI & Associates Ltd. prior to construction.
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Benchmark: 280.96m

SITE BENCHMARK IS THE TOP OF THE SIB NEAR THE SOUTHWEST CORNER OF PART 1, PLAN 51R–35905 HAVING AN ELEVATION OF 280.96.

No.	Issue / Revision	Date
1	FSR SUBMISSION	JAN. 27, 2021

140 LOCKHART ROAD

CONCEPTUAL GRADING PLAN

Client:
2640085 Ontario Inc.
60 Ashwarren Road
Toronto, Ontario
M3J 1Z5

WMI & Associates Limited
119 Collier Street
Barrie, Ontario
L4M 1H5
Ph 705-797-2027
www.wmiengineering.ca

Drawn By	Checked By	Drawing No.
AW	DAI	LGR
Scale 1:1500	Project No. 19–540	

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APPENDIX B

STORMWATER MANAGEMENT, SANITARY & WATER CALCULATIONS

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

RUNOFF COEFFICIENT CALCULATIONS
"C" SPREADSHEET

Date: 2021-01-21 **Project No.:** 19-540

Project: 140 Lockhart Road **Prepared By:** BD

RUNOFF COEFFICIENT NUMBERS

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade	0.22	0.35	0.55
	5 - 10% grade	0.3	0.45	0.6
	10 - 30% grade	0.4	0.65	0.7
Pasture Land	0 - 5% grade	0.1	0.28	0.4
	5 - 10% grade	0.15	0.35	0.45
	10 - 30% grade	0.22	0.4	0.55
Woodlot or Cutover	0 - 5% grade	0.08	0.25	0.35
	5 - 10% grade	0.12	0.3	0.42
	10 - 30% grade	0.18	0.35	0.52
Lakes and Wetlands		0.05	0.05	0.05
Impervious Area	(i.e. buildings, roads, parking lot, etc.)	0.95	0.95	0.95
Gravel	(not used for proposed parking or storage areas)	0.4	0.5	0.6
Residential	Single Family	0.3	0.4	0.5
	Multiple (i.e. semi, townhouse, apartment, etc.)	0.5	0.6	0.7
Industrial	Light	0.55	0.65	0.75
	Heavy	0.65	0.75	0.85
Commercial		0.6	0.7	0.8
Unimproved Areas		0.1	0.2	0.3
Lawn	< 2% grade	0.05	0.11	0.17
	2 - 7% grade	0.1	0.16	0.22
	> 7% grade	0.15	0.25	0.35

Ref: Runoff Coefficient Numbers - Adapted from Design Chart 1.07, Ontario Ministry of Transportation, "MTO Drainage Management Manual", MTO. (1997)

<<< Elements Requiring Input Information

PRE-DEVELOPMENT CONDITION - PRE1

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade	17.98		
	5 - 10% grade			
	10 - 30% grade			
Pasture Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Woodlot or Cutover	0 - 5% grade	11.77		
	5 - 10% grade			
	10 - 30% grade			
Lakes and Wetlands				
Impervious Area	(i.e. buildings, roads, parking lot, etc.)	0.05		
Gravel	(not used for proposed parking or storage areas)			
Residential	Single Family			
	Multiple (i.e. semi, townhouse, apartment, etc.)			
Industrial	Light			
	Heavy			
Commercial				
Unimproved Areas				
Lawn	< 2% grade			
	2 - 7% grade			
	> 7% grade			

Total Area (ha) = 29.80 **Runoff Coefficient, C =** **0.17**

PRE - DEVELOPMENT CONDITION - PRE2

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade	6.56		
	5 - 10% grade			
	10 - 30% grade			
Pasture Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Woodlot or Cutover	0 - 5% grade	0.74		
	5 - 10% grade			
	10 - 30% grade			
Lakes and Wetlands				
Impervious Area	(i.e. buildings, roads, parking lot, etc.)			
Gravel	(not used for proposed parking or storage areas)			
Residential	Single Family			
	Multiple (i.e. semi, townhouse, apartment, etc.)			
Industrial	Light			
	Heavy			
Commercial				
Unimproved Areas				
Lawn	< 2% grade			
	2 - 7% grade			
	> 7% grade			

Total Area (ha) = 7.30 **Runoff Coefficient, C =** **0.21**

POST-DEVELOPMENT CONDITION - POST1A

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Pasture Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Woodlot or Cutover	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Lakes and Wetlands				
Impervious Area	(i.e. buildings, roads, parking lot, etc.)	11.50		
Gravel	(not used for proposed parking or storage areas)			
Residential	Single Family			
	Multiple (i.e. semi, townhouse, apartment, etc.)			
Industrial	Light			
	Heavy			
Commercial				
Unimproved Areas				
Lawn	< 2% grade	3.20		
	2 - 7% grade			
	> 7% grade			

Total Area (ha) = 14.70 **Runoff Coefficient, C =** **0.75**

POST-DEVELOPMENT CONDITION - POST1B

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Pasture Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Woodlot or Cutover	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Lakes and Wetlands				
Impervious Area	(i.e. buildings, roads, parking lot, etc.)	8.15		
Gravel	(not used for proposed parking or storage areas)			
Residential	Single Family			
	Multiple (i.e. semi, townhouse, apartment, etc.)			
Industrial	Light			
	Heavy			
Commercial				
Unimproved Areas				
Lawn	< 2% grade	2.35		
	2 - 7% grade			
	> 7% grade			

Total Area (ha) = 10.50 **Runoff Coefficient, C =** **0.75**

POST - DEVELOPMENT CONDITION - POST2A

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Pasture Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Woodlot or Cutover	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Lakes and Wetlands				
Impervious Area	(i.e. buildings, roads, parking lot, etc.)	4.90		
Gravel	(not used for proposed parking or storage areas)			
Residential	Single Family			
	Multiple (i.e. semi, townhouse, apartment, etc.)			
Industrial	Light			
	Heavy			
Commercial				
Unimproved Areas				
Lawn	< 2% grade	1.40		
	2 - 7% grade			
	> 7% grade			

Total Area (ha) = 6.30 **Runoff Coefficient, C =** **0.75**

POST - DEVELOPMENT CONDITION - POST2B

Land Cover		Hydrologic Soil Groups		
		A-AB	B-BC	C-D
Cultivated Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Pasture Land	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Woodlot or Cutover	0 - 5% grade			
	5 - 10% grade			
	10 - 30% grade			
Lakes and Wetlands				
Impervious Area	(i.e. buildings, roads, parking lot, etc.)	0.78		
Gravel	(not used for proposed parking or storage areas)			
Residential	Single Family			
	Multiple (i.e. semi, townhouse, apartment, etc.)			
Industrial	Light			
	Heavy			
Commercial				
Unimproved Areas				
Lawn	< 2% grade	0.22		
	2 - 7% grade			
	> 7% grade			

Total Area (ha) = 1.00 **Runoff Coefficient, C =** **0.75**

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
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CURVE NUMBER & INITIAL ABSTRACTION CALCULATIONS
CN & IA SPREADSHEET

Date: 2021-01-21 **Project No.:** 19-540

Project: 140 Lockhart Road **Prepared By:** BD

SCS CURVE NUMBERS (AMC II (NORMAL) CONDITION) — **INITIAL RAINFALL ABSTRACTION**

	Hydrologic Soil Groups							IA
Land Cover	**A**	**AB**	**B**	**BC**	**C**	**CD**	**D**	**(mm)**
Wetlands/Lakes/SWMF's	50	50	50	50	50	50	50	
Woods	32	46	60	67	73	76	79	10
Meadows	38	51	65	71	76	79	81	8
Pasture/Lawn	49	59	69	74	79	82	84	5
Cultivated	62	68	74	78	82	84	86	7
Impervious Areas	100	100	100	100	100	100	100	2

Ref: SCS Curve Numbers - Adapted from Design Chart 1.09, Ontario Ministry of Transportation, "MTO Drainage Management Manual", MTO.(1997)
Ref: Initial Rainfall Abstraction Values - UNESCO, Manual on Drainage in Urbanized Areas, (1987)
Ref: AMC I & III Condition SCS Curve Number Values - Modern Sewer Design, Third Edition (Canadian), pg. 69, Table 3.6, (1996)

NOTES:
- **AMC II Condition** SCS Curve Number values are not applicable to frozen soils or to the period where snowmelt contributes to stormwater runoff.
- **STANDHYD COMMANDS** (Swmhymo) - CN values are based solely on the **pervious surfaces** within the catchment.
- **NASHYD COMMANDS** (Swmhymo) - CN values are based on both the **pervious and impervious surfaces** within the catchment (composite CN value).

<<< **Elements Requiring Input Information**

PRE-DEVELOPMENT CONDITION - PRE1

Area per Land Cover Type and Hydrologic Soil Group

	Hydrologic Soil Groups							(for Nashyd Command)	
Land Cover	**A**	**AB**	**B**	**BC**	**C**	**CD**	**D**	**Total Area (ha) =**	29.80
Wetlands/Lakes/SWMF's									
Woods	11.77							**CN(I) =**	31
Meadows								**CN(II) =**	50
Pasture/Lawn								**CN(III) =**	70
Cultivated	17.98								
Impervious Areas	0.05							**IA (mm) =**	8.2

PRE-DEVELOPMENT CONDITION - PRE2

Area per Land Cover Type and Hydrologic Soil Group

	Hydrologic Soil Groups							(for Nashyd Command)	
Land Cover	**A**	**AB**	**B**	**BC**	**C**	**CD**	**D**	**Total Area (ha) =**	7.30
Wetlands/Lakes/SWMF's									
Woods	0.74							**CN(I) =**	39
Meadows								**CN(II) =**	59
Pasture/Lawn								**CN(III) =**	77
Cultivated	6.56								
Impervious Areas								**IA (mm) =**	7.3

POST-DEVELOPMENT CONDITION - POST1A

Area per Land Cover Type and Hydrologic Soil Group

	Hydrologic Soil Groups							(for Standhyd Command)	
Land Cover	**A**	**AB**	**B**	**BC**	**C**	**CD**	**D**	**Pervious Area (ha) =**	3.20
Wetlands/Lakes/SWMF's									
Woods								**CN(I) =**	30
Meadows								**CN(II) =**	49
Pasture/Lawn	3.2							**CN(III) =**	69
Cultivated									
Impervious Areas								**IA (mm) =**	5.0

POST-DEVELOPMENT CONDITION - POST1B

Area per Land Cover Type and Hydrologic Soil Group

	Hydrologic Soil Groups							(for Standhyd Command)	
Land Cover	**A**	**AB**	**B**	**BC**	**C**	**CD**	**D**	**Pervious Area (ha) =**	2.35
Wetlands/Lakes/SWMF's									
Woods								**CN(I) =**	30
Meadows								**CN(II) =**	49
Pasture/Lawn	2.35							**CN(III) =**	69
Cultivated									
Impervious Areas								**IA (mm) =**	5.0

POST-DEVELOPMENT CONDITION - POST2A

Area per Land Cover Type and Hydrologic Soil Group

	Hydrologic Soil Groups							(for Standhyd Command)	
Land Cover	**A**	**AB**	**B**	**BC**	**C**	**CD**	**D**	**Pervious Area (ha) =**	1.40
Wetlands/Lakes/SWMF's									
Woods								**CN(I) =**	30
Meadows								**CN(II) =**	49
Pasture/Lawn	1.40							**CN(III) =**	69
Cultivated									
Impervious Areas								**IA (mm) =**	5.0

POST-DEVELOPMENT CONDITION - POST2B

Area per Land Cover Type and Hydrologic Soil Group

	Hydrologic Soil Groups							(for Standhyd Command)	
Land Cover	**A**	**AB**	**B**	**BC**	**C**	**CD**	**D**	**Pervious Area (ha) =**	0.22
Wetlands/Lakes/SWMF's									
Woods								**CN(I) =**	30
Meadows								**CN(II) =**	49
Pasture/Lawn	0.22							**CN(III) =**	69
Cultivated									
Impervious Areas								**IA (mm) =**	5.0

C:\Users\BDANIELS\Desktop\COVID-19\1_Projects\19-540\Design\Storm\FSR_1\[1.1_210121_CN___IA_CALCS.xlsx]CN & IA CALCS

WMI & Associates Limited
119 Collier Street, Barrie, Ontario L4M 1H5
p (705) 797-2027 f (705) 797-2028

TIME OF CONCENTRATION & TIME TO PEAK CALCULATIONS
T_C & T_P SPREADSHEET

Date: 2021-01-22 **Project No.:** 19-540

Project: 140 Lockhart Road **Prepared By:** BD

OVERLAND SHEET FLOW TIME OF CONCENTRATION (T_C) CALCULATION, $T_{C, OVER}$

The Runoff Coefficient 'C' governs which Time of Concentration Formula is used: C > 0.40 Bransby Williams Formula
C <= 0.40 Airport Formula (FAA Equation)
Ref: MTO, Drainage Management Manual, pg 28, Ch. 8, 1997

<<< Elements Requiring Input Information

Catchment I.D.	Area (ha)	h_1 (m)	h_2 (m)	Length (m)	Runoff Coefficient	h_{DELTA} (m)	Slope (%)
PRE1	29.8	288.5	275.5	533	0.17	13.0	2.4
PRE2	7.3	284.5	274.5	237	0.21	10.0	4.2

$T_{C, OVER}$ (min.)	
Airport Formula	Bransby Williams Formula
52.4	
27.8	

Airport Formula (FAA Equation)

$$T_{C, OVER} = \frac{3.26\,(1.1-C)\,(L)^{0.5}}{(S)^{0.33}} \quad \text{(min.)}$$

where, C = Runoff Coefficient
L = Length of Overland Flow Path, (m)
S = Avg. Slope of Overland Flow Path, (%)

Bransby Williams Formula

$$T_{C, OVER} = \frac{0.057\,(L)}{(S)^{0.2}\,(A)^{0.1}} \quad \text{(min.)}$$

where, L = Length of Overland Flow Path, (m)
S = Avg. Slope of Overland Flow Path, (%)
A = Catchment Area, (ha)

CHANNELIZED FLOW TIME OF CONCENTRATION (T_C) CALCULATION, $T_{C, CHAN}$

Refer to separate sheet attached for the calculation of the Velocity values (i.e. Flow Master Output, Manning's Channel Spreadsheet, etc.).

Catchment I.D.	Length (m)	Velocity (m/s)

$T_{C, CHAN}$ (min.)

$$T_{C, CHAN} = \frac{L}{V} \quad \text{(min.)}$$

where, L = Length of Channel, (m)
V = Flow Velocity in Channel, (m/s)

PIPED FLOW TIME OF CONCENTRATION (T_C) CALCULATION, $T_{C, PIPE}$

Refer to separate sheet attached for the calculation of the Velocity values (i.e. Culvert Master Output, Manning's Pipe Spreadsheet, etc.).

Catchment I.D.	Length (m)	Velocity (m/s)

$T_{C, PIPE}$ (min.)

$$T_{C, PIPE} = \frac{L}{V} \quad \text{(min.)}$$

where, L = Length of Pipe, (m)
V = Flow Velocity in Pipe, (m/s)

TOTAL TIME OF CONCENTRATION (T_C) AND TIME TO PEAK (T_P) CALCULATION, $T_{C, TOTAL}$, $T_{P, TOTAL}$

The Total Time of Concentration and Time to Peak values consist of a combination of the Overland, Channel and/or Pipe travel times.

Catchment I.D.	$T_{C, OVER}$ (min.)	$T_{C, CHAN}$ (min.)	$T_{C, PIPE}$ (min.)
PRE1	52.4		
PRE2	27.8		

$T_{C, TOTAL}$ (min.)	$T_{P, TOTAL}$ (min.)	$T_{P, TOTAL}$ (hr.)
52.4	**35.1**	**0.59**
27.8	**18.6**	**0.31**

$$T_{C, TOTAL} = T_{C, OVER} + T_{C, CHAN} + T_{C, PIPE} \quad \text{(min.)}$$

$$T_{P, TOTAL} = 0.67 \times T_{C, TOTAL} \quad \text{(min.)}$$

WMI & Associates Limited
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Storm Sewer Design Sheet
140 Lockhart

<<< Elements Requiring Input Information

Rational Method Calculation:

$Q = 2.78*(C_F*C*I*A)$

where,

Q = peak flow rate (L/s)

C_F = runoff coefficient factor for storms **> 10-yr** (C_F = 1.0 for the 2, 5 & 10-yr storm events and C_F = 1.1, 1.2 & 1.25 for the 25, 50 & 100-yr storm events respectively)

C = runoff coefficient

I = rainfall intensity (mm/hr)

A = area (ha)

Manning's Formula Calculation:

$V = (k*R^{2/3}*S^{1/2}) / n$ $Q = V*A$

MOE Velocity Requirements: 0.8m/s - 6.0m/s

where,

V = mean velocity (m/s)

k = 1.0 for SI units

R = hydraulic radius (m)

S = friction slope (m/m)

n = Mannings Coefficient **0.013**

Rainfall Intensity Calculation:

$I = \frac{A}{(T+B)^C}$

where,

I = Rainfall Intensity (mm/hr)

T = Time of Concentration (min.)

A = Rainfall IDF Coefficient

B = Rainfall IDF Coefficient

C = Rainfall IDF Coefficient

Rainfall IDF Data: **Barrie WPCC** 1979-2003 adjusted for climate change

	5-year	100-year
A =	853.608	1426.408
B =	4.699	5.273
C =	0.766	0.759
Runoff Coeff. Factors, C_F =	1.00	1.25

Date: 26-Jan-21
Project No: 19-540
Prepared by: AW

Location			Runoff Calculation Data										Sewer Calculation Data							Sewer Profile Data					
Street	Upstream MH	Downstream MH	Drainage Areas (ha) C = 0.05	C = 0.19	C = 0.75	C = 0.80	Individual 2.78CA	Accumulated 2.78CA	Time of Concentration (mins)	Storm Event	Rainfall Intensity (mm/hr)	Peak Runoff Flow (L/s)	Diameter (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Pipe Flow Time (mins)	Pipe Storage Volume (m^3)	Fall in Sewer (m)	Drop in MH (m) DS	Top of Grate Elevation (m) US	Top of Grate Elevation (m) DS	Invert Elevation (m) US	Invert Elevation (m) DS
	MH 23	MH 22			1.75		3.65	3.65	10.00	5-year	108.92	397.43	525	1.0	101.60	448.66	2.01	0.84	22.7	1.02	0.05	282.39	281.85	280.37	279.35
	MH 22	MH 21			0.85		1.77	5.42	10.84	5-year	104.37	565.76	525	2.1	29.70	650.17	2.91	0.17	6.6	0.62	0.05	281.85	281.33	279.30	278.68
	MH 21	MH 20			0.43		0.90	6.32	11.01	5-year	103.50	653.86	600	1.4	95.10	760.62	2.61	0.61	27.8	1.34	0.05	281.33	279.54	278.63	277.29
	MH 20	MH 19			0.57		1.19	7.51	11.62	5-year	100.53	754.59	675	0.8	45.90	784.35	2.12	0.36	17.0	0.37	0.05	279.54	279.16	277.24	276.87
	MH 19	MH 18			0.91		1.90	9.40	11.98	5-year	98.86	929.65	750	0.8	66.70	1038.80	2.28	0.49	30.4	0.53	0.05	279.16	278.47	276.82	276.29
	MH 18	MH 17			0.41		0.85	10.26	12.47	5-year	96.70	992.01	750	0.8	51.70	1038.80	2.28	0.38	23.6	0.41	0.05	278.47	277.91	276.24	275.83
	MH 17	MH 16			0.23		0.48	10.74	12.85	5-year	95.10	1021.19	750	0.9	56.60	1101.81	2.42	0.39	25.8	0.51	0.05	277.91	277.55	275.78	275.27
	MH 16	HW 3			0.00		0.00	10.74	13.24	5-year	93.51	1004.12	750	1.0	12.10	1161.41	2.55	0.08	5.5	0.12		277.55	277.00	275.22	275.10
	MH 15	MH 14			1.06		2.21	2.21	10.00	5-year	108.92	240.73	450	1.0	66.60	297.43	1.81	0.61	10.9	0.67	0.05	282.38	282.04	280.58	279.91
	MH 14	MH 13			0.44		0.92	3.13	10.61	5-year	105.57	330.16	525	1.0	39.00	448.66	2.01	0.32	8.7	0.39	0.05	282.04	281.87	279.86	279.47
	MH 13	MH 12			0.78		1.63	4.75	10.94	5-year	103.89	493.87	600	1.1	27.10	671.82	2.30	0.20	7.9	0.30	0.05	281.87	281.45	279.42	279.12
	MH 12	MH 11			1.45		3.02	7.78	11.13	5-year	102.90	800.27	675	1.1	40.60	919.74	2.49	0.27	15.0	0.45	0.05	281.45	280.80	279.07	278.62
	MH 11	MH 10			1.55		3.23	11.01	11.40	5-year	101.57	1118.15	750	1.1	99.90	1218.10	2.67	0.62	45.6	1.10	0.05	280.80	279.88	278.57	277.47
	MH 10	MH 6			0.81		1.69	12.70	12.03	5-year	98.66	1252.70	750	1.4	64.60	1374.20	3.01	0.36	29.5	0.90	0.10	279.88	279.03	277.42	276.52
	MH 9	MH 8			0.78		1.63	1.63	10.00	5-year	108.92	177.14	450	0.5	95.80	210.32	1.28	1.25	15.7	0.48	0.10	280.00	279.66	278.05	277.57
	MH 8	MH 7			1.65		3.44	5.07	11.25	5-year	102.34	518.51	675	0.5	60.70	620.09	1.68	0.60	22.4	0.30	0.05	279.66	279.33	277.47	277.17
	MH 7	MH 6			0.56		1.17	6.23	11.85	5-year	99.47	620.12	750	0.5	45.50	821.24	1.80	0.42	20.7	0.23	0.47	279.33	279.03	277.12	276.89
	MH 6	MH 5			0.31		0.65	19.58	12.39	5-year	97.07	1900.49	1050	0.5	60.00	2014.40	2.25	0.44	53.6	0.30	0.05	279.03	278.78	276.42	276.12
	MH 5	MH 4			0.15		0.31	19.89	12.83	5-year	95.18	1893.29	1050	0.5	58.90	2014.40	2.25	0.44	52.6	0.29	0.05	278.78	278.53	276.07	275.78
	MH 4	MH 3			1.39		2.90	22.79	13.26	5-year	93.41	2128.75	1050	0.7	42.60	2383.47	2.67	0.27	38.1	0.30	0.05	278.53	278.30	275.73	275.43
	MH 3	MH 2			0.13		0.27	23.06	13.53	5-year	92.36	2129.92	1050	0.7	98.80	2383.47	2.67	0.62	88.3	0.69	0.73	278.30	277.82	275.38	274.69
	MH 33	MH 2			1.06		2.21	2.21	10.00	5-year	108.92	240.73	375	3.2	53.90	325.15	2.85	0.31	6.1	1.70	0.90	278.36	277.82	276.56	274.86
	MH 2	CBMH 1			0.67		1.40	26.67	14.15	5-year	90.04	2401.03	1050	2.0	10.50	4028.80	4.51	0.04	9.4	0.21	0.90	277.82	278.30	273.96	273.75
	CBMH 1	HW 1			0.18		0.38	27.04	14.19	5-year	89.90	2430.98	1050	1.0	34.60	2848.80	3.19	0.18	30.9	0.35	0.00	278.30	274.00	272.85	272.50
	CBMH 32	CBMH 31			0.23		0.48	0.48	10.00	5-year	108.92	52.23	300	0.5	72.10	71.33	0.98	1.23	5.3	0.36	0.05	277.82	277.82	276.02	275.66
	CBMH 31	CBMH 30			0.27		0.56	1.04	11.23	5-year	102.42	106.78	375	0.5	41.00	128.04	1.12	0.61	4.7	0.20	0.05	277.82	277.75	275.61	275.41
	CBMH 30	CBMH 29			0.04		0.08	1.13	11.84	5-year	99.52	112.05	375	3.3	73.00	330.25	2.90	0.42	8.3	2.38	0.06	277.75	274.85	275.36	272.98
	CBMH 29	CBMH 28			0.75		1.56	2.69	12.26	5-year	97.63	262.59	525	0.5	54.80	317.25	1.42	0.64	12.2	0.27	0.05	274.85	274.64	272.92	272.65
	CBMH 28	CBMH 27			0.22		0.46	3.15	12.90	5-year	94.88	298.73	525	0.5	85.00	314.06	1.41	1.01	19.0	0.42	0.05	274.64	274.64	272.60	272.18
	CBMH 27	CBMH 24			0.80		1.67	4.82	13.91	5-year	90.92	437.91	600	0.5	61.90	452.94	1.55	0.66	18.1	0.31	0.05	274.64	274.60	272.13	271.82
	CBMH 26	CBMH 25			0.13		0.27	0.27	10.00	5-year	108.92	29.52	300	1.0	45.00	100.88	1.38	0.54	3.3	0.45	0.05	274.64	274.64	272.60	272.15
	CBMH 25	CBMH 24			0.08		0.17	0.44	10.54	5-year	105.94	46.39	300	1.0	27.50	100.88	1.38	0.33	2.0	0.28	0.05	274.64	274.60	272.10	271.82
	CBMH 24	HW 4			0.03		0.06	5.32	14.57	5-year	88.51	470.59	600	1.0	80.00	640.56	2.19	0.61	23.3	0.80	0.05	274.60	272.00	271.77	270.97
	Sum of Drainage Areas (ha):		0.00	0.00	20.67	0.00																			
	Total Drainage Area (ha):		20.67																						

NOTES:

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Sanitary Sewer Design Sheet
140 Lockhart

<<< Elements Requiring Input Information

Comm/Inst	Peaking Factor:				
Industrial	Peaking Factor:	**3**			
Res - SFD	Single Family Dwellings:	q:		L/cap./day	ppd =
Res - MFD	Multi-Family Dwellings:	q:		L/cap./day	ppu =

Average Daily Flow: i: **0.505** L/s/ha
(as per the City of Barrie standard industrial flows, general industrial 35m^3/day/ha (0.405L/s/ha) plus the extraneous flow of 0.1L/s/ha for a total of 0.505L/s/ha)
Mannings Coefficient
n: **0.013**

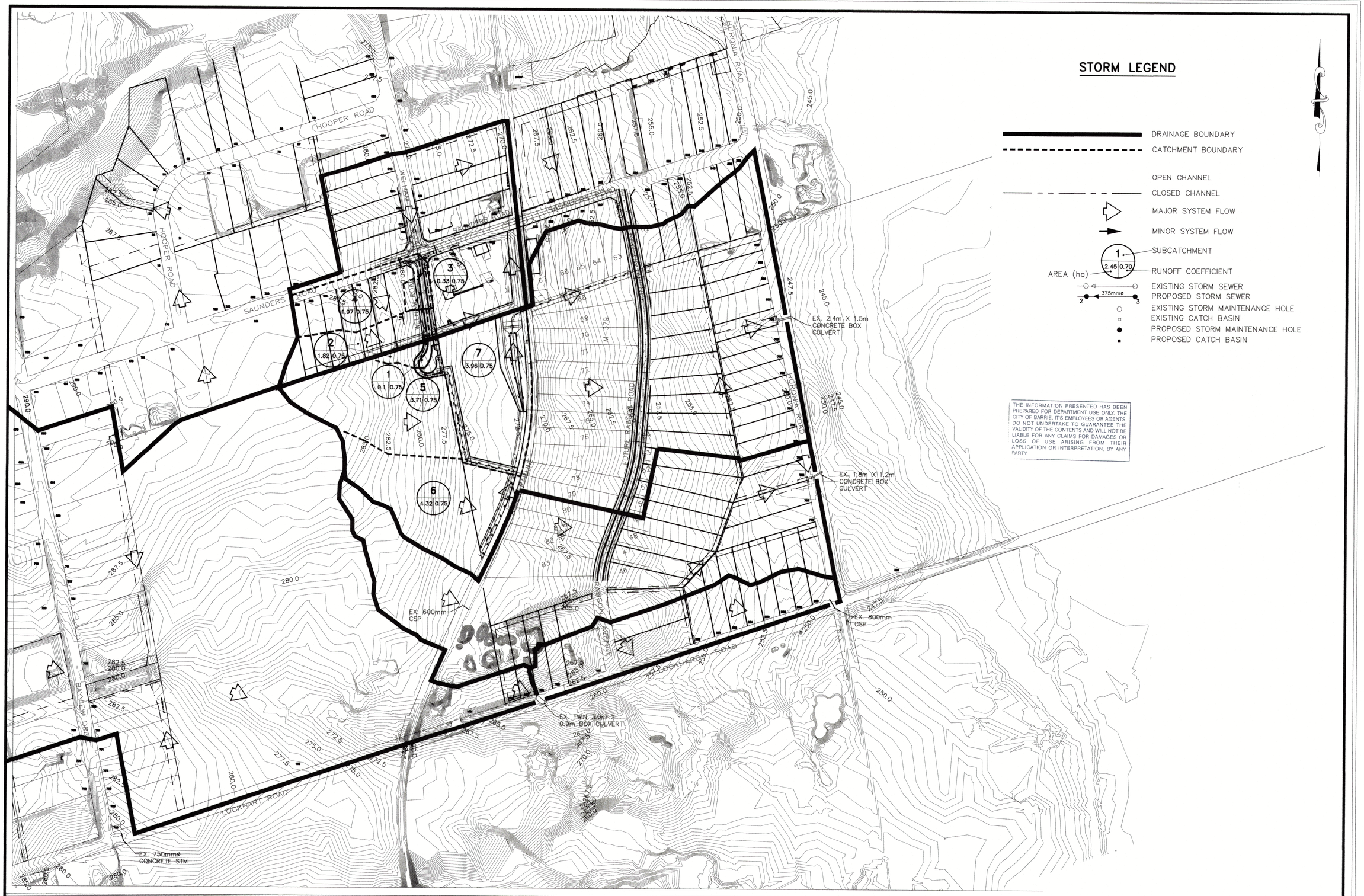
Date: 26-Jan-21
Project No: 19-540
Prepared by: AW

Location			Sewage Flow Calculation Data				Sewer Calculation Data					Sewer Profile Data					
Street	Upstream MH	Downstream MH	Sewage Flow			Total Peak Flow (L/s)	Dia. (mm)	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Fall in Sewer (m)	Drop in MH (m)	Top of Grate Elevation (m)		Invert Elevation (m)	
			Individual Area (ha)	Cumulative Area (ha)	Flow (L/s)								DS	US	DS	US	DS
	MH Q	**MH P**	**1.47**	1.47	0.74	2.23	**300**	**0.9**	**102.3**	93.55	1.28	0.88	**0.05**	**282.44**	281.76	279.64	278.76
	MH P	**MH N**	**1.34**	2.81	1.42	4.26	**300**	**2.1**	**30.9**	146.19	2.00	0.65	**0.05**	**281.76**	281.40	278.71	278.06
	MH N	**MH C**	**1.42**	4.23	2.14	6.41	**300**	**3.5**	**100.0**	188.73	2.59	3.50	**0.05**	**281.40**	279.65	278.01	274.51
	MH M	**MH L**	**2.39**	2.39	1.21	3.62	**300**	**0.5**	**110.0**	71.33	0.98	0.55	**0.05**	**282.45**	281.90	279.72	279.17
	MH L	**MH K**	**1.72**	4.11	2.08	6.23	**300**	**1.8**	**28.0**	135.35	1.85	0.50	**0.05**	**281.90**	281.52	279.12	278.62
	MH K	**MH J**	**0.70**	4.81	2.43	7.29	**300**	**1.8**	**43.2**	135.35	1.85	0.78	**0.05**	**281.52**	281.01	278.57	277.79
	MH J	**MH H**	**1.86**	6.67	3.37	10.11	**300**	**1.8**	**61.5**	135.35	1.85	1.11	**0.05**	**281.01**	280.37	277.74	276.63
	MH H	**MH G**	**1.09**	7.76	3.92	11.76	**300**	**0.5**	**110.0**	71.33	0.98	0.55	**0.05**	**280.37**	279.16	276.58	276.03
	MH S	**MH R**	**1.56**	1.56	0.79	2.36	**300**	**0.5**	**69.5**	71.33	0.98	0.35	**0.05**	**278.52**	278.87	276.72	276.37
	MH R	**MH G**	**0.27**	1.83	0.92	2.77	**300**	**0.5**	**58.6**	71.33	0.98	0.29	**0.05**	**278.87**	279.16	276.32	276.03
	MH G	**MH F**	**0.54**	10.13	5.12	15.35	**300**	**0.5**	**55.4**	71.33	0.98	0.28	**0.05**	**279.16**	279.44	275.98	275.70
	MH F	**MH E**	**1.02**	11.15	5.63	16.89	**300**	**0.5**	**80.0**	71.33	0.98	0.40	**0.05**	**279.44**	279.84	275.65	275.25
	MH E	**MH D**	**0.50**	11.65	5.88	17.65	**300**	**0.5**	**58.9**	71.33	0.98	0.29	**0.05**	**279.84**	280.05	275.20	274.91
	MH D	**MH C**	**0.60**	12.25	6.19	18.56	**300**	**0.5**	**69.9**	71.33	0.98	0.35	**0.05**	**280.05**	279.65	274.86	274.51
	PS	**MH C**	**9.55**	9.55	4.82	14.47	**300**	**2.1**	**101.0**	146.89	2.01	2.14	**0.05**	**279.65**	**274.87**	274.51	**272.37**
	MH C	**MH B**	**0.13**	26.16	13.21	39.63	**300**	**0.5**	**44.7**	71.33	0.98	0.22	**0.05**	**279.65**	279.22	274.46	274.24
	MH B	**MH A**	**0.14**	26.30	13.28	39.85	**300**	**0.5**	**62.9**	71.33	0.98	0.31	**0.05**	**279.22**	278.58	274.19	273.88
	MH A	**EX. MH**	**0.80**	27.10	13.69	41.06	**300**	**0.5**	**110.0**	71.33	0.98	0.55		**278.58**	**277.40**	273.83	**273.28**
	MH W	**MH V**	**1.24**	1.24	0.63	1.88	**300**	**0.5**	**56.3**	71.33	0.98	0.28	**0.05**	**277.91**	278.67	276.11	275.83
	MH V	**MH U**	**0.19**	1.43	0.72	2.17	**300**	**0.5**	**70.0**	71.33	0.98	0.35	**0.05**	**278.67**	279.58	275.78	275.43
	MH U	**MH T**	**0.05**	1.48	0.75	2.24	**300**	**0.5**	**19.8**	71.33	0.98	0.10		**279.58**	**279.40**	275.38	**275.28**
			28.58														

NOTES: -The average daily sewage design flow rate has been calculated based on the City of Barrie standard "Sanitary Sewage Collection System Policies and Design Guideline" under section "3.3.3 Industrial flows" general industrial use = 35m^3/day/ha. This flow converted to L/s/ha equals 0.405L/s/ha.
-The total daily design flow rate was then added to the extraneous flow rate of 0.1L/s/ha (this flow rate was taken from the City of Barrie standard "Sanitary Sewage Collection System Policies and Design Guideline" under section 3.3.4). Therefore, the sanitary sewer average design flow rate for the site equals 0.505L/s/ha.
- Under City of Barrie's Zoning By-law 2009-141 South Section map 140 Lockhart is zoned as "General Industrial".

APPENDIX C

CITY OF BARRIE
PLAN & PROFILES
& DRAINAGE PLAN



GENERAL NOTES

REFER TO CURRENT CITY OF BARRIE STANDARDS FOR OTHER APPLICABLE GENERAL NOTES.

BENCH MARKS

MONUMENT # 001713846

267.500 – THE HORIZONTAL MONUMENT IS LOCATED ON THE NORTH SIDE OF MAPLEVIEW DRIVE EAST AND EAST OF THE A.C.D.C RAILWAY, SOUTH WEST OF HURONIA ROAD.

BEARINGS ARE UTM GRID BEARINGS AND ARE REFERRED TO THE CENTRAL MERIDIAN IN ZONE 17 (NAD83) AND ARE DERIVED FROM OBSERVATIONS ON MNR CONTROL MONUMENTS 001713846 (N=4910455.748, E=606268.293) AND 010860409 (N=4909702.055, E=606333.848).

DISTANCES SHOWN HEREON ARE GROUND DISTANCES AND CAN BE CONVERTED TO GRID DISTANCES BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 0.9997026.

NO.	REVISIONS	DATE	APPROVED

CITY OF BARRIE
APPROVED
DATE. Aug. 4/05.
R. W. McAlpine, P.Eng.
DIRECTOR OF ENGINEERING

LICENSED PROFESSIONAL ENGINEER
L.H. BORGDORFF
100199/05
PROVINCE OF ONTARIO

WELHAM ROAD CONSTRUCTION
(SAUNDERS ROAD TO 200m SOUTHERLY)

STORM DRAINAGE PLAN

CITY OF BARRIE INCORPORATED 1853

CITY of BARRIE
ENGINEERING DEPARTMENT

SCALE HOR.	1:3000	VERT.	— — —	DRAWING NO.	2005-27
DESIGN	MDN	DRAWN	MDN	SHEET NO.	STM1
REVIEWED	LHB	DATE	05/20/05		

2005-027-003

APPENDIX D

HYDROLOGIC MODELING (SWMHYMO)

- **Pre-Development Condition**
- **Post-Development Condition**

SENSITIVITY ANALYSIS COMPARISON CHARTS
THEORETICAL

24HR SCS PRE DEVELOPMENT

STORM	PRE1A	PRE1B	PRE1	PRE2
	Pro-rated	Pro-rated	TOTAL	TOTAL
	cms	cms	cms	cms
2	0.114	0.081	0.231	0.128
5	0.230	0.165	0.467	0.248
25	0.461	0.329	0.934	0.478
100	0.693	0.495	1.404	0.703

24HR SCS POST DEVELOPMENT

STORM	POST1A	SWM1A	Volume A	POST1B	SWM1B	Volume B	POST1AB	POST2AB
	Unctrl.	Cntrl.		Unctrl.	Cntrl.		TOTAL	TOTAL
	cms	cms	cu.m	cms	cms	cu.m	cms	cms
2	1.692	0.114	3865	1.209	0.081	2764	0.195	0.841
5	2.443	0.230	5243	1.745	0.165	3746	0.395	1.213
25	3.601	0.461	7257	2.572	0.329	5187	0.790	1.789
100	4.640	0.693	8885	3.315	0.495	6350	1.187	2.305

12HR SCS PRE DEVELOPMENT

STORM	PRE1A	PRE1B	PRE1	PRE2
	Pro-rated	Pro-rated	TOTAL	TOTAL
	cms	cms	cms	cms
2	0.095	0.068	0.192	0.107
5	0.195	0.140	0.396	0.213
25	0.398	0.284	0.806	0.418
100	0.603	0.431	1.222	0.620

12HR SCS POST DEVELOPMENT

STORM	POST1A	SWM1A	Volume A	POST1B	SWM1B	Volume B	POST1AB	POST2AB
	Unctrl.	Cntrl.		Unctrl.	Cntrl.		TOTAL	TOTAL
	cms	cms	cu.m	cms	cms	cu.m	cms	cms
2	1.713	0.095	3786	1.223	0.068	2703	0.162	0.851
5	2.459	0.195	5106	1.757	0.140	3645	0.335	1.221
25	3.609	0.398	7067	2.578	0.284	5047	0.682	1.792
100	4.634	0.603	8656	3.310	0.431	6182	1.033	2.301

6HR SCS PRE DEVELOPMENT

STORM	PRE1A	PRE1B	PRE1	PRE2
	Pro-rated	Pro-rated	TOTAL	TOTAL
	cms	cms	cms	cms
2	0.088	0.063	0.178	0.099
5	0.193	0.138	0.391	0.211
25	0.409	0.292	0.829	0.432
100	0.633	0.452	1.283	0.654

6HR SCS POST DEVELOPMENT

STORM	POST1A	SWM1A	Volume A	POST1B	SWM1B	Volume B	POST1AB	POST2AB
	Unctrl.	Cntrl.		Unctrl.	Cntrl.		TOTAL	TOTAL
	cms	cms	cu.m	cms	cms	cu.m	cms	cms
2	1.849	0.088	3831	1.321	0.063	2735	0.151	0.918
5	2.711	0.193	5224	1.937	0.138	3730	0.331	1.347
25	4.067	0.409	7281	2.905	0.292	5201	0.701	2.020
100	5.209	0.633	8982	3.721	0.452	6415	1.085	2.587

4HR CHI PRE DEVELOPMENT

STORM	PRE1A	PRE1B	PRE1	PRE2
	Pro-rated	Pro-rated	TOTAL	TOTAL
	cms	cms	cms	cms
2	0.058	0.041	0.117	0.063
5	0.121	0.086	0.245	0.127
25	0.255	0.182	0.517	0.261
100	0.391	0.279	0.793	0.394

4HR CHI POST DEVELOPMENT

STORM	POST1A	SWM1A	Volume A	POST1B	SWM1B	Volume B	POST1AB	POST2AB
	Unctrl.	Cntrl.		Unctrl.	Cntrl.		TOTAL	TOTAL
	cms	cms	cu.m	cms	cms	cu.m	cms	cms
2	2.027	0.058	3567	1.448	0.041	2552	0.099	1.007
5	2.760	0.121	4721	1.971	0.086	3377	0.207	1.371
25	3.976	0.255	6287	2.840	0.182	4493	0.437	1.975
100	4.957	0.391	7496	3.541	0.279	5356	0.671	2.462

Pre-Development Condition
24-hour SCS Type-II Storm Distribution

```
2     Metric units
*#*********************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*********************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*********************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
*% 2-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                   ["2Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
READ STORM          STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
* PRE1
CALIB NASHYD        ID=[1], NHYD=["PRE1"], DT=[1]min, AREA=[29.8](ha),
                    DWF=[0](cms),  CN/C=[50], IA=[8.2](mm),
                    N=[3], TP=[0.59]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
* PRE2
CALIB NASHYD        ID=[2], NHYD=["PRE2"], DT=[1]min, AREA=[7.3](ha),
                    DWF=[0](cms),  CN/C=[59], IA=[7.3](mm),
                    N=[3], TP=[0.31]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
*% 5-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*%                   ["5Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 10-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*%                   ["10Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*%                   ["25Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 50-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*%                   ["50Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 100-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*%                   ["100Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% Hurricane Hazel Regional Storm (48-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
```



```
*%                   ["HAZEL.STM"] <--storm filename
*%-----------------|-------------------------------------------------------|
FINISH
```

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

  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   77777 ==
  S       W W W   MM MM   H   H    Y Y    MM MM   O   O           2    0   0   11   7   7
  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O           2    0   0   11       7
      S    W W    M   M   H   H     Y     M   M   O   O         222    0   0   11      7
  SSSSS     W W    M   M   H   H     Y     M   M    OOO          2      0   0   11     7   ==
                                                                 2      0   0   11    7    #
        StormWater Management HYdrologic Model                   222     000    11    7    ==

  ******************************************************************************************
  ************************************** SWMHYMO Ver4.05.0 ******************************
  ******************* A single event and continuous hydrologic simulation model ************
  *******************     based on the principles of HYMO and its successors      ************
  *******************                 OTTHYMO-83 and OTTHYMO-89.                  ************
  ******************************************************************************************
  ****************** Distributed by:  J.F. Sabourin and Associates Inc.           ************
  *******************                 Ottawa,  Ontario: (613) 836-3884            ************
  *******************                 Gatineau, Quebec: (819) 243-6858            ************
  *******************                 E-Mail: swmhymo@jfsa.com                    ************
  ******************************************************************************************

  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  ++++++++++++++++++ Licensed user: WMI & Associates Ltd.                      +++++++++++
  ++++++++++++++++++                Barrie                SERIAL#:2880720       +++++++++++
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

  ******************************************************************************************
  *******************          ++++++ PROGRAM ARRAY DIMENSIONS ++++++            ************
  *******************          Maximum value for ID numbers  :     11            ************
  *******************          Max. number of rainfall points: 105408            ************
  *******************          Max. number of flow points    : 105408            ************
  ******************************************************************************************


  ******************************   D E T A I L E D   O U T P U T   ************************
  ******************************************************************************************
  *                 RUN DATE: 2021-01-21     TIME: 15:54:57     RUN COUNTER: 000004
  ******************************************************************************************
  * Input   file: C:\Temp\19-540\EX\24-hour_SCS\2-CYRSCS.dat
  * Output  file: C:\Temp\19-540\EX\24-hour_SCS\2-CYRSCS.out
  * Summary file: C:\Temp\19-540\EX\24-hour_SCS\2-CYRSCS.sum
  * User comments:
  * 1:_____________________________________________________________________________________
  * 2:_____________________________________________________________________________________
  * 3:_____________________________________________________________________________________
  ******************************************************************************************

-----------------------------------------------------------------------------------------
R0001:C00001-----------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
```



```
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0001
    NSTORM=   1
           #  1=2Y24H.stm
-----------------------------------------------------------------------------------------
R0001:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\24-hour_SCS\2Y24H.stm
| Ptotal=  55.00 mm|  Comments: 2yr/24hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15    .550|   4:15    .880|   8:15   1.480|  12:15   7.920|  16:15    .990|  20:15
      0:30    .550|   4:30    .880|   8:30   1.480|  12:30   7.920|  16:30    .990|  20:30
      0:45    .550|   4:45    .880|   8:45   1.480|  12:45   4.070|  16:45    .990|  20:45
      1:00    .550|   5:00    .880|   9:00   1.480|  13:00   4.070|  17:00    .990|  21:00
      1:15    .550|   5:15    .880|   9:15   1.760|  13:15    .770|  17:15    .990|  21:15
      1:30    .550|   5:30    .880|   9:30   1.760|  13:30    .770|  17:30    .990|  21:30
      1:45    .550|   5:45    .880|   9:45   1.980|  13:45   4.510|  17:45    .990|  21:45
      2:00    .990|   6:00    .880|  10:00   1.980|  14:00   4.510|  18:00    .990|  22:00
      2:15    .720|   6:15   1.100|  10:15   2.530|  14:15   1.650|  18:15    .990|  22:15
      2:30    .720|   6:30   1.100|  10:30   2.530|  14:30   1.650|  18:30    .990|  22:30
      2:45    .720|   6:45   1.100|  10:45   3.410|  14:45   1.650|  18:45    .990|  22:45
      3:00    .720|   7:00   1.100|  11:00   3.410|  15:00   1.650|  19:00    .990|  23:00
      3:15    .720|   7:15   1.100|  11:15   5.280|  15:15   1.650|  19:15    .990|  23:15
      3:30    .720|   7:30   1.100|  11:30   5.280|  15:30   1.650|  19:30    .990|  23:30
      3:45    .720|   7:45   1.100|  11:45  22.880|  15:45   1.650|  19:45    .990|  23:45
      4:00    .720|   8:00   1.100|  12:00  60.720|  16:00   1.650|  20:00    .990|  24:00

-----------------------------------------------------------------------------------------
R0001:C00003-----------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=     .231 (i)
```

```
     TIME TO PEAK    (hrs)=   12.583
     DURATION        (hrs)=   27.867, (dddd|hh:mm:)=   1|03:52
     AVERAGE FLOW    (cms)=     .022
     RUNOFF VOLUME    (mm)=    7.283
     TOTAL RAINFALL   (mm)=   55.004
     RUNOFF COEFFICIENT   =     .132

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

--------------------------------------------------------------------------------
R0001:C00004----------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .128 (i)
     TIME TO PEAK    (hrs)=   12.217
     DURATION        (hrs)=   26.150, (dddd|hh:mm:)=   1|02:09
     AVERAGE FLOW    (cms)=     .008
     RUNOFF VOLUME    (mm)=   10.150
     TOTAL RAINFALL   (mm)=   55.004
     RUNOFF COEFFICIENT   =     .185

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

--------------------------------------------------------------------------------
R0001:C00005----------------------------------------------------------------------
  ** END OF RUN :    0

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0002
    NSTORM=   1
           #  1=5Y24H.stm
--------------------------------------------------------------------------------
R0002:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
```



```
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0002:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\24-hour_SCS\5Y24H.stm
| Ptotal=  76.01 mm|  Comments: 5yr/24hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15    .760|   4:15   1.220|   8:15   2.050|  12:15  10.940|  16:15   1.370|  20:15
      0:30    .760|   4:30   1.220|   8:30   2.050|  12:30  10.940|  16:30   1.370|  20:30
      0:45    .760|   4:45   1.220|   8:45   2.050|  12:45   5.620|  16:45   1.370|  20:45
      1:00    .760|   5:00   1.220|   9:00   2.050|  13:00   5.620|  17:00   1.370|  21:00
      1:15    .760|   5:15   1.220|   9:15   2.430|  13:15   1.060|  17:15   1.370|  21:15
      1:30    .760|   5:30   1.220|   9:30   2.430|  13:30   1.060|  17:30   1.370|  21:30
      1:45    .760|   5:45   1.220|   9:45   2.740|  13:45   6.230|  17:45   1.370|  21:45
      2:00   1.370|   6:00   1.220|  10:00   2.740|  14:00   6.230|  18:00   1.370|  22:00
      2:15    .990|   6:15   1.520|  10:15   3.500|  14:15   2.280|  18:15   1.370|  22:15
      2:30    .990|   6:30   1.520|  10:30   3.500|  14:30   2.280|  18:30   1.370|  22:30
      2:45    .990|   6:45   1.520|  10:45   4.710|  14:45   2.280|  18:45   1.370|  22:45
      3:00    .990|   7:00   1.520|  11:00   4.710|  15:00   2.280|  19:00   1.370|  23:00
      3:15    .990|   7:15   1.520|  11:15   7.300|  15:15   2.280|  19:15   1.370|  23:15
      3:30    .990|   7:30   1.520|  11:30   7.300|  15:30   2.280|  19:30   1.370|  23:30
      3:45    .990|   7:45   1.520|  11:45  31.620|  15:45   2.280|  19:45   1.370|  23:45
      4:00    .990|   8:00   1.520|  12:00  83.900|  16:00   2.280|  20:00   1.370|  24:00

--------------------------------------------------------------------------------
R0002:C00003----------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=     .467 (i)
     TIME TO PEAK    (hrs)=   12.550
     DURATION        (hrs)=   27.867, (dddd|hh:mm:)=   1|03:52
     AVERAGE FLOW    (cms)=     .042
     RUNOFF VOLUME    (mm)=   14.287
     TOTAL RAINFALL   (mm)=   76.006
     RUNOFF COEFFICIENT   =     .188

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

```
---------------------------------------------------------------------------------------
R0002:C00004-----------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .248 (i)
     TIME TO PEAK    (hrs)=   12.217
     DURATION        (hrs)=   26.150, (dddd|hh:mm:)=   1|02:09
     AVERAGE FLOW    (cms)=     .015
     RUNOFF VOLUME    (mm)=   19.251
     TOTAL RAINFALL   (mm)=   76.006
     RUNOFF COEFFICIENT   =     .253

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

---------------------------------------------------------------------------------------
R0002:C00005-----------------------------------------------------------------------------
---------------------------------------------------------------------------------------
R0002:C00002-----------------------------------------------------------------------------
  ** END OF RUN :    1

***************************************************************************************
```

```
--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0003
    NSTORM=   1
           #  1=10Y24H.stm
---------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
*#*************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
```



```
*
---------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\24-hour_SCS\10Y24H.stm
| Ptotal=  89.94 mm|  Comments: 10yr/24hr Barrie Wpcc +15% SCS
--------------------
```

TIME hh:mm	RAIN mm/hr	TIME hh:mm	RAIN mm/hr	TIME hh:mm	RAIN mm/hr	TIME hh:mm	RAIN mm/hr	TIME hh:mm	RAIN mm/hr	TIME hh:mm
0:15	.900	4:15	1.440	8:15	2.430	12:15	12.950	16:15	1.620	20:15
0:30	.900	4:30	1.440	8:30	2.430	12:30	12.950	16:30	1.620	20:30
0:45	.900	4:45	1.440	8:45	2.430	12:45	6.650	16:45	1.620	20:45
1:00	.900	5:00	1.440	9:00	2.430	13:00	6.650	17:00	1.620	21:00
1:15	.900	5:15	1.440	9:15	2.880	13:15	1.260	17:15	1.620	21:15
1:30	.900	5:30	1.440	9:30	2.880	13:30	1.260	17:30	1.620	21:30
1:45	.900	5:45	1.440	9:45	3.240	13:45	7.370	17:45	1.620	21:45
2:00	1.620	6:00	1.440	10:00	3.240	14:00	7.370	18:00	1.620	22:00
2:15	1.170	6:15	1.800	10:15	4.140	14:15	2.700	18:15	1.620	22:15
2:30	1.170	6:30	1.800	10:30	4.140	14:30	2.700	18:30	1.620	22:30
2:45	1.170	6:45	1.800	10:45	5.570	14:45	2.700	18:45	1.620	22:45
3:00	1.170	7:00	1.800	11:00	5.570	15:00	2.700	19:00	1.620	23:00
3:15	1.170	7:15	1.800	11:15	8.630	15:15	2.700	19:15	1.620	23:15
3:30	1.170	7:30	1.800	11:30	8.630	15:30	2.700	19:30	1.620	23:30
3:45	1.170	7:45	1.800	11:45	37.400	15:45	2.700	19:45	1.620	23:45
4:00	1.170	8:00	1.800	12:00	99.250	16:00	2.700	20:00	1.620	24:00

```
---------------------------------------------------------------------------------------
R0003:C00003-----------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=     .658 (i)
     TIME TO PEAK    (hrs)=   12.550
     DURATION        (hrs)=   27.867, (dddd|hh:mm:)=   1|03:52
     AVERAGE FLOW    (cms)=     .059
     RUNOFF VOLUME    (mm)=   19.900
     TOTAL RAINFALL   (mm)=   89.938
     RUNOFF COEFFICIENT   =     .221

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

---------------------------------------------------------------------------------------
R0003:C00004-----------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310
```

```
     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .344 (i)
     TIME TO PEAK    (hrs)=   12.200
     DURATION        (hrs)=   26.150, (dddd|hh:mm:)=   1|02:09
     AVERAGE FLOW    (cms)=     .020
     RUNOFF VOLUME    (mm)=   26.352
     TOTAL RAINFALL   (mm)=   89.938
     RUNOFF COEFFICIENT   =     .293

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

--------------------------------------------------------------------------------
R0003:C00005----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0003:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0003:C00002----------------------------------------------------------------------
  ** END OF RUN :    2

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0004
    NSTORM=   1
           #  1=25Y24H.stm
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\24-hour_SCS\25Y24H.stm
```



```
| Ptotal= 107.47 mm|  Comments: 25yr/24hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   1.080|   4:15   1.720|   8:15   2.900|  12:15  15.480|  16:15   1.930|  20:15
      0:30   1.080|   4:30   1.720|   8:30   2.900|  12:30  15.480|  16:30   1.930|  20:30
      0:45   1.080|   4:45   1.720|   8:45   2.900|  12:45   7.950|  16:45   1.930|  20:45
      1:00   1.080|   5:00   1.720|   9:00   2.900|  13:00   7.950|  17:00   1.930|  21:00
      1:15   1.080|   5:15   1.720|   9:15   3.440|  13:15   1.500|  17:15   1.930|  21:15
      1:30   1.080|   5:30   1.720|   9:30   3.440|  13:30   1.500|  17:30   1.930|  21:30
      1:45   1.080|   5:45   1.720|   9:45   3.870|  13:45   8.820|  17:45   1.930|  21:45
      2:00   1.930|   6:00   1.720|  10:00   3.870|  14:00   8.820|  18:00   1.930|  22:00
      2:15   1.400|   6:15   2.150|  10:15   4.940|  14:15   3.220|  18:15   1.930|  22:15
      2:30   1.400|   6:30   2.150|  10:30   4.940|  14:30   3.220|  18:30   1.930|  22:30
      2:45   1.400|   6:45   2.150|  10:45   6.660|  14:45   3.220|  18:45   1.930|  22:45
      3:00   1.400|   7:00   2.150|  11:00   6.660|  15:00   3.220|  19:00   1.930|  23:00
      3:15   1.400|   7:15   2.150|  11:15  10.320|  15:15   3.220|  19:15   1.930|  23:15
      3:30   1.400|   7:30   2.150|  11:30  10.320|  15:30   3.220|  19:30   1.930|  23:30
      3:45   1.400|   7:45   2.150|  11:45  44.720|  15:45   3.220|  19:45   1.930|  23:45
      4:00   1.400|   8:00   2.150|  12:00 118.680|  16:00   3.220|  20:00   1.930|  24:00

--------------------------------------------------------------------------------
R0004:C00003----------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=     .934 (i)
     TIME TO PEAK    (hrs)=   12.550
     DURATION        (hrs)=   27.867, (dddd|hh:mm:)=   1|03:52
     AVERAGE FLOW    (cms)=     .083
     RUNOFF VOLUME    (mm)=   27.896
     TOTAL RAINFALL   (mm)=  107.473
     RUNOFF COEFFICIENT   =     .260

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

--------------------------------------------------------------------------------
R0004:C00004----------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .478 (i)
     TIME TO PEAK    (hrs)=   12.200
```

```
     DURATION        (hrs)=   26.150, (dddd|hh:mm:)=   1|02:09
     AVERAGE FLOW    (cms)=     .028
     RUNOFF VOLUME    (mm)=   36.268
     TOTAL RAINFALL   (mm)=  107.473
     RUNOFF COEFFICIENT   =     .337

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

--------------------------------------------------------------------------------
R0004:C00005----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
  ** END OF RUN :    3

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0005
    NSTORM=   1
           #  1=50Y24H.stm
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\24-hour_SCS\50Y24H.stm
| Ptotal= 120.63 mm|  Comments: 50yr/24hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
```



```
      hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
       0:15   1.210|   4:15   1.930|   8:15   3.260|  12:15  17.370|  16:15   2.170|  20:15
       0:30   1.210|   4:30   1.930|   8:30   3.260|  12:30  17.370|  16:30   2.170|  20:30
       0:45   1.210|   4:45   1.930|   8:45   3.260|  12:45   8.920|  16:45   2.170|  20:45
       1:00   1.210|   5:00   1.930|   9:00   3.260|  13:00   8.920|  17:00   2.170|  21:00
       1:15   1.210|   5:15   1.930|   9:15   3.860|  13:15   1.690|  17:15   2.170|  21:15
       1:30   1.210|   5:30   1.930|   9:30   3.860|  13:30   1.690|  17:30   2.170|  21:30
       1:45   1.210|   5:45   1.930|   9:45   4.340|  13:45   9.890|  17:45   2.170|  21:45
       2:00   2.170|   6:00   1.930|  10:00   4.340|  14:00   9.890|  18:00   2.170|  22:00
       2:15   1.570|   6:15   2.410|  10:15   5.550|  14:15   3.620|  18:15   2.170|  22:15
       2:30   1.570|   6:30   2.410|  10:30   5.550|  14:30   3.620|  18:30   2.170|  22:30
       2:45   1.570|   6:45   2.410|  10:45   7.480|  14:45   3.620|  18:45   2.170|  22:45
       3:00   1.570|   7:00   2.410|  11:00   7.480|  15:00   3.620|  19:00   2.170|  23:00
       3:15   1.570|   7:15   2.410|  11:15  11.580|  15:15   3.620|  19:15   2.170|  23:15
       3:30   1.570|   7:30   2.410|  11:30  11.580|  15:30   3.620|  19:30   2.170|  23:30
       3:45   1.570|   7:45   2.410|  11:45  50.170|  15:45   3.620|  19:45   2.170|  23:45
       4:00   1.570|   8:00   2.410|  12:00 133.140|  16:00   3.620|  20:00   2.170|  24:00

--------------------------------------------------------------------------------
R0005:C00003----------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=    1.161 (i)
     TIME TO PEAK    (hrs)=   12.533
     DURATION        (hrs)=   27.867, (dddd|hh:mm:)=   1|03:52
     AVERAGE FLOW    (cms)=     .102
     RUNOFF VOLUME    (mm)=   34.494
     TOTAL RAINFALL   (mm)=  120.626
     RUNOFF COEFFICIENT   =     .286

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

--------------------------------------------------------------------------------
R0005:C00004----------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .588 (i)
     TIME TO PEAK    (hrs)=   12.200
     DURATION        (hrs)=   26.150, (dddd|hh:mm:)=   1|02:09
     AVERAGE FLOW    (cms)=     .034
     RUNOFF VOLUME    (mm)=   44.311
```

```
     TOTAL RAINFALL   (mm)=  120.626
     RUNOFF COEFFICIENT   =     .367

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

--------------------------------------------------------------------------------
R0005:C00005----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
  ** END OF RUN :    4

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0006
    NSTORM=   1
           #  1=100Y24H.stm
--------------------------------------------------------------------------------
R0006:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0006:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\24-hour_SCS\100Y24H.stm
| Ptotal= 133.60 mm|  Comments: 100yr/24hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
```



```
      0:15   1.340|   4:15   2.140|   8:15   3.610|  12:15  19.240|  16:15   2.400|  20:15
      0:30   1.340|   4:30   2.140|   8:30   3.610|  12:30  19.240|  16:30   2.400|  20:30
      0:45   1.340|   4:45   2.140|   8:45   3.610|  12:45   9.890|  16:45   2.400|  20:45
      1:00   1.340|   5:00   2.140|   9:00   3.610|  13:00   9.890|  17:00   2.400|  21:00
      1:15   1.340|   5:15   2.140|   9:15   4.280|  13:15   1.870|  17:15   2.400|  21:15
      1:30   1.340|   5:30   2.140|   9:30   4.280|  13:30   1.870|  17:30   2.400|  21:30
      1:45   1.340|   5:45   2.140|   9:45   4.810|  13:45  10.960|  17:45   2.400|  21:45
      2:00   2.400|   6:00   2.140|  10:00   4.810|  14:00  10.960|  18:00   2.400|  22:00
      2:15   1.740|   6:15   2.670|  10:15   6.150|  14:15   4.010|  18:15   2.400|  22:15
      2:30   1.740|   6:30   2.670|  10:30   6.150|  14:30   4.010|  18:30   2.400|  22:30
      2:45   1.740|   6:45   2.670|  10:45   8.280|  14:45   4.010|  18:45   2.400|  22:45
      3:00   1.740|   7:00   2.670|  11:00   8.280|  15:00   4.010|  19:00   2.400|  23:00
      3:15   1.740|   7:15   2.670|  11:15  12.830|  15:15   4.010|  19:15   2.400|  23:15
      3:30   1.740|   7:30   2.670|  11:30  12.830|  15:30   4.010|  19:30   2.400|  23:30
      3:45   1.740|   7:45   2.670|  11:45  55.580|  15:45   4.010|  19:45   2.400|  23:45
      4:00   1.740|   8:00   2.670|  12:00 147.490|  16:00   4.010|  20:00   2.400|  24:00

--------------------------------------------------------------------------------
R0006:C00003----------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=    1.404 (i)
     TIME TO PEAK    (hrs)=   12.533
     DURATION        (hrs)=   27.867, (dddd|hh:mm:)=   1|03:52
     AVERAGE FLOW    (cms)=     .123
     RUNOFF VOLUME    (mm)=   41.447
     TOTAL RAINFALL   (mm)=  133.599
     RUNOFF COEFFICIENT   =     .310

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

--------------------------------------------------------------------------------
R0006:C00004----------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .703 (i)
     TIME TO PEAK    (hrs)=   12.200
     DURATION        (hrs)=   26.150, (dddd|hh:mm:)=   1|02:09
     AVERAGE FLOW    (cms)=     .041
     RUNOFF VOLUME    (mm)=   52.679
     TOTAL RAINFALL   (mm)=  133.599
```

```
     RUNOFF COEFFICIENT   =     .394

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

-----------------------------------------------------------------------------------------
R0006:C00005-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
  ** END OF RUN :    5

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0007
    NSTORM=   1
           #  1=HAZEL.STM
-----------------------------------------------------------------------------------------
R0007:C00002-----------------------------------------------------------------------------
*#***************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#***************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#***************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-----------------------------------------------------------------------------------------
R0007:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\24-hour_SCS\HAZEL.STM
| Ptotal= 212.00 mm|  Comments: * REGIONAL DESIGN STORM - HAZEL
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
```



```
      hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
       0:12   6.000|   2:12   6.000|   4:12  17.000|   6:12  23.000|   8:12  13.000|  10:12
       0:24   6.000|   2:24   6.000|   4:24  17.000|   6:24  23.000|   8:24  13.000|  10:24
       0:36   6.000|   2:36   6.000|   4:36  17.000|   6:36  23.000|   8:36  13.000|  10:36
       0:48   6.000|   2:48   6.000|   4:48  17.000|   6:48  23.000|   8:48  13.000|  10:48
       1:00   6.000|   3:00   6.000|   5:00  17.000|   7:00  23.000|   9:00  13.000|  11:00
       1:12   4.000|   3:12  13.000|   5:12  13.000|   7:12  13.000|   9:12  53.000|  11:12
       1:24   4.000|   3:24  13.000|   5:24  13.000|   7:24  13.000|   9:24  53.000|  11:24
       1:36   4.000|   3:36  13.000|   5:36  13.000|   7:36  13.000|   9:36  53.000|  11:36
       1:48   4.000|   3:48  13.000|   5:48  13.000|   7:48  13.000|   9:48  53.000|  11:48
       2:00   4.000|   4:00  13.000|   6:00  13.000|   8:00  13.000|  10:00  53.000|  12:00

-----------------------------------------------------------------------------------------
R0007:C00003-----------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=    2.127 (i)
     TIME TO PEAK    (hrs)=   10.633
     DURATION        (hrs)=   15.867, (dddd|hh:mm:)=   0|15:52
     AVERAGE FLOW    (cms)=     .473
     RUNOFF VOLUME    (mm)=   90.726
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .428

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

-----------------------------------------------------------------------------------------
R0007:C00004-----------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .708 (i)
     TIME TO PEAK    (hrs)=   10.100
     DURATION        (hrs)=   14.150, (dddd|hh:mm:)=   0|14:09
     AVERAGE FLOW    (cms)=     .158
     RUNOFF VOLUME    (mm)=  109.919
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .518

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

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

```
R0007:C00005-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------
| FINISH           |
--------------------
-------------------------------------------------------------------------------------------
*******************************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2021-01-21     at 15:54:57
===========================================================================================
```

Pre-Development Condition
12-hour SCS Type-II Storm Distribution

```
2     Metric units
*#*********************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*********************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*********************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
*% 2-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                   ["2Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
READ STORM          STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
* PRE1
CALIB NASHYD        ID=[1], NHYD=["PRE1"], DT=[1]min, AREA=[29.8](ha),
                    DWF=[0](cms),  CN/C=[50], IA=[8.2](mm),
                    N=[3], TP=[0.59]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
* PRE2
CALIB NASHYD        ID=[2], NHYD=["PRE2"], DT=[1]min, AREA=[7.3](ha),
                    DWF=[0](cms),  CN/C=[59], IA=[7.3](mm),
                    N=[3], TP=[0.31]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
*% 5-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*%                   ["5Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 10-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*%                   ["10Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*%                   ["25Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 50-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*%                   ["50Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 100-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*%                   ["100Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% Hurricane Hazel Regional Storm (48-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
```



```
*%                   ["HAZEL.STM"] <--storm filename
*%-----------------|-------------------------------------------------------|
FINISH
```

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

  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   77777 ==
  S       W W W   MM MM   H   H    Y Y    MM MM   O   O           2    0   0   11   7   7
  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O           2    0   0   11       7
      S    W W    M   M   H   H     Y     M   M   O   O        222     0   0   11      7
  SSSSS     W W    M   M   H   H     Y     M   M    OOO         2       0   0   11     7   ==
                                                                2       0   0   11    7    #
        StormWater Management HYdrologic Model                 222     000    11    7    ==

  ******************************************************************************************
  *************************************  SWMHYMO Ver4.05.0  ******************************
  ******************  A single event and continuous hydrologic simulation model  ************
  ******************     based on the principles of HYMO and its successors      ************
  ******************                 OTTHYMO-83 and OTTHYMO-89.                  ************
  ******************************************************************************************
  ****************** Distributed by:  J.F. Sabourin and Associates Inc.          ************
  ******************                  Ottawa,  Ontario: (613) 836-3884           ************
  ******************                  Gatineau, Quebec: (819) 243-6858           ************
  ******************                  E-Mail: swmhymo@jfsa.com                   ************
  ******************************************************************************************

  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  +++++++++++++++++++ Licensed user: WMI & Associates Ltd.                      +++++++++++
  +++++++++++++++++++                Barrie                SERIAL#:2880720       +++++++++++
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

  ******************************************************************************************
  ******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            ************
  ******************           Maximum value for ID numbers  :     11            ************
  ******************           Max. number of rainfall points: 105408            ************
  ******************           Max. number of flow points    : 105408            ************
  ******************************************************************************************


  ******************************   D E T A I L E D   O U T P U T   ************************
  ******************************************************************************************
  *                  RUN DATE: 2021-01-21     TIME: 15:54:40     RUN COUNTER: 000003
  ******************************************************************************************
  * Input   file: C:\Temp\19-540\EX\12-hour_SCS\2-CYRSCS.dat
  * Output  file: C:\Temp\19-540\EX\12-hour_SCS\2-CYRSCS.out
  * Summary file: C:\Temp\19-540\EX\12-hour_SCS\2-CYRSCS.sum
  * User comments:
  * 1:_____________________________________________________________________________________
  * 2:_____________________________________________________________________________________
  * 3:_____________________________________________________________________________________
  ******************************************************************************************

 ------------------------------------------------------------------------------------------
 R0001:C00001-----------------------------------------------------------------------------
 *#*********************************************************************************************
 *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
 *#*********************************************************************************************
```



```
 *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
 *#  Date        : 10-14-2020
 *#  Modeller    : [BD]
 *#  Company     : WMI & Associates Ltd.
 *#  License #   :  2880720
 *#*********************************************************************************************
 *
 * Pre-Development Condition - 140 Lockhart Road
 *
 --------------------
 | START            | Project  dir.:C:\Temp\19-540\EX\12-hour_SCS\
 -------------------- Rainfall dir.:C:\Temp\19-540\EX\12-hour_SCS\
     TZERO =   .00 hrs on        0
     METOUT=   2 (output = METRIC)
     NRUN  = 0001
     NSTORM=   1
            #  1=2Y12H.stm
 ------------------------------------------------------------------------------------------
 R0001:C00002-----------------------------------------------------------------------------
 --------------------
 | READ STORM       |  Filename: C:\Temp\19-540\EX\12-hour_SCS\2Y12H.stm
 | Ptotal=  46.69 mm|  Comments: 2yr/12hr Barrie Wpcc +15% SCS
 --------------------
       TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
      hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
       0:15   1.170|   2:15   1.400|   4:15   2.800|   6:15   8.410|   8:15   1.630|  10:15
       0:30   1.170|   2:30   1.400|   4:30   2.800|   6:30   8.410|   8:30   1.630|  10:30
       0:45   1.170|   2:45   1.400|   4:45   3.740|   6:45   3.740|   8:45   1.630|  10:45
       1:00   1.170|   3:00   1.400|   5:00   3.740|   7:00   3.740|   9:00   1.630|  11:00
       1:15   1.170|   3:15   1.870|   5:15   5.600|   7:15   2.800|   9:15   1.630|  11:15
       1:30   1.170|   3:30   1.870|   5:30   5.600|   7:30   2.800|   9:30   1.630|  11:30
       1:45   1.170|   3:45   1.870|   5:45  22.420|   7:45   2.800|   9:45   1.630|  11:45
       2:00   1.170|   4:00   1.870|   6:00  61.640|   8:00   2.800|  10:00   1.630|  12:00

 ------------------------------------------------------------------------------------------
 R0001:C00003-----------------------------------------------------------------------------
 * PRE1
 --------------------------
 | CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
 | 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
 --------------------------   U.H. Tp(hrs)=     .590

      Unit Hyd Qpeak  (cms)=    1.929

      PEAK FLOW       (cms)=     .192 (i)
      TIME TO PEAK    (hrs)=    6.617
      DURATION        (hrs)=   15.867, (dddd|hh:mm:)=   0|15:52
      AVERAGE FLOW    (cms)=     .026
      RUNOFF VOLUME    (mm)=    5.065
      TOTAL RAINFALL   (mm)=   46.690
      RUNOFF COEFFICIENT   =     .108

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

```
  ----------------------------------------------------------------------------------------
  R0001:C00004-----------------------------------------------------------------------------
  * PRE2
  --------------------------
  | CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
  | 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
  --------------------------   U.H. Tp(hrs)=     .310

       Unit Hyd Qpeak  (cms)=     .899

       PEAK FLOW       (cms)=     .107 (i)
       TIME TO PEAK    (hrs)=    6.233
       DURATION        (hrs)=   14.150, (dddd|hh:mm:)=   0|14:09
       AVERAGE FLOW    (cms)=     .010
       RUNOFF VOLUME    (mm)=    7.187
       TOTAL RAINFALL   (mm)=   46.690
       RUNOFF COEFFICIENT   =     .154

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

  ----------------------------------------------------------------------------------------
  R0001:C00005-----------------------------------------------------------------------------
    ** END OF RUN :    0

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



  --------------------
  | START            | Project  dir.:C:\Temp\19-540\EX\12-hour_SCS\
  -------------------- Rainfall dir.:C:\Temp\19-540\EX\12-hour_SCS\
      TZERO =   .00 hrs on        0
      METOUT=   2 (output = METRIC)
      NRUN  = 0002
      NSTORM=   1
             #  1=5Y12H.stm
  ----------------------------------------------------------------------------------------
  R0002:C00002-----------------------------------------------------------------------------
  *#**************************************************************************************
  *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
  *#**************************************************************************************
  *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
  *#  Date        : 10-14-2020
  *#  Modeller    : [BD]
  *#  Company     : WMI & Associates Ltd.
  *#  License #   :  2880720
  *#**************************************************************************************
  *
  * Pre-Development Condition - 140 Lockhart Road
  *
```



```
  ----------------------------------------------------------------------------------------
  R0002:C00002-----------------------------------------------------------------------------
  --------------------
  | READ STORM       |  Filename: C:\Temp\19-540\EX\12-hour_SCS\5Y12H.stm
  | Ptotal=  64.31 mm|  Comments: 5yr/12hr Barrie Wpcc +15% SCS
  --------------------
        TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
       hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
        0:15   1.610|   2:15   1.930|   4:15   3.860|   6:15  11.570|   8:15   2.250|  10:15
        0:30   1.610|   2:30   1.930|   4:30   3.860|   6:30  11.570|   8:30   2.250|  10:30
        0:45   1.610|   2:45   1.930|   4:45   5.140|   6:45   5.140|   8:45   2.250|  10:45
        1:00   1.610|   3:00   1.930|   5:00   5.140|   7:00   5.140|   9:00   2.250|  11:00
        1:15   1.610|   3:15   2.570|   5:15   7.720|   7:15   3.860|   9:15   2.250|  11:15
        1:30   1.610|   3:30   2.570|   5:30   7.720|   7:30   3.860|   9:30   2.250|  11:30
        1:45   1.610|   3:45   2.570|   5:45  30.860|   7:45   3.860|   9:45   2.250|  11:45
        2:00   1.610|   4:00   2.570|   6:00  84.880|   8:00   3.860|  10:00   2.250|  12:00

  ----------------------------------------------------------------------------------------
  R0002:C00003-----------------------------------------------------------------------------
  * PRE1
  --------------------------
  | CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
  | 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
  --------------------------   U.H. Tp(hrs)=     .590

       Unit Hyd Qpeak  (cms)=    1.929

       PEAK FLOW       (cms)=     .396 (i)
       TIME TO PEAK    (hrs)=    6.600
       DURATION        (hrs)=   15.867, (dddd|hh:mm:)=   0|15:52
       AVERAGE FLOW    (cms)=     .053
       RUNOFF VOLUME    (mm)=   10.152
       TOTAL RAINFALL   (mm)=   64.309
       RUNOFF COEFFICIENT   =     .158

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

  ----------------------------------------------------------------------------------------
  R0002:C00004-----------------------------------------------------------------------------
  * PRE2
  --------------------------
  | CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
  | 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
  --------------------------   U.H. Tp(hrs)=     .310

       Unit Hyd Qpeak  (cms)=     .899

       PEAK FLOW       (cms)=     .213 (i)
       TIME TO PEAK    (hrs)=    6.217
       DURATION        (hrs)=   14.150, (dddd|hh:mm:)=   0|14:09
       AVERAGE FLOW    (cms)=     .020
       RUNOFF VOLUME    (mm)=   13.918
       TOTAL RAINFALL   (mm)=   64.309
```

```
     RUNOFF COEFFICIENT   =     .216

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

-----------------------------------------------------------------------------------------
R0002:C00005-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0002:C00002-----------------------------------------------------------------------------
  ** END OF RUN :    1

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\12-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\12-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0003
    NSTORM=   1
           #  1=10Y12H.stm
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
*#***************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#***************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#***************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\12-hour_SCS\10Y12H.stm
| Ptotal=  76.00 mm|  Comments: 10yr/12hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   1.900|   2:15   2.280|   4:15   4.560|   6:15  13.680|   8:15   2.660|  10:15
      0:30   1.900|   2:30   2.280|   4:30   4.560|   6:30  13.680|   8:30   2.660|  10:30
      0:45   1.900|   2:45   2.280|   4:45   6.080|   6:45   6.080|   8:45   2.660|  10:45
      1:00   1.900|   3:00   2.280|   5:00   6.080|   7:00   6.080|   9:00   2.660|  11:00
      1:15   1.900|   3:15   3.040|   5:15   9.120|   7:15   4.560|   9:15   2.660|  11:15
      1:30   1.900|   3:30   3.040|   5:30   9.120|   7:30   4.560|   9:30   2.660|  11:30
      1:45   1.900|   3:45   3.040|   5:45  36.480|   7:45   4.560|   9:45   2.660|  11:45
```



```
      2:00   1.900|   4:00   3.040|   6:00 100.320|   8:00   4.560|  10:00   2.660|  12:00

-----------------------------------------------------------------------------------------
R0003:C00003-----------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=     .563 (i)
     TIME TO PEAK    (hrs)=    6.583
     DURATION        (hrs)=   15.867, (dddd|hh:mm:)=   0|15:52
     AVERAGE FLOW    (cms)=     .075
     RUNOFF VOLUME    (mm)=   14.285
     TOTAL RAINFALL   (mm)=   76.000
     RUNOFF COEFFICIENT   =     .188

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

-----------------------------------------------------------------------------------------
R0003:C00004-----------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .298 (i)
     TIME TO PEAK    (hrs)=    6.217
     DURATION        (hrs)=   14.150, (dddd|hh:mm:)=   0|14:09
     AVERAGE FLOW    (cms)=     .028
     RUNOFF VOLUME    (mm)=   19.248
     TOTAL RAINFALL   (mm)=   76.000
     RUNOFF COEFFICIENT   =     .253

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

-----------------------------------------------------------------------------------------
R0003:C00005-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
  ** END OF RUN :    2

*****************************************************************************************
```

```
--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\12-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\12-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0004
    NSTORM=   1
           #  1=25Y12H.stm
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\12-hour_SCS\25Y12H.stm
| Ptotal=  90.69 mm|  Comments: 25yr/12hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   2.270|   2:15   2.720|   4:15   5.440|   6:15  16.330|   8:15   3.170|  10:15
      0:30   2.270|   2:30   2.720|   4:30   5.440|   6:30  16.330|   8:30   3.170|  10:30
      0:45   2.270|   2:45   2.720|   4:45   7.260|   6:45   7.260|   8:45   3.170|  10:45
      1:00   2.270|   3:00   2.720|   5:00   7.260|   7:00   7.260|   9:00   3.170|  11:00
      1:15   2.270|   3:15   3.630|   5:15  10.880|   7:15   5.440|   9:15   3.170|  11:15
      1:30   2.270|   3:30   3.630|   5:30  10.880|   7:30   5.440|   9:30   3.170|  11:30
      1:45   2.270|   3:45   3.630|   5:45  43.540|   7:45   5.440|   9:45   3.170|  11:45
      2:00   2.270|   4:00   3.630|   6:00 119.720|   8:00   5.440|  10:00   3.170|  12:00

--------------------------------------------------------------------------------
R0004:C00003----------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=     .806 (i)
```



```
     TIME TO PEAK    (hrs)=    6.567
     DURATION        (hrs)=   15.867, (dddd|hh:mm:)=   0|15:52
     AVERAGE FLOW    (cms)=     .106
     RUNOFF VOLUME    (mm)=   20.222
     TOTAL RAINFALL   (mm)=   90.690
     RUNOFF COEFFICIENT   =     .223

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

--------------------------------------------------------------------------------
R0004:C00004----------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .418 (i)
     TIME TO PEAK    (hrs)=    6.217
     DURATION        (hrs)=   14.150, (dddd|hh:mm:)=   0|14:09
     AVERAGE FLOW    (cms)=     .038
     RUNOFF VOLUME    (mm)=   26.756
     TOTAL RAINFALL   (mm)=   90.690
     RUNOFF COEFFICIENT   =     .295

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

--------------------------------------------------------------------------------
R0004:C00005----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
  ** END OF RUN :    3

********************************************************************************
```

```
--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\12-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\12-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0005
    NSTORM=   1
           #  1=50Y12H.stm
```

```
---------------------------------------------------------------------------------------
R0005:C00002-----------------------------------------------------------------------------
*#*******************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*******************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*******************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
---------------------------------------------------------------------------------------
R0005:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\12-hour_SCS\50Y12H.stm
| Ptotal= 101.69 mm|  Comments: 50yr/12hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   2.540|   2:15   3.050|   4:15   6.100|   6:15  18.310|   8:15   3.560|  10:15
      0:30   2.540|   2:30   3.050|   4:30   6.100|   6:30  18.310|   8:30   3.560|  10:30
      0:45   2.540|   2:45   3.050|   4:45   8.140|   6:45   8.140|   8:45   3.560|  10:45
      1:00   2.540|   3:00   3.050|   5:00   8.140|   7:00   8.140|   9:00   3.560|  11:00
      1:15   2.540|   3:15   4.070|   5:15  12.200|   7:15   6.100|   9:15   3.560|  11:15
      1:30   2.540|   3:30   4.070|   5:30  12.200|   7:30   6.100|   9:30   3.560|  11:30
      1:45   2.540|   3:45   4.070|   5:45  48.820|   7:45   6.100|   9:45   3.560|  11:45
      2:00   2.540|   4:00   4.070|   6:00 134.240|   8:00   6.100|  10:00   3.560|  12:00

---------------------------------------------------------------------------------------
R0005:C00003-----------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=    1.008 (i)
     TIME TO PEAK    (hrs)=    6.567
     DURATION        (hrs)=   15.867, (dddd|hh:mm:)=   0|15:52
     AVERAGE FLOW    (cms)=     .131
     RUNOFF VOLUME    (mm)=   25.153
     TOTAL RAINFALL   (mm)=  101.690
     RUNOFF COEFFICIENT   =     .247

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

---------------------------------------------------------------------------------------
R0005:C00004-----------------------------------------------------------------------------
```



```
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .517 (i)
     TIME TO PEAK    (hrs)=    6.217
     DURATION        (hrs)=   14.150, (dddd|hh:mm:)=   0|14:09
     AVERAGE FLOW    (cms)=     .047
     RUNOFF VOLUME    (mm)=   32.889
     TOTAL RAINFALL   (mm)=  101.690
     RUNOFF COEFFICIENT   =     .323

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

---------------------------------------------------------------------------------------
R0005:C00005-----------------------------------------------------------------------------
---------------------------------------------------------------------------------------
R0005:C00002-----------------------------------------------------------------------------
---------------------------------------------------------------------------------------
R0005:C00002-----------------------------------------------------------------------------
---------------------------------------------------------------------------------------
R0005:C00002-----------------------------------------------------------------------------
---------------------------------------------------------------------------------------
R0005:C00002-----------------------------------------------------------------------------
---------------------------------------------------------------------------------------
  ** END OF RUN :    4

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\12-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\12-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0006
    NSTORM=   1
           #  1=100Y12H.stm
---------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
*#*******************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*******************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
```

```
*#  License #   :  2880720
*#*****************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\12-hour_SCS\100Y12H.stm
| Ptotal= 112.51 mm|  Comments: 100yr/12hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   2.810|   2:15   3.380|   4:15   6.750|   6:15  20.250|   8:15   3.940|  10:15
      0:30   2.810|   2:30   3.380|   4:30   6.750|   6:30  20.250|   8:30   3.940|  10:30
      0:45   2.810|   2:45   3.380|   4:45   9.000|   6:45   9.000|   8:45   3.940|  10:45
      1:00   2.810|   3:00   3.380|   5:00   9.000|   7:00   9.000|   9:00   3.940|  11:00
      1:15   2.810|   3:15   4.500|   5:15  13.500|   7:15   6.750|   9:15   3.940|  11:15
      1:30   2.810|   3:30   4.500|   5:30  13.500|   7:30   6.750|   9:30   3.940|  11:30
      1:45   2.810|   3:45   4.500|   5:45  54.000|   7:45   6.750|   9:45   3.940|  11:45
      2:00   2.810|   4:00   4.500|   6:00 148.500|   8:00   6.750|  10:00   3.940|  12:00

-----------------------------------------------------------------------------------------
R0006:C00003-----------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=    1.222 (i)
     TIME TO PEAK    (hrs)=    6.567
     DURATION        (hrs)=   15.867, (dddd|hh:mm:)=   0|15:52
     AVERAGE FLOW    (cms)=     .158
     RUNOFF VOLUME    (mm)=   30.364
     TOTAL RAINFALL   (mm)=  112.505
     RUNOFF COEFFICIENT   =     .270

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

-----------------------------------------------------------------------------------------
R0006:C00004-----------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .620 (i)
```



```
     TIME TO PEAK    (hrs)=    6.217
     DURATION        (hrs)=   14.150, (dddd|hh:mm:)=   0|14:09
     AVERAGE FLOW    (cms)=     .056
     RUNOFF VOLUME    (mm)=   39.288
     TOTAL RAINFALL   (mm)=  112.505
     RUNOFF COEFFICIENT   =     .349

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

-----------------------------------------------------------------------------------------
R0006:C00005-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
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R0006:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
  ** END OF RUN :    5

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\12-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\12-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0007
    NSTORM=   1
           #  1=HAZEL.STM
-----------------------------------------------------------------------------------------
R0007:C00002-----------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-----------------------------------------------------------------------------------------
R0007:C00002-----------------------------------------------------------------------------
```

```
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\12-hour_SCS\HAZEL.STM
| Ptotal= 212.00 mm|  Comments: * REGIONAL DESIGN STORM - HAZEL
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:12   6.000|   2:12   6.000|   4:12  17.000|   6:12  23.000|   8:12  13.000|  10:12
      0:24   6.000|   2:24   6.000|   4:24  17.000|   6:24  23.000|   8:24  13.000|  10:24
      0:36   6.000|   2:36   6.000|   4:36  17.000|   6:36  23.000|   8:36  13.000|  10:36
      0:48   6.000|   2:48   6.000|   4:48  17.000|   6:48  23.000|   8:48  13.000|  10:48
      1:00   6.000|   3:00   6.000|   5:00  17.000|   7:00  23.000|   9:00  13.000|  11:00
      1:12   4.000|   3:12  13.000|   5:12  13.000|   7:12  13.000|   9:12  53.000|  11:12
      1:24   4.000|   3:24  13.000|   5:24  13.000|   7:24  13.000|   9:24  53.000|  11:24
      1:36   4.000|   3:36  13.000|   5:36  13.000|   7:36  13.000|   9:36  53.000|  11:36
      1:48   4.000|   3:48  13.000|   5:48  13.000|   7:48  13.000|   9:48  53.000|  11:48
      2:00   4.000|   4:00  13.000|   6:00  13.000|   8:00  13.000|  10:00  53.000|  12:00

-------------------------------------------------------------------------------------------
R0007:C00003-----------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=    2.127 (i)
     TIME TO PEAK    (hrs)=   10.633
     DURATION        (hrs)=   15.867, (dddd|hh:mm:)=   0|15:52
     AVERAGE FLOW    (cms)=     .473
     RUNOFF VOLUME    (mm)=   90.726
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .428

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

-------------------------------------------------------------------------------------------
R0007:C00004-----------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .708 (i)
     TIME TO PEAK    (hrs)=   10.100
     DURATION        (hrs)=   14.150, (dddd|hh:mm:)=   0|14:09
     AVERAGE FLOW    (cms)=     .158
     RUNOFF VOLUME    (mm)=  109.919
     TOTAL RAINFALL   (mm)=  212.000
```



```
     RUNOFF COEFFICIENT   =     .518

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

-------------------------------------------------------------------------------------------
R0007:C00005-----------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0007:C00002-----------------------------------------------------------------------------
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R0007:C00002-----------------------------------------------------------------------------
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R0007:C00002-----------------------------------------------------------------------------
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R0007:C00002-----------------------------------------------------------------------------
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R0007:C00002-----------------------------------------------------------------------------
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R0007:C00002-----------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0007:C00002-----------------------------------------------------------------------------
--------------------
| FINISH           |
--------------------
-------------------------------------------------------------------------------------------
*******************************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2021-01-21     at 15:54:40
===========================================================================================
```

Pre-Development Condition
6-hour SCS Type-II Storm Distribution

```
2     Metric units
*#*********************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*********************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*********************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
*% 2-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                   ["2Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
READ STORM          STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
* PRE1
CALIB NASHYD        ID=[1], NHYD=["PRE1"], DT=[1]min, AREA=[29.8](ha),
                    DWF=[0](cms),  CN/C=[50], IA=[8.2](mm),
                    N=[3], TP=[0.59]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
* PRE2
CALIB NASHYD        ID=[2], NHYD=["PRE2"], DT=[1]min, AREA=[7.3](ha),
                    DWF=[0](cms),  CN/C=[59], IA=[7.3](mm),
                    N=[3], TP=[0.31]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
*% 5-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*%                   ["5Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 10-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*%                   ["10Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*%                   ["25Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 50-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*%                   ["50Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 100-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*%                   ["100Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% Hurricane Hazel Regional Storm (48-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
```



```
*%                   ["HAZEL.STM"] <--storm filename
*%-----------------|-------------------------------------------------------|
FINISH
```

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

  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   77777 ==
  S       W W W   MM MM   H   H    Y Y    MM MM   O   O           2    0   0   11   7   7
  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O           2    0   0   11       7
      S    W W    M   M   H   H     Y     M   M   O   O        222     0   0   11      7
  SSSSS     W     M   M   H   H     Y     M   M    OOO         2       0   0   11     7   ==
                                                               2       0   0   11    7    #
        StormWater Management HYdrologic Model                  222     000    11    7    ==

  ******************************************************************************************
  ************************************** SWMHYMO Ver4.05.0  ******************************
  ******************  A single event and continuous hydrologic simulation model  ************
  ******************     based on the principles of HYMO and its successors      ************
  ******************                 OTTHYMO-83 and OTTHYMO-89.                  ************
  ******************************************************************************************
  ****************** Distributed by:  J.F. Sabourin and Associates Inc.          ************
  ******************                  Ottawa,  Ontario: (613) 836-3884           ************
  ******************                  Gatineau, Quebec: (819) 243-6858           ************
  ******************                  E-Mail: swmhymo@jfsa.com                   ************
  ******************************************************************************************

  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  +++++++++++++++++++ Licensed user: WMI & Associates Ltd.                      +++++++++++
  +++++++++++++++++++                Barrie                SERIAL#:2880720       +++++++++++
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

  ******************************************************************************************
  ******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            ************
  ******************           Maximum value for ID numbers  :     11            ************
  ******************           Max. number of rainfall points: 105408            ************
  ******************           Max. number of flow points    : 105408            ************
  ******************************************************************************************


  ******************************   D E T A I L E D   O U T P U T   ************************
  ******************************************************************************************
  *                 RUN DATE: 2021-01-21     TIME: 15:54:14     RUN COUNTER: 000002
  ******************************************************************************************
  * Input   file: C:\Temp\19-540\EX\6-hour_SCS\2-CYRSCS.dat
  * Output  file: C:\Temp\19-540\EX\6-hour_SCS\2-CYRSCS.out
  * Summary file: C:\Temp\19-540\EX\6-hour_SCS\2-CYRSCS.sum
  * User comments:
  * 1:_____________________________________________________________________________________
  * 2:_____________________________________________________________________________________
  * 3:_____________________________________________________________________________________
  ******************************************************************************************

 ------------------------------------------------------------------------------------------
 R0001:C00001-----------------------------------------------------------------------------
 *#****************************************************************************************
 *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
 *#****************************************************************************************
```



```
 *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
 *#  Date        : 10-14-2020
 *#  Modeller    : [BD]
 *#  Company     : WMI & Associates Ltd.
 *#  License #   :  2880720
 *#****************************************************************************************
 *
 * Pre-Development Condition - 140 Lockhart Road
 *
 --------------------
 | START            | Project  dir.:C:\Temp\19-540\EX\6-hour_SCS\
 -------------------- Rainfall dir.:C:\Temp\19-540\EX\6-hour_SCS\
     TZERO =   .00 hrs on        0
     METOUT=   2 (output = METRIC)
     NRUN  = 0001
     NSTORM=   1
            #  1=2Y6H.stm
 ------------------------------------------------------------------------------------------
 R0001:C00002-----------------------------------------------------------------------------
 --------------------
 | READ STORM       |  Filename: C:\Temp\19-540\EX\6-hour_SCS\2Y6H.stm
 | Ptotal=  42.30 mm|  Comments: 2yr/6hr Barrie Wpcc +15% SCS
 --------------------
       TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
      hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
       0:15   1.690|   1:15   2.540|   2:15   5.080|   3:15   9.310|   4:15   3.380|   5:15
       0:30   1.690|   1:30   2.540|   2:30   5.080|   3:30   9.310|   4:30   3.380|   5:30
       0:45   2.540|   1:45   4.230|   2:45  25.380|   3:45   4.230|   4:45   2.540|   5:45
       1:00   2.540|   2:00   4.230|   3:00  65.990|   4:00   4.230|   5:00   2.540|   6:00

 ------------------------------------------------------------------------------------------
 R0001:C00003-----------------------------------------------------------------------------
 * PRE1
 --------------------------
 | CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
 | 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
 --------------------------   U.H. Tp(hrs)=     .590

      Unit Hyd Qpeak  (cms)=    1.929

      PEAK FLOW       (cms)=     .178 (i)
      TIME TO PEAK    (hrs)=    3.650
      DURATION        (hrs)=    9.867, (dddd|hh:mm:)=   0|09:52
      AVERAGE FLOW    (cms)=     .034
      RUNOFF VOLUME    (mm)=    4.037
      TOTAL RAINFALL   (mm)=   42.302
      RUNOFF COEFFICIENT   =     .095

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

 ------------------------------------------------------------------------------------------
 R0001:C00004-----------------------------------------------------------------------------
 * PRE2
```

```
      --------------------------
      | CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
      | 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
      --------------------------   U.H. Tp(hrs)=     .310

           Unit Hyd Qpeak  (cms)=     .899

           PEAK FLOW       (cms)=     .099 (i)
           TIME TO PEAK    (hrs)=    3.250
           DURATION        (hrs)=    8.150, (dddd|hh:mm:)=   0|08:09
           AVERAGE FLOW    (cms)=     .014
           RUNOFF VOLUME    (mm)=    5.792
           TOTAL RAINFALL   (mm)=   42.302
           RUNOFF COEFFICIENT   =     .137

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

      ------------------------------------------------------------------------------------
      R0001:C00005-------------------------------------------------------------------------
        ** END OF RUN :    0

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




      --------------------
      | START            | Project  dir.:C:\Temp\19-540\EX\6-hour_SCS\
      -------------------- Rainfall dir.:C:\Temp\19-540\EX\6-hour_SCS\
          TZERO =   .00 hrs on        0
          METOUT=   2 (output = METRIC)
          NRUN  = 0002
          NSTORM=   1
                 #  1=5Y6H.stm
      ------------------------------------------------------------------------------------
      R0002:C00002-------------------------------------------------------------------------
      *#**********************************************************************************
      *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
      *#**********************************************************************************
      *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
      *#  Date        : 10-14-2020
      *#  Modeller    : [BD]
      *#  Company     : WMI & Associates Ltd.
      *#  License #   :  2880720
      *#**********************************************************************************
      *
      * Pre-Development Condition - 140 Lockhart Road
      *
      ------------------------------------------------------------------------------------
      R0002:C00002-------------------------------------------------------------------------
      --------------------
      | READ STORM       |  Filename: C:\Temp\19-540\EX\6-hour_SCS\5Y6H.stm
```



```
      | Ptotal=  59.50 mm|  Comments: 5yr/6hr Barrie Wpcc +15% SCS
      --------------------
            TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
           hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
            0:15   2.380|   1:15   3.570|   2:15   7.140|   3:15  13.090|   4:15   4.760|   5:15
            0:30   2.380|   1:30   3.570|   2:30   7.140|   3:30  13.090|   4:30   4.760|   5:30
            0:45   3.570|   1:45   5.950|   2:45  35.700|   3:45   5.950|   4:45   3.570|   5:45
            1:00   3.570|   2:00   5.950|   3:00  92.820|   4:00   5.950|   5:00   3.570|   6:00

      ------------------------------------------------------------------------------------
      R0002:C00003-------------------------------------------------------------------------
      * PRE1
      --------------------------
      | CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
      | 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
      --------------------------   U.H. Tp(hrs)=     .590

           Unit Hyd Qpeak  (cms)=    1.929

           PEAK FLOW       (cms)=     .391 (i)
           TIME TO PEAK    (hrs)=    3.633
           DURATION        (hrs)=    9.867, (dddd|hh:mm:)=   0|09:52
           AVERAGE FLOW    (cms)=     .072
           RUNOFF VOLUME    (mm)=    8.620
           TOTAL RAINFALL   (mm)=   59.500
           RUNOFF COEFFICIENT   =     .145

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

      ------------------------------------------------------------------------------------
      R0002:C00004-------------------------------------------------------------------------
      * PRE2
      --------------------------
      | CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
      | 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
      --------------------------   U.H. Tp(hrs)=     .310

           Unit Hyd Qpeak  (cms)=     .899

           PEAK FLOW       (cms)=     .211 (i)
           TIME TO PEAK    (hrs)=    3.233
           DURATION        (hrs)=    8.150, (dddd|hh:mm:)=   0|08:09
           AVERAGE FLOW    (cms)=     .030
           RUNOFF VOLUME    (mm)=   11.914
           TOTAL RAINFALL   (mm)=   59.500
           RUNOFF COEFFICIENT   =     .200

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

      ------------------------------------------------------------------------------------
      R0002:C00005-------------------------------------------------------------------------
      ------------------------------------------------------------------------------------
      R0002:C00002-------------------------------------------------------------------------
```

```
  ** END OF RUN :    1

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\6-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\6-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0003
    NSTORM=   1
           #  1=10Y6H.stm
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
*#*********************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*********************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*********************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\6-hour_SCS\10Y6H.stm
| Ptotal=  70.80 mm|  Comments: 10yr/6hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   2.830|   1:15   4.250|   2:15   8.500|   3:15  15.580|   4:15   5.660|   5:15
      0:30   2.830|   1:30   4.250|   2:30   8.500|   3:30  15.580|   4:30   5.660|   5:30
      0:45   4.250|   1:45   7.080|   2:45  42.480|   3:45   7.080|   4:45   4.250|   5:45
      1:00   4.250|   2:00   7.080|   3:00 110.450|   4:00   7.080|   5:00   4.250|   6:00

-----------------------------------------------------------------------------------------
R0003:C00003-----------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929
```



```
     PEAK FLOW       (cms)=     .568 (i)
     TIME TO PEAK    (hrs)=    3.617
     DURATION        (hrs)=    9.867, (dddd|hh:mm:)=   0|09:52
     AVERAGE FLOW    (cms)=     .104
     RUNOFF VOLUME    (mm)=   12.379
     TOTAL RAINFALL   (mm)=   70.803
     RUNOFF COEFFICIENT   =     .175

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

-----------------------------------------------------------------------------------------
R0003:C00004-----------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .301 (i)
     TIME TO PEAK    (hrs)=    3.233
     DURATION        (hrs)=    8.150, (dddd|hh:mm:)=   0|08:09
     AVERAGE FLOW    (cms)=     .042
     RUNOFF VOLUME    (mm)=   16.802
     TOTAL RAINFALL   (mm)=   70.803
     RUNOFF COEFFICIENT   =     .237

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

-----------------------------------------------------------------------------------------
R0003:C00005-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
  ** END OF RUN :    2

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\6-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\6-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0004
    NSTORM=   1
           #  1=25Y6H.stm
-----------------------------------------------------------------------------------------
```

```
R0004:C00002-------------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\6-hour_SCS\25Y6H.stm
| Ptotal=  85.20 mm|  Comments: 25yr/6hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   3.410|   1:15   5.110|   2:15  10.220|   3:15  18.740|   4:15   6.820|   5:15
      0:30   3.410|   1:30   5.110|   2:30  10.220|   3:30  18.740|   4:30   6.820|   5:30
      0:45   5.110|   1:45   8.520|   2:45  51.120|   3:45   8.520|   4:45   5.110|   5:45
      1:00   5.110|   2:00   8.520|   3:00 132.910|   4:00   8.520|   5:00   5.110|   6:00

-------------------------------------------------------------------------------------------
R0004:C00003-------------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=     .829 (i)
     TIME TO PEAK    (hrs)=    3.600
     DURATION        (hrs)=    9.867, (dddd|hh:mm:)=   0|09:52
     AVERAGE FLOW    (cms)=     .150
     RUNOFF VOLUME    (mm)=   17.911
     TOTAL RAINFALL   (mm)=   85.198
     RUNOFF COEFFICIENT   =     .210

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

-------------------------------------------------------------------------------------------
R0004:C00004-------------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310
```



```
     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .432 (i)
     TIME TO PEAK    (hrs)=    3.233
     DURATION        (hrs)=    8.150, (dddd|hh:mm:)=   0|08:09
     AVERAGE FLOW    (cms)=     .059
     RUNOFF VOLUME    (mm)=   23.852
     TOTAL RAINFALL   (mm)=   85.198
     RUNOFF COEFFICIENT   =     .280

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

-------------------------------------------------------------------------------------------
R0004:C00005-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
  ** END OF RUN :    3

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\6-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\6-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0005
    NSTORM=   1
           #  1=50Y6H.stm
-------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
```

```
     --------------------
     | READ STORM       |  Filename: C:\Temp\19-540\EX\6-hour_SCS\50Y6H.stm
     | Ptotal=  95.90 mm|  Comments: 50yr/6hr Barrie Wpcc +15% SCS
     --------------------
          TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
         hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
          0:15   3.840|   1:15   5.750|   2:15  11.510|   3:15  21.100|   4:15   7.670|   5:15
          0:30   3.840|   1:30   5.750|   2:30  11.510|   3:30  21.100|   4:30   7.670|   5:30
          0:45   5.750|   1:45   9.590|   2:45  57.540|   3:45   9.590|   4:45   5.750|   5:45
          1:00   5.750|   2:00   9.590|   3:00 149.600|   4:00   9.590|   5:00   5.750|   6:00

     ------------------------------------------------------------------------------------------
     R0005:C00003-----------------------------------------------------------------------------
     * PRE1
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
     | 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .590

          Unit Hyd Qpeak  (cms)=    1.929

          PEAK FLOW       (cms)=    1.048 (i)
          TIME TO PEAK    (hrs)=    3.600
          DURATION        (hrs)=    9.867, (dddd|hh:mm:)=   0|09:52
          AVERAGE FLOW    (cms)=     .189
          RUNOFF VOLUME    (mm)=   22.509
          TOTAL RAINFALL   (mm)=   95.900
          RUNOFF COEFFICIENT   =     .235

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

     ------------------------------------------------------------------------------------------
     R0005:C00004-----------------------------------------------------------------------------
     * PRE2
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
     | 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .310

          Unit Hyd Qpeak  (cms)=     .899

          PEAK FLOW       (cms)=     .540 (i)
          TIME TO PEAK    (hrs)=    3.217
          DURATION        (hrs)=    8.150, (dddd|hh:mm:)=   0|08:09
          AVERAGE FLOW    (cms)=     .074
          RUNOFF VOLUME    (mm)=   29.610
          TOTAL RAINFALL   (mm)=   95.900
          RUNOFF COEFFICIENT   =     .309

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

     ------------------------------------------------------------------------------------------
     R0005:C00005-----------------------------------------------------------------------------
```



```
     ------------------------------------------------------------------------------------------
     R0005:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0005:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0005:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0005:C00002-----------------------------------------------------------------------------
       ** END OF RUN :    4

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




     --------------------
     | START            | Project  dir.:C:\Temp\19-540\EX\6-hour_SCS\
     -------------------- Rainfall dir.:C:\Temp\19-540\EX\6-hour_SCS\
         TZERO =   .00 hrs on        0
         METOUT=   2 (output = METRIC)
         NRUN  = 0006
         NSTORM=   1
                #  1=100Y6H.stm
     ------------------------------------------------------------------------------------------
     R0006:C00002-----------------------------------------------------------------------------
     *#****************************************************************************************
     *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
     *#****************************************************************************************
     *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
     *#  Date        : 10-14-2020
     *#  Modeller    : [BD]
     *#  Company     : WMI & Associates Ltd.
     *#  License #   :  2880720
     *#****************************************************************************************
     *
     * Pre-Development Condition - 140 Lockhart Road
     *
     ------------------------------------------------------------------------------------------
     R0006:C00002-----------------------------------------------------------------------------
     --------------------
     | READ STORM       |  Filename: C:\Temp\19-540\EX\6-hour_SCS\100Y6H.stm
     | Ptotal= 106.50 mm|  Comments: 100yr/6hr Barrie Wpcc +15% SCS
     --------------------
          TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
         hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
          0:15   4.260|   1:15   6.390|   2:15  12.780|   3:15  23.430|   4:15   8.520|   5:15
          0:30   4.260|   1:30   6.390|   2:30  12.780|   3:30  23.430|   4:30   8.520|   5:30
          0:45   6.390|   1:45  10.650|   2:45  63.900|   3:45  10.650|   4:45   6.390|   5:45
          1:00   6.390|   2:00  10.650|   3:00 166.140|   4:00  10.650|   5:00   6.390|   6:00

     ------------------------------------------------------------------------------------------
     R0006:C00003-----------------------------------------------------------------------------
```

```
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=    1.283 (i)
     TIME TO PEAK    (hrs)=    3.600
     DURATION        (hrs)=    9.867, (dddd|hh:mm:)=   0|09:52
     AVERAGE FLOW    (cms)=     .230
     RUNOFF VOLUME    (mm)=   27.428
     TOTAL RAINFALL   (mm)=  106.500
     RUNOFF COEFFICIENT   =     .258

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

-------------------------------------------------------------------------------------
R0006:C00004-------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .654 (i)
     TIME TO PEAK    (hrs)=    3.217
     DURATION        (hrs)=    8.150, (dddd|hh:mm:)=   0|08:09
     AVERAGE FLOW    (cms)=     .089
     RUNOFF VOLUME    (mm)=   35.692
     TOTAL RAINFALL   (mm)=  106.500
     RUNOFF COEFFICIENT   =     .335

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

-------------------------------------------------------------------------------------
R0006:C00005-------------------------------------------------------------------------
-------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------
-------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------
-------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------
-------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------
-------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------
  ** END OF RUN :    5

*************************************************************************************
```



```
--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\6-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\6-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0007
    NSTORM=   1
           #  1=HAZEL.STM
-------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\6-hour_SCS\HAZEL.STM
| Ptotal= 212.00 mm|  Comments: * REGIONAL DESIGN STORM - HAZEL
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:12   6.000|   2:12   6.000|   4:12  17.000|   6:12  23.000|   8:12  13.000|  10:12
      0:24   6.000|   2:24   6.000|   4:24  17.000|   6:24  23.000|   8:24  13.000|  10:24
      0:36   6.000|   2:36   6.000|   4:36  17.000|   6:36  23.000|   8:36  13.000|  10:36
      0:48   6.000|   2:48   6.000|   4:48  17.000|   6:48  23.000|   8:48  13.000|  10:48
      1:00   6.000|   3:00   6.000|   5:00  17.000|   7:00  23.000|   9:00  13.000|  11:00
      1:12   4.000|   3:12  13.000|   5:12  13.000|   7:12  13.000|   9:12  53.000|  11:12
      1:24   4.000|   3:24  13.000|   5:24  13.000|   7:24  13.000|   9:24  53.000|  11:24
      1:36   4.000|   3:36  13.000|   5:36  13.000|   7:36  13.000|   9:36  53.000|  11:36
      1:48   4.000|   3:48  13.000|   5:48  13.000|   7:48  13.000|   9:48  53.000|  11:48
      2:00   4.000|   4:00  13.000|   6:00  13.000|   8:00  13.000|  10:00  53.000|  12:00

-------------------------------------------------------------------------------------
R0007:C00003-------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590
```

```
     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=    2.127 (i)
     TIME TO PEAK    (hrs)=   10.633
     DURATION        (hrs)=   15.867, (dddd|hh:mm:)=   0|15:52
     AVERAGE FLOW    (cms)=     .473
     RUNOFF VOLUME    (mm)=   90.726
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .428

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

--------------------------------------------------------------------------------
R0007:C00004----------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .708 (i)
     TIME TO PEAK    (hrs)=   10.100
     DURATION        (hrs)=   14.150, (dddd|hh:mm:)=   0|14:09
     AVERAGE FLOW    (cms)=     .158
     RUNOFF VOLUME    (mm)=  109.919
     TOTAL RAINFALL   (mm)=  212.000
     RUNOFF COEFFICIENT   =     .518

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

--------------------------------------------------------------------------------
R0007:C00005----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
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R0007:C00002----------------------------------------------------------------------
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R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------
| FINISH           |
--------------------
--------------------------------------------------------------------------------
********************************************************************************
     WARNINGS / ERRORS / NOTES
```



```
          -------------------------
        Simulation ended on 2021-01-21     at 15:54:14
    ================================================================================
```

Pre-Development Condition
4-hour Chicago Storm Distribution

```
2     Metric units
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
*% 2-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                    ["CHI2YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
READ STORM           STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
* PRE1
CALIB NASHYD         ID=[1], NHYD=["PRE1"], DT=[1]min, AREA=[29.8](ha),
                     DWF=[0](cms),  CN/C=[50], IA=[8.2](mm),
                     N=[3], TP=[0.59]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
* PRE2
CALIB NASHYD         ID=[2], NHYD=["PRE2"], DT=[1]min, AREA=[7.3](ha),
                     DWF=[0](cms),  CN/C=[59], IA=[7.3](mm),
                     N=[3], TP=[0.31]hrs,
                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------|
*% 5-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*%                    ["CHI5YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 10-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*%                    ["CHI10YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*%                    ["CHI25YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 50-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*%                    ["CHI50YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 100-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*%                    ["CHI100YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25mm Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
```



```
*%                    ["25mm4hr.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% Hurricane Hazel Regional Storm (48-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[8]
*%                    ["HAZEL.STM"] <--storm filename
*%-----------------|-------------------------------------------------------|
FINISH
```

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

  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   77777 ==
  S       W W W   MM MM   H   H    Y Y    MM MM   O   O           2    0   0   11   7   7
  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O           2    0   0   11       7
      S    W W    M   M   H   H     Y     M   M   O   O         222    0   0   11      7
  SSSSS     W W    M   M   H   H     Y     M   M    OOO          2      0   0   11     7   ==
                                                                 2      0   0   11    7    #
        StormWater Management HYdrologic Model                   222     000    11    7    ==

  ******************************************************************************************
  ************************************** SWMHYMO Ver4.05.0 ******************************
  ******************* A single event and continuous hydrologic simulation model ************
  *******************     based on the principles of HYMO and its successors      ************
  *******************                OTTHYMO-83 and OTTHYMO-89.                   ************
  ******************************************************************************************
  ****************** Distributed by:  J.F. Sabourin and Associates Inc.           ************
  *******************                 Ottawa,  Ontario: (613) 836-3884             ************
  *******************                 Gatineau, Quebec: (819) 243-6858             ************
  *******************                 E-Mail: swmhymo@jfsa.com                     ************
  ******************************************************************************************

  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  ++++++++++++++++++ Licensed user: WMI & Associates Ltd.                       ++++++++++++
  ++++++++++++++++++                Barrie                SERIAL#:2880720        ++++++++++++
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

  ******************************************************************************************
  *******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            ************
  *******************           Maximum value for ID numbers  :     11            ************
  *******************           Max. number of rainfall points: 105408            ************
  *******************           Max. number of flow points    : 105408            ************
  ******************************************************************************************


  ******************************   D E T A I L E D   O U T P U T   ************************
  ******************************************************************************************
  *                 RUN DATE: 2021-01-21     TIME: 15:53:51     RUN COUNTER: 000001
  ******************************************************************************************
  * Input   file: C:\Temp\19-540\EX\4-hour_Chic\2-CYRCHI.dat
  * Output  file: C:\Temp\19-540\EX\4-hour_Chic\2-CYRCHI.out
  * Summary file: C:\Temp\19-540\EX\4-hour_Chic\2-CYRCHI.sum
  * User comments:
  * 1:_____________________________________________________________________________________
  * 2:_____________________________________________________________________________________
  * 3:_____________________________________________________________________________________
  ******************************************************************************************

 ------------------------------------------------------------------------------------------
 R0001:C00001-----------------------------------------------------------------------------
 *#****************************************************************************************
 *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
 *#****************************************************************************************
```



```
 *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
 *#  Date        : 10-14-2020
 *#  Modeller    : [BD]
 *#  Company     : WMI & Associates Ltd.
 *#  License #   :  2880720
 *#****************************************************************************************
 *
 * Pre-Development Condition - 140 Lockhart Road
 *
 --------------------
 | START            | Project  dir.:C:\Temp\19-540\EX\4-hour_Chic\
 -------------------- Rainfall dir.:C:\Temp\19-540\EX\4-hour_Chic\
     TZERO =   .00 hrs on        0
     METOUT=   2 (output = METRIC)
     NRUN  = 0001
     NSTORM=   1
            #  1=CHI2YR.stm
 ------------------------------------------------------------------------------------------
 R0001:C00002-----------------------------------------------------------------------------
 --------------------
 | READ STORM       |  Filename: C:\Temp\19-540\EX\4-hour_Chic\CHI2YR.stm
 | Ptotal=  36.95 mm|  Comments: * City of Barrie - 2 yr Chicago (4hr) + 15%
 --------------------
       TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
      hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
       0:10   2.470|   0:50   5.300|   1:30  24.570|   2:10   5.730|   2:50   3.460|   3:30
       0:20   2.820|   1:00   7.980|   1:40  13.010|   2:20   4.890|   3:00   3.170|   3:40
       0:30   3.310|   1:10  18.780|   1:50   9.010|   2:30   4.280|   3:10   2.930|   3:50
       0:40   4.050|   1:20  83.110|   2:00   6.970|   2:40   3.820|   3:20   2.720|   4:00

 ------------------------------------------------------------------------------------------
 R0001:C00003-----------------------------------------------------------------------------
 * PRE1
 --------------------------
 | CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
 | 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
 --------------------------   U.H. Tp(hrs)=     .590

      Unit Hyd Qpeak  (cms)=    1.929

      PEAK FLOW       (cms)=     .117 (i)
      TIME TO PEAK    (hrs)=    2.200
      DURATION        (hrs)=    7.867, (dddd|hh:mm:)=   0|07:52
      AVERAGE FLOW    (cms)=     .031
      RUNOFF VOLUME    (mm)=    2.924
      TOTAL RAINFALL   (mm)=   36.955
      RUNOFF COEFFICIENT   =     .079

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

 ------------------------------------------------------------------------------------------
 R0001:C00004-----------------------------------------------------------------------------
 * PRE2
```

```
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
     | 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .310

          Unit Hyd Qpeak  (cms)=     .899

          PEAK FLOW       (cms)=     .063 (i)
          TIME TO PEAK    (hrs)=    1.750
          DURATION        (hrs)=    6.150, (dddd|hh:mm:)=   0|06:09
          AVERAGE FLOW    (cms)=     .014
          RUNOFF VOLUME    (mm)=    4.266
          TOTAL RAINFALL   (mm)=   36.955
          RUNOFF COEFFICIENT   =     .115

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

     ------------------------------------------------------------------------------------
     R0001:C00005-------------------------------------------------------------------------
       ** END OF RUN :    0

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




     --------------------
     | START            | Project  dir.:C:\Temp\19-540\EX\4-hour_Chic\
     -------------------- Rainfall dir.:C:\Temp\19-540\EX\4-hour_Chic\
         TZERO =   .00 hrs on        0
         METOUT=   2 (output = METRIC)
         NRUN  = 0002
         NSTORM=   1
                #  1=CHI5YR.stm
     ------------------------------------------------------------------------------------
     R0002:C00002-------------------------------------------------------------------------
     *#**********************************************************************************
     *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
     *#**********************************************************************************
     *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
     *#  Date        : 10-14-2020
     *#  Modeller    : [BD]
     *#  Company     : WMI & Associates Ltd.
     *#  License #   :  2880720
     *#**********************************************************************************
     *
     * Pre-Development Condition - 140 Lockhart Road
     *
     ------------------------------------------------------------------------------------
     R0002:C00002-------------------------------------------------------------------------
     --------------------
     | READ STORM       |  Filename: C:\Temp\19-540\EX\4-hour_Chic\CHI5YR.stm
```



```
     | Ptotal=  50.52 mm|  Comments: * City of Barrie - 5 yr Chicago (4hr) + 15%
     --------------------
           TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
          hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
           0:10   3.570|   0:50   7.530|   1:30  33.310|   2:10   8.120|   2:50   4.970|   3:30
           0:20   4.070|   1:00  11.200|   1:40  17.990|   2:20   6.960|   3:00   4.560|   3:40
           0:30   4.760|   1:10  25.640|   1:50  12.600|   2:30   6.120|   3:10   4.220|   3:50
           0:40   5.790|   1:20 108.920|   2:00   9.820|   2:40   5.480|   3:20   3.930|   4:00

     ------------------------------------------------------------------------------------
     R0002:C00003-------------------------------------------------------------------------
     * PRE1
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
     | 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .590

          Unit Hyd Qpeak  (cms)=    1.929

          PEAK FLOW       (cms)=     .245 (i)
          TIME TO PEAK    (hrs)=    2.167
          DURATION        (hrs)=    7.867, (dddd|hh:mm:)=   0|07:52
          AVERAGE FLOW    (cms)=     .064
          RUNOFF VOLUME    (mm)=    6.044
          TOTAL RAINFALL   (mm)=   50.518
          RUNOFF COEFFICIENT   =     .120

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

     ------------------------------------------------------------------------------------
     R0002:C00004-------------------------------------------------------------------------
     * PRE2
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
     | 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .310

          Unit Hyd Qpeak  (cms)=     .899

          PEAK FLOW       (cms)=     .127 (i)
          TIME TO PEAK    (hrs)=    1.733
          DURATION        (hrs)=    6.150, (dddd|hh:mm:)=   0|06:09
          AVERAGE FLOW    (cms)=     .028
          RUNOFF VOLUME    (mm)=    8.501
          TOTAL RAINFALL   (mm)=   50.518
          RUNOFF COEFFICIENT   =     .168

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

     ------------------------------------------------------------------------------------
     R0002:C00005-------------------------------------------------------------------------
     ------------------------------------------------------------------------------------
     R0002:C00002-------------------------------------------------------------------------
```

```
  ** END OF RUN :    1

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\4-hour_Chic\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\4-hour_Chic\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0003
    NSTORM=   1
           #  1=CHI10YR.stm
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
*#***************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#***************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#***************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\4-hour_Chic\CHI10YR.stm
| Ptotal=  59.69 mm|  Comments: * City of Barrie - 10 yr Chicago (4hr) + 15%
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:10   4.320|   0:50   9.030|   1:30  39.220|   2:10   9.720|   2:50   5.990|   3:30
      0:20   4.910|   1:00  13.360|   1:40  21.350|   2:20   8.350|   3:00   5.500|   3:40
      0:30   5.730|   1:10  30.270|   1:50  15.010|   2:30   7.350|   3:10   5.090|   3:50
      0:40   6.960|   1:20 126.550|   2:00  11.740|   2:40   6.590|   3:20   4.740|   4:00

-----------------------------------------------------------------------------------------
R0003:C00003-----------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929
```



```
     PEAK FLOW       (cms)=     .354 (i)
     TIME TO PEAK    (hrs)=    2.150
     DURATION        (hrs)=    7.867, (dddd|hh:mm:)=   0|07:52
     AVERAGE FLOW    (cms)=     .091
     RUNOFF VOLUME    (mm)=    8.680
     TOTAL RAINFALL   (mm)=   59.693
     RUNOFF COEFFICIENT   =     .145

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

-----------------------------------------------------------------------------------------
R0003:C00004-----------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .182 (i)
     TIME TO PEAK    (hrs)=    1.717
     DURATION        (hrs)=    6.150, (dddd|hh:mm:)=   0|06:09
     AVERAGE FLOW    (cms)=     .040
     RUNOFF VOLUME    (mm)=   11.992
     TOTAL RAINFALL   (mm)=   59.693
     RUNOFF COEFFICIENT   =     .201

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

-----------------------------------------------------------------------------------------
R0003:C00005-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
  ** END OF RUN :    2

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\4-hour_Chic\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\4-hour_Chic\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0004
    NSTORM=   1
           #  1=CHI25YR.stm
-----------------------------------------------------------------------------------------
```

```
R0004:C00002-------------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\4-hour_Chic\CHI25YR.stm
| Ptotal=  71.24 mm|  Comments: * City of Barrie - 25 yr Chicago (4hr) + 15%
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:10   5.220|   0:50  10.910|   1:30  47.060|   2:10  11.740|   2:50   7.240|   3:30
      0:20   5.940|   1:00  16.130|   1:40  25.720|   2:20  10.090|   3:00   6.650|   3:40
      0:30   6.930|   1:10  36.370|   1:50  18.110|   2:30   8.890|   3:10   6.150|   3:50
      0:40   8.420|   1:20 148.150|   2:00  14.170|   2:40   7.960|   3:20   5.740|   4:00

-------------------------------------------------------------------------------------------
R0004:C00003-------------------------------------------------------------------------------
* PRE1
--------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=     .517 (i)
     TIME TO PEAK    (hrs)=    2.133
     DURATION        (hrs)=    7.867, (dddd|hh:mm:)=   0|07:52
     AVERAGE FLOW    (cms)=     .132
     RUNOFF VOLUME    (mm)=   12.534
     TOTAL RAINFALL   (mm)=   71.237
     RUNOFF COEFFICIENT   =     .176

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

-------------------------------------------------------------------------------------------
R0004:C00004-------------------------------------------------------------------------------
* PRE2
--------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
--------------------------   U.H. Tp(hrs)=     .310
```



```
     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .261 (i)
     TIME TO PEAK    (hrs)=    1.717
     DURATION        (hrs)=    6.150, (dddd|hh:mm:)=   0|06:09
     AVERAGE FLOW    (cms)=     .056
     RUNOFF VOLUME    (mm)=   17.001
     TOTAL RAINFALL   (mm)=   71.237
     RUNOFF COEFFICIENT   =     .239

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

-------------------------------------------------------------------------------------------
R0004:C00005-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
  ** END OF RUN :    3

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\4-hour_Chic\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\4-hour_Chic\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0005
    NSTORM=   1
           #  1=CHI50YR.stm
-------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
```

```
     --------------------
     | READ STORM       |  Filename: C:\Temp\19-540\EX\4-hour_Chic\CHI50YR.stm
     | Ptotal=  79.45 mm|  Comments: * City of Barrie - 50 yr Chicago (4hr) + 15%
     --------------------
          TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
         hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
          0:10   5.930|   0:50  12.270|   1:30  51.920|   2:10  13.200|   2:50   8.190|   3:30
          0:20   6.740|   1:00  18.040|   1:40  28.580|   2:20  11.370|   3:00   7.530|   3:40
          0:30   7.850|   1:10  40.220|   1:50  20.230|   2:30  10.030|   3:10   6.980|   3:50
          0:40   9.500|   1:20 164.220|   2:00  15.880|   2:40   9.000|   3:20   6.510|   4:00

     ------------------------------------------------------------------------------------------
     R0005:C00003-----------------------------------------------------------------------------
     * PRE1
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
     | 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .590

          Unit Hyd Qpeak  (cms)=    1.929

          PEAK FLOW       (cms)=     .645 (i)
          TIME TO PEAK    (hrs)=    2.133
          DURATION        (hrs)=    7.867, (dddd|hh:mm:)=   0|07:52
          AVERAGE FLOW    (cms)=     .164
          RUNOFF VOLUME    (mm)=   15.609
          TOTAL RAINFALL   (mm)=   79.453
          RUNOFF COEFFICIENT   =     .196

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

     ------------------------------------------------------------------------------------------
     R0005:C00004-----------------------------------------------------------------------------
     * PRE2
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
     | 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .310

          Unit Hyd Qpeak  (cms)=     .899

          PEAK FLOW       (cms)=     .323 (i)
          TIME TO PEAK    (hrs)=    1.717
          DURATION        (hrs)=    6.150, (dddd|hh:mm:)=   0|06:09
          AVERAGE FLOW    (cms)=     .069
          RUNOFF VOLUME    (mm)=   20.936
          TOTAL RAINFALL   (mm)=   79.453
          RUNOFF COEFFICIENT   =     .264

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

     ------------------------------------------------------------------------------------------
     R0005:C00005-----------------------------------------------------------------------------
```



```
     ------------------------------------------------------------------------------------------
     R0005:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0005:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0005:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0005:C00002-----------------------------------------------------------------------------
       ** END OF RUN :    4

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



     --------------------
     | START            | Project  dir.:C:\Temp\19-540\EX\4-hour_Chic\
     -------------------- Rainfall dir.:C:\Temp\19-540\EX\4-hour_Chic\
         TZERO =   .00 hrs on        0
         METOUT=   2 (output = METRIC)
         NRUN  = 0006
         NSTORM=   1
                #  1=CHI100YR.stm
     ------------------------------------------------------------------------------------------
     R0006:C00002-----------------------------------------------------------------------------
     *#****************************************************************************************
     *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
     *#****************************************************************************************
     *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
     *#  Date        : 10-14-2020
     *#  Modeller    : [BD]
     *#  Company     : WMI & Associates Ltd.
     *#  License #   :  2880720
     *#****************************************************************************************
     *
     * Pre-Development Condition - 140 Lockhart Road
     *
     ------------------------------------------------------------------------------------------
     R0006:C00002-----------------------------------------------------------------------------
     --------------------
     | READ STORM       |  Filename: C:\Temp\19-540\EX\4-hour_Chic\CHI100YR.stm
     | Ptotal=  87.58 mm|  Comments: * City of Barrie - 100 yr Chicago (4hr) + 15%
     --------------------
          TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
         hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
          0:10   6.410|   0:50  13.450|   1:30  58.540|   2:10  14.500|   2:50   8.900|   3:30
          0:20   7.290|   1:00  19.960|   1:40  31.960|   2:20  12.440|   3:00   8.160|   3:40
          0:30   8.520|   1:10  45.220|   1:50  22.450|   2:30  10.940|   3:10   7.560|   3:50
          0:40  10.360|   1:20 180.150|   2:00  17.520|   2:40   9.800|   3:20   7.040|   4:00

     ------------------------------------------------------------------------------------------
     R0006:C00003-----------------------------------------------------------------------------
```

```
     * PRE1
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
     | 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .590

          Unit Hyd Qpeak  (cms)=    1.929

          PEAK FLOW       (cms)=     .793 (i)
          TIME TO PEAK    (hrs)=    2.117
          DURATION        (hrs)=    7.867, (dddd|hh:mm:)=   0|07:52
          AVERAGE FLOW    (cms)=     .199
          RUNOFF VOLUME    (mm)=   18.900
          TOTAL RAINFALL   (mm)=   87.578
          RUNOFF COEFFICIENT   =     .216

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

     ------------------------------------------------------------------------------------
     R0006:C00004-----------------------------------------------------------------------
     * PRE2
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
     | 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .310

          Unit Hyd Qpeak  (cms)=     .899

          PEAK FLOW       (cms)=     .394 (i)
          TIME TO PEAK    (hrs)=    1.700
          DURATION        (hrs)=    6.150, (dddd|hh:mm:)=   0|06:09
          AVERAGE FLOW    (cms)=     .083
          RUNOFF VOLUME    (mm)=   25.097
          TOTAL RAINFALL   (mm)=   87.578
          RUNOFF COEFFICIENT   =     .287

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

     ------------------------------------------------------------------------------------
     R0006:C00005-----------------------------------------------------------------------
     ------------------------------------------------------------------------------------
     R0006:C00002-----------------------------------------------------------------------
     ------------------------------------------------------------------------------------
     R0006:C00002-----------------------------------------------------------------------
     ------------------------------------------------------------------------------------
     R0006:C00002-----------------------------------------------------------------------
     ------------------------------------------------------------------------------------
     R0006:C00002-----------------------------------------------------------------------
     ------------------------------------------------------------------------------------
     R0006:C00002-----------------------------------------------------------------------
       ** END OF RUN :    5

     ************************************************************************************
```



```
     --------------------
     | START            | Project  dir.:C:\Temp\19-540\EX\4-hour_Chic\
     -------------------- Rainfall dir.:C:\Temp\19-540\EX\4-hour_Chic\
         TZERO =   .00 hrs on        0
         METOUT=   2 (output = METRIC)
         NRUN  = 0007
         NSTORM=   1
                #  1=25mm4hr.stm
     ------------------------------------------------------------------------------------
     R0007:C00002-----------------------------------------------------------------------
     *#***************************************************************************************
     *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
     *#***************************************************************************************
     *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
     *#  Date        : 10-14-2020
     *#  Modeller    : [BD]
     *#  Company     : WMI & Associates Ltd.
     *#  License #   :  2880720
     *#***************************************************************************************
     *
     * Pre-Development Condition - 140 Lockhart Road
     *
     ------------------------------------------------------------------------------------
     R0007:C00002-----------------------------------------------------------------------
     --------------------
     | READ STORM       |  Filename: C:\Temp\19-540\EX\4-hour_Chic\25mm4hr.stm
     | Ptotal=  24.99 mm|  Comments: * City of Barrie - 25mm Chicago (4hr) + 15%
     --------------------
           TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
          hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
           0:10   1.670|   0:50   3.580|   1:30  16.620|   2:10   3.880|   2:50   2.340|   3:30
           0:20   1.910|   1:00   5.400|   1:40   8.800|   2:20   3.310|   3:00   2.140|   3:40
           0:30   2.240|   1:10  12.700|   1:50   6.090|   2:30   2.900|   3:10   1.980|   3:50
           0:40   2.740|   1:20  56.220|   2:00   4.710|   2:40   2.580|   3:20   1.840|   4:00

     ------------------------------------------------------------------------------------
     R0007:C00003-----------------------------------------------------------------------
     * PRE1
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
     | 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .590

          Unit Hyd Qpeak  (cms)=    1.929

          PEAK FLOW       (cms)=     .039 (i)
          TIME TO PEAK    (hrs)=    2.317
          DURATION        (hrs)=    7.867, (dddd|hh:mm:)=   0|07:52
```

```
     AVERAGE FLOW    (cms)=     .011
     RUNOFF VOLUME    (mm)=    1.042
     TOTAL RAINFALL   (mm)=   24.995
     RUNOFF COEFFICIENT   =     .042

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

--------------------------------------------------------------------------------
R0007:C00004----------------------------------------------------------------------
* PRE2
-------------------------
| CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
| 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .310

     Unit Hyd Qpeak  (cms)=     .899

     PEAK FLOW       (cms)=     .021 (i)
     TIME TO PEAK    (hrs)=    1.817
     DURATION        (hrs)=    6.150, (dddd|hh:mm:)=   0|06:09
     AVERAGE FLOW    (cms)=     .005
     RUNOFF VOLUME    (mm)=    1.612
     TOTAL RAINFALL   (mm)=   24.995
     RUNOFF COEFFICIENT   =     .065

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

--------------------------------------------------------------------------------
R0007:C00005----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
  ** END OF RUN :    6

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\EX\4-hour_Chic\
-------------------- Rainfall dir.:C:\Temp\19-540\EX\4-hour_Chic\
    TZERO =   .00 hrs on        0
```



```
    METOUT=   2 (output = METRIC)
    NRUN  = 0008
    NSTORM=   1
           #  1=HAZEL.STM
--------------------------------------------------------------------------------
R0008:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Pre-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0008:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\EX\4-hour_Chic\HAZEL.STM
| Ptotal= 212.00 mm|  Comments: * REGIONAL DESIGN STORM - HAZEL
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:12   6.000|   2:12   6.000|   4:12  17.000|   6:12  23.000|   8:12  13.000|  10:12
      0:24   6.000|   2:24   6.000|   4:24  17.000|   6:24  23.000|   8:24  13.000|  10:24
      0:36   6.000|   2:36   6.000|   4:36  17.000|   6:36  23.000|   8:36  13.000|  10:36
      0:48   6.000|   2:48   6.000|   4:48  17.000|   6:48  23.000|   8:48  13.000|  10:48
      1:00   6.000|   3:00   6.000|   5:00  17.000|   7:00  23.000|   9:00  13.000|  11:00
      1:12   4.000|   3:12  13.000|   5:12  13.000|   7:12  13.000|   9:12  53.000|  11:12
      1:24   4.000|   3:24  13.000|   5:24  13.000|   7:24  13.000|   9:24  53.000|  11:24
      1:36   4.000|   3:36  13.000|   5:36  13.000|   7:36  13.000|   9:36  53.000|  11:36
      1:48   4.000|   3:48  13.000|   5:48  13.000|   7:48  13.000|   9:48  53.000|  11:48
      2:00   4.000|   4:00  13.000|   6:00  13.000|   8:00  13.000|  10:00  53.000|  12:00

--------------------------------------------------------------------------------
R0008:C00003----------------------------------------------------------------------
* PRE1
-------------------------
| CALIB NASHYD           |   Area    (ha)=   29.800   Curve Number   (CN)= 50.00
| 01:PRE1       DT= 1.00 |   Ia      (mm)=    8.200   # of Linear Res.(N)=  3.00
-------------------------   U.H. Tp(hrs)=     .590

     Unit Hyd Qpeak  (cms)=    1.929

     PEAK FLOW       (cms)=    2.127 (i)
     TIME TO PEAK    (hrs)=   10.633
     DURATION        (hrs)=   15.867, (dddd|hh:mm:)=   0|15:52
     AVERAGE FLOW    (cms)=     .473
     RUNOFF VOLUME    (mm)=   90.726
     TOTAL RAINFALL   (mm)=  212.000
```

```
          RUNOFF COEFFICIENT   =     .428

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

     ------------------------------------------------------------------------------------------
     R0008:C00004-------------------------------------------------------------------------------
     * PRE2
     --------------------------
     | CALIB NASHYD           |   Area    (ha)=    7.300   Curve Number   (CN)= 59.00
     | 02:PRE2       DT= 1.00 |   Ia      (mm)=    7.300   # of Linear Res.(N)=  3.00
     --------------------------   U.H. Tp(hrs)=     .310

          Unit Hyd Qpeak  (cms)=     .899

          PEAK FLOW       (cms)=     .708 (i)
          TIME TO PEAK    (hrs)=   10.100
          DURATION        (hrs)=   14.150, (dddd|hh:mm:)=   0|14:09
          AVERAGE FLOW    (cms)=     .158
          RUNOFF VOLUME    (mm)=  109.919
          TOTAL RAINFALL   (mm)=  212.000
          RUNOFF COEFFICIENT   =     .518

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

     ------------------------------------------------------------------------------------------
     R0008:C00005-------------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0008:C00002-------------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0008:C00002-------------------------------------------------------------------------------
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     R0008:C00002-------------------------------------------------------------------------------
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     R0008:C00002-------------------------------------------------------------------------------
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     R0008:C00002-------------------------------------------------------------------------------
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     R0008:C00002-------------------------------------------------------------------------------
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     R0008:C00002-------------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0008:C00002-------------------------------------------------------------------------------
     --------------------
     | FINISH           |
     --------------------
     ------------------------------------------------------------------------------------------
     ******************************************************************************************
          WARNINGS / ERRORS / NOTES
          -------------------------
        Simulation ended on 2021-01-21     at 15:53:51
     ==========================================================================================
```

Post-Development Condition
24-hour SCS Type-II Storm Distribution

```
2     Metric units
*#*********************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*********************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*********************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
*% 2-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                    ["2Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
READ STORM           STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
* POST1A
CALIB STANDHYD       ID=[1], NHYD=["POST1A"], DT=[1](min), AREA=[14.7](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*SWM1A
ROUTE RESERVOIR      IDout=[2], NHYD=["SWM1A"], IDin=[1], RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                               [   0.0 ,  0.0 ]
                               [0.114 , 0.3865]
                               [0.230 , 0.5243]
                               [0.461 , 0.7257]
                               [0.693 , 0.8885]
                               [   -1  ,  -1  ]  (maximum one hundred pairs of points)
                               IDovf=[   ], NHYDovf=["      "],
*%-----------------|-------------------------------------------------------------
* POST1B
CALIB STANDHYD       ID=[3], NHYD=["POST1B"], DT=[1](min), AREA=[10.5](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*SWM1B
ROUTE RESERVOIR      IDout=[4], NHYD=["SWM1B"], IDin=[3], RDT=[1](min),
```



```
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                               [   0.0 ,  0.0 ]
                               [0.081 , 0.2764]
                               [0.165 , 0.3746]
                               [0.329 , 0.5187]
                               [0.495 , 0.6350]
                               [   -1  ,  -1  ]  (maximum one hundred pairs of points)
                               IDovf=[   ], NHYDovf=["      "],
*%-----------------|-------------------------------------------------------------
*POST1AB
ADD HYD              IDsum=[5], NHYD=["POST1AB"], IDs to add=[2+4](maximum ten)
*%-----------------|-------------------------------------------------------------
* POST2A
CALIB STANDHYD       ID=[6], NHYD=["POST2A"], DT=[1](min), AREA=[6.3](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
* POST2B
CALIB STANDHYD       ID=[7], NHYD=["POST2B"], DT=[1](min), AREA=[1.0](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*POST2AB
ADD HYD              IDsum=[8], NHYD=["POST2AB"], IDs to add=[6+7](maximum ten)
*%-----------------|-------------------------------------------------------------
*% 5-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*%                    ["5Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 10-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*%                    ["10Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*%                    ["25Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 50-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*%                    ["50Y24H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 100-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (24-hr)
```

```
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*%                   ["100Y24H.stm"] <--storm filename
*%-----------------|-----------------------------------------------------------|
*% Hurricane Hazel Regional Storm (48-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
*%                   ["HAZEL.STM"] <--storm filename
*%-----------------|-----------------------------------------------------------|
FINISH
```

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

    SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   77777 ==
    S       W W W   MM MM   H   H    Y Y    MM MM   O   O           2    0   0   11   7   7
    SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O           2    0   0   11       7
        S    W W    M   M   H   H     Y     M   M   O   O         222    0   0   11      7
    SSSSS    W W    M   M   H   H     Y     M   M    OOO          2      0   0   11     7   ==
                                                                  2      0   0   11    7    #
          StormWater Management HYdrologic Model                   222     000    11    7    ==

    ******************************************************************************************
    ************************************** SWMHYMO Ver4.05.0 ******************************
    ******************  A single event and continuous hydrologic simulation model  ************
    ******************     based on the principles of HYMO and its successors      ************
    ******************                 OTTHYMO-83 and OTTHYMO-89.                  ************
    ******************************************************************************************
    ****************** Distributed by:  J.F. Sabourin and Associates Inc.          ************
    ******************                  Ottawa,  Ontario: (613) 836-3884           ************
    ******************                  Gatineau, Quebec: (819) 243-6858           ************
    ******************                  E-Mail: swmhymo@jfsa.com                   ************
    ******************************************************************************************

    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
    +++++++++++++++++++ Licensed user: WMI & Associates Ltd.                       ++++++++++++
    +++++++++++++++++++                Barrie                SERIAL#:2880720       ++++++++++++
    ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

    ******************************************************************************************
    ******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            ************
    ******************           Maximum value for ID numbers  :     11            ************
    ******************           Max. number of rainfall points: 105408            ************
    ******************           Max. number of flow points    : 105408            ************
    ******************************************************************************************


    ******************************   D E T A I L E D   O U T P U T   ************************
    ******************************************************************************************
    *                 RUN DATE: 2021-01-22     TIME: 12:13:53     RUN COUNTER: 000033
    ******************************************************************************************
    * Input   file: C:\Temp\19-540\PR\24-hour_SCS\2-CYRSCS.dat
    * Output  file: C:\Temp\19-540\PR\24-hour_SCS\2-CYRSCS.out
    * Summary file: C:\Temp\19-540\PR\24-hour_SCS\2-CYRSCS.sum
    * User comments:
    * 1:_____________________________________________________________________________________
    * 2:_____________________________________________________________________________________
    * 3:_____________________________________________________________________________________
    ******************************************************************************************

  ----------------------------------------------------------------------------------------
  R0001:C00001------------------------------------------------------------------------------
  *#****************************************************************************************
  *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
  *#****************************************************************************************
```



```
  *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
  *#  Date        : 10-14-2020
  *#  Modeller    : [BD]
  *#  Company     : WMI & Associates Ltd.
  *#  License #   :  2880720
  *#****************************************************************************************
  *
  * Post-Development Condition - 140 Lockhart Road
  *
  --------------------
  | START            | Project  dir.:C:\Temp\19-540\PR\24-hour_SCS\
  -------------------- Rainfall dir.:C:\Temp\19-540\PR\24-hour_SCS\
      TZERO =   .00 hrs on        0
      METOUT=   2 (output = METRIC)
      NRUN  = 0001
      NSTORM=   1
             #  1=2Y24H.stm
  ----------------------------------------------------------------------------------------
  R0001:C00002------------------------------------------------------------------------------
  --------------------
  | READ STORM       |  Filename: C:\Temp\19-540\PR\24-hour_SCS\2Y24H.stm
  | Ptotal=  55.00 mm|  Comments: 2yr/24hr Barrie Wpcc +15% SCS
  --------------------
        TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
       hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
        0:15    .550|   4:15    .880|   8:15   1.480|  12:15   7.920|  16:15    .990|  20:15
        0:30    .550|   4:30    .880|   8:30   1.480|  12:30   7.920|  16:30    .990|  20:30
        0:45    .550|   4:45    .880|   8:45   1.480|  12:45   4.070|  16:45    .990|  20:45
        1:00    .550|   5:00    .880|   9:00   1.480|  13:00   4.070|  17:00    .990|  21:00
        1:15    .550|   5:15    .880|   9:15   1.760|  13:15    .770|  17:15    .990|  21:15
        1:30    .550|   5:30    .880|   9:30   1.760|  13:30    .770|  17:30    .990|  21:30
        1:45    .550|   5:45    .880|   9:45   1.980|  13:45   4.510|  17:45    .990|  21:45
        2:00    .990|   6:00    .880|  10:00   1.980|  14:00   4.510|  18:00    .990|  22:00
        2:15    .720|   6:15   1.100|  10:15   2.530|  14:15   1.650|  18:15    .990|  22:15
        2:30    .720|   6:30   1.100|  10:30   2.530|  14:30   1.650|  18:30    .990|  22:30
        2:45    .720|   6:45   1.100|  10:45   3.410|  14:45   1.650|  18:45    .990|  22:45
        3:00    .720|   7:00   1.100|  11:00   3.410|  15:00   1.650|  19:00    .990|  23:00
        3:15    .720|   7:15   1.100|  11:15   5.280|  15:15   1.650|  19:15    .990|  23:15
        3:30    .720|   7:30   1.100|  11:30   5.280|  15:30   1.650|  19:30    .990|  23:30
        3:45    .720|   7:45   1.100|  11:45  22.880|  15:45   1.650|  19:45    .990|  23:45
        4:00    .720|   8:00   1.100|  12:00  60.720|  16:00   1.650|  20:00    .990|  24:00

  ----------------------------------------------------------------------------------------
  R0001:C00003------------------------------------------------------------------------------
  * POST1A
  --------------------------
  | CALIB STANDHYD         |   Area    (ha)=   14.70
  | 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
  --------------------------
                                IMPERVIOUS    PERVIOUS (i)
       Surface Area     (ha)=      11.47         3.23
       Dep. Storage     (mm)=       2.00         5.00
       Average Slope     (%)=       1.50         2.00
```

```
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      60.72         5.49
                over (min)        7.00        33.00
     Storage Coeff.  (min)=       7.25 (ii)   33.01 (ii)
     Unit Hyd. Tpeak (min)=       7.00        33.00
     Unit Hyd. peak  (cms)=        .16          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.68          .03         1.692 (iii)
     TIME TO PEAK    (hrs)=      12.02        12.47        12.017
     RUNOFF VOLUME    (mm)=      53.00         7.95        43.093
     TOTAL RAINFALL   (mm)=      55.00        55.00        55.004
     RUNOFF COEFFICIENT   =        .96          .14          .783

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0001:C00004----------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .230 .5243E+00|    .461 .7257E+00|    .693 .
                           .114 .3865E+00|    .461 .7257E+00|    .693 .8885E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     1.692    12.017     43.093
    OUTFLOW < 02:SWM1A         14.700      .114    13.117     43.093

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.736
                    TIME SHIFT OF PEAK FLOW         (min)=    66.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3865E+00

--------------------------------------------------------------------------------
R0001:C00005----------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
```



```
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      60.72         5.49
                over (min)        7.00        33.00
     Storage Coeff.  (min)=       7.25 (ii)   33.01 (ii)
     Unit Hyd. Tpeak (min)=       7.00        33.00
     Unit Hyd. peak  (cms)=        .16          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.20          .02         1.209 (iii)
     TIME TO PEAK    (hrs)=      12.02        12.47        12.017
     RUNOFF VOLUME    (mm)=      52.99         7.95        43.093
     TOTAL RAINFALL   (mm)=      55.00        55.00        55.004
     RUNOFF COEFFICIENT   =        .96          .14          .783

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0001:C00006----------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .165 .3746E+00|    .329 .5187E+00|    .495 .
                           .081 .2764E+00|    .329 .5187E+00|    .495 .6350E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     1.209    12.017     43.093
    OUTFLOW < 04:SWM1B         10.500      .081    13.117     43.092

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.701
                    TIME SHIFT OF PEAK FLOW         (min)=    66.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2764E+00

--------------------------------------------------------------------------------
R0001:C00007----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .114   13.117    43.093    .000
                       +ID 2 04:SWM1B         10.500      .081   13.117    43.092    .000
                       ======================================================================
                       SUM   05:POST1AB       25.200      .195   13.117    43.093    .000

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

```
--------------------------------------------------------------------------------------------
R0001:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      60.72         5.49
                over (min)        7.00        33.00
     Storage Coeff.  (min)=       7.25 (ii)   33.01 (ii)
     Unit Hyd. Tpeak (min)=       7.00        33.00
     Unit Hyd. peak  (cms)=        .16          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .72          .01          .725 (iii)
     TIME TO PEAK    (hrs)=      12.02        12.47        12.017
     RUNOFF VOLUME    (mm)=      52.99         7.95        43.093
     TOTAL RAINFALL   (mm)=      55.00        55.00        55.004
     RUNOFF COEFFICIENT   =        .96          .14          .783

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0001:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      60.72         5.49
                over (min)        7.00        33.00
     Storage Coeff.  (min)=       7.25 (ii)   33.01 (ii)
     Unit Hyd. Tpeak (min)=       7.00        33.00
     Unit Hyd. peak  (cms)=        .16          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .11          .00          .115 (iii)
```



```
     TIME TO PEAK    (hrs)=      12.02        12.47        12.017
     RUNOFF VOLUME    (mm)=      53.00         7.95        43.093
     TOTAL RAINFALL   (mm)=      55.00        55.00        55.004
     RUNOFF COEFFICIENT   =        .96          .14          .783

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0001:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 06:POST2A        6.300      .725   12.017    43.093    .000
                       +ID 2 07:POST2B        1.000      .115   12.017    43.093    .000
                       ===================================================================
                       SUM   08:POST2AB       7.300      .841   12.017    43.093    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0001:C00011-------------------------------------------------------------------------------
  ** END OF RUN :    0

********************************************************************************************
```

```
--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0002
    NSTORM=   1
           #  1=5Y24H.stm
--------------------------------------------------------------------------------------------
R0002:C00002-------------------------------------------------------------------------------
*#******************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************************
```

```
*
* Post-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------------
R0002:C00002-------------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\24-hour_SCS\5Y24H.stm
| Ptotal=  76.01 mm|  Comments: 5yr/24hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15    .760|   4:15   1.220|   8:15   2.050|  12:15  10.940|  16:15   1.370|  20:15
      0:30    .760|   4:30   1.220|   8:30   2.050|  12:30  10.940|  16:30   1.370|  20:30
      0:45    .760|   4:45   1.220|   8:45   2.050|  12:45   5.620|  16:45   1.370|  20:45
      1:00    .760|   5:00   1.220|   9:00   2.050|  13:00   5.620|  17:00   1.370|  21:00
      1:15    .760|   5:15   1.220|   9:15   2.430|  13:15   1.060|  17:15   1.370|  21:15
      1:30    .760|   5:30   1.220|   9:30   2.430|  13:30   1.060|  17:30   1.370|  21:30
      1:45    .760|   5:45   1.220|   9:45   2.740|  13:45   6.230|  17:45   1.370|  21:45
      2:00   1.370|   6:00   1.220|  10:00   2.740|  14:00   6.230|  18:00   1.370|  22:00
      2:15    .990|   6:15   1.520|  10:15   3.500|  14:15   2.280|  18:15   1.370|  22:15
      2:30    .990|   6:30   1.520|  10:30   3.500|  14:30   2.280|  18:30   1.370|  22:30
      2:45    .990|   6:45   1.520|  10:45   4.710|  14:45   2.280|  18:45   1.370|  22:45
      3:00    .990|   7:00   1.520|  11:00   4.710|  15:00   2.280|  19:00   1.370|  23:00
      3:15    .990|   7:15   1.520|  11:15   7.300|  15:15   2.280|  19:15   1.370|  23:15
      3:30    .990|   7:30   1.520|  11:30   7.300|  15:30   2.280|  19:30   1.370|  23:30
      3:45    .990|   7:45   1.520|  11:45  31.620|  15:45   2.280|  19:45   1.370|  23:45
      4:00    .990|   8:00   1.520|  12:00  83.900|  16:00   2.280|  20:00   1.370|  24:00

-------------------------------------------------------------------------------------------
R0002:C00003-------------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.90        12.86
                over (min)        6.00        25.00
     Storage Coeff.  (min)=       6.37 (ii)   24.70 (ii)
     Unit Hyd. Tpeak (min)=       6.00        25.00
     Unit Hyd. peak  (cms)=        .18          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.41          .07         2.443 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.32        12.017
     RUNOFF VOLUME    (mm)=      73.99        15.03        61.032
     TOTAL RAINFALL   (mm)=      76.01        76.01        76.006
     RUNOFF COEFFICIENT   =        .97          .20          .803
```



```
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------------
R0002:C00004-------------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .230 .5243E+00|    .461 .7257E+00|    .693 .
                          .114 .3865E+00|    .461 .7257E+00|    .693 .8885E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     2.443    12.017     61.032
    OUTFLOW < 02:SWM1A         14.700      .230    12.850     61.031

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.415
                    TIME SHIFT OF PEAK FLOW         (min)=    50.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5243E+00

-------------------------------------------------------------------------------------------
R0002:C00005-------------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.90        12.86
                over (min)        6.00        25.00
     Storage Coeff.  (min)=       6.37 (ii)   24.70 (ii)
     Unit Hyd. Tpeak (min)=       6.00        25.00
     Unit Hyd. peak  (cms)=        .18          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.72          .05         1.745 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.32        12.017
     RUNOFF VOLUME    (mm)=      73.99        15.03        61.032
     TOTAL RAINFALL   (mm)=      76.01        76.01        76.006
     RUNOFF COEFFICIENT   =        .97          .20          .803
```

```
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0002:C00006-------------------------------------------------------------------------------
*SWM1B
------------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .165 .3746E+00|    .329 .5187E+00|    .495 .
                           .081 .2764E+00|    .329 .5187E+00|    .495 .6350E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------     (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     1.745    12.017     61.032
    OUTFLOW < 04:SWM1B         10.500      .165    12.833     61.031

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.456
                    TIME SHIFT OF PEAK FLOW         (min)=    49.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3746E+00

--------------------------------------------------------------------------------------------
R0002:C00007-------------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 02:SWM1A         14.700      .230   12.850    61.031    .000
                      +ID 2 04:SWM1B         10.500      .165   12.833    61.031    .000
                      ==================================================================
                      SUM   05:POST1AB       25.200      .395   12.833    61.031    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0002:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250
```



```
     Max.eff.Inten.(mm/hr)=      83.90        12.86
                over (min)        6.00        25.00
     Storage Coeff.  (min)=       6.37 (ii)   24.70 (ii)
     Unit Hyd. Tpeak (min)=       6.00        25.00
     Unit Hyd. peak  (cms)=        .18          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.03          .03         1.047 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.32        12.017
     RUNOFF VOLUME    (mm)=      74.00        15.03        61.032
     TOTAL RAINFALL   (mm)=      76.01        76.01        76.006
     RUNOFF COEFFICIENT   =        .97          .20          .803

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0002:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.90        12.86
                over (min)        6.00        25.00
     Storage Coeff.  (min)=       6.37 (ii)   24.70 (ii)
     Unit Hyd. Tpeak (min)=       6.00        25.00
     Unit Hyd. peak  (cms)=        .18          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .16          .01          .166 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.32        12.017
     RUNOFF VOLUME    (mm)=      74.01        15.03        61.032
     TOTAL RAINFALL   (mm)=      76.01        76.01        76.006
     RUNOFF COEFFICIENT   =        .97          .20          .803

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0002:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
```

```
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 06:POST2A         6.300     1.047   12.017    61.032    .000
                      +ID 2 07:POST2B         1.000      .166   12.017    61.032    .000
                      ================================================================
                      SUM   08:POST2AB        7.300     1.213   12.017    61.032    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------------
R0002:C00011-----------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0002:C00002-----------------------------------------------------------------------------
  ** END OF RUN :    1

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0003
    NSTORM=   1
           #  1=10Y24H.stm
-------------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
*#***************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#***************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#***************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------------
R0003:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\24-hour_SCS\10Y24H.stm
| Ptotal=  89.94 mm|  Comments: 10yr/24hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15    .900|   4:15   1.440|   8:15   2.430|  12:15  12.950|  16:15   1.620|  20:15
```



```
      0:30    .900|   4:30   1.440|   8:30   2.430|  12:30  12.950|  16:30   1.620|  20:30
      0:45    .900|   4:45   1.440|   8:45   2.430|  12:45   6.650|  16:45   1.620|  20:45
      1:00    .900|   5:00   1.440|   9:00   2.430|  13:00   6.650|  17:00   1.620|  21:00
      1:15    .900|   5:15   1.440|   9:15   2.880|  13:15   1.260|  17:15   1.620|  21:15
      1:30    .900|   5:30   1.440|   9:30   2.880|  13:30   1.260|  17:30   1.620|  21:30
      1:45    .900|   5:45   1.440|   9:45   3.240|  13:45   7.370|  17:45   1.620|  21:45
      2:00   1.620|   6:00   1.440|  10:00   3.240|  14:00   7.370|  18:00   1.620|  22:00
      2:15   1.170|   6:15   1.800|  10:15   4.140|  14:15   2.700|  18:15   1.620|  22:15
      2:30   1.170|   6:30   1.800|  10:30   4.140|  14:30   2.700|  18:30   1.620|  22:30
      2:45   1.170|   6:45   1.800|  10:45   5.570|  14:45   2.700|  18:45   1.620|  22:45
      3:00   1.170|   7:00   1.800|  11:00   5.570|  15:00   2.700|  19:00   1.620|  23:00
      3:15   1.170|   7:15   1.800|  11:15   8.630|  15:15   2.700|  19:15   1.620|  23:15
      3:30   1.170|   7:30   1.800|  11:30   8.630|  15:30   2.700|  19:30   1.620|  23:30
      3:45   1.170|   7:45   1.800|  11:45  37.400|  15:45   2.700|  19:45   1.620|  23:45
      4:00   1.170|   8:00   1.800|  12:00  99.250|  16:00   2.700|  20:00   1.620|  24:00

-------------------------------------------------------------------------------------------
R0003:C00003-----------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      99.25        20.04
                over (min)        6.00        21.00
     Storage Coeff.  (min)=       5.96 (ii)   21.31 (ii)
     Unit Hyd. Tpeak (min)=       6.00        21.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.89          .11          2.949 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.25         12.000
     RUNOFF VOLUME    (mm)=      87.93        20.65         73.135
     TOTAL RAINFALL   (mm)=      89.94        89.94         89.938
     RUNOFF COEFFICIENT   =        .98          .23           .813

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------------
R0003:C00004-----------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
```

```
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTLFOW   STORAGE| OUTLFOW   STORAGE| OUTLFOW   STORAGE| OUTLFOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .230 .5243E+00|    .461 .7257E+00|    .693 .
                           .114 .3865E+00|    .461 .7257E+00|    .693 .8885E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     2.949    12.000     73.135
    OUTFLOW < 02:SWM1A         14.700      .332    12.683     73.134

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.253
                    TIME SHIFT OF PEAK FLOW         (min)=    41.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.6132E+00

-------------------------------------------------------------------------------------
R0003:C00005---------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      99.25        20.04
                over (min)        6.00        21.00
     Storage Coeff.  (min)=       5.96 (ii)   21.31 (ii)
     Unit Hyd. Tpeak (min)=       6.00        21.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.06          .08          2.107 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.25         12.000
     RUNOFF VOLUME    (mm)=      87.94        20.65         73.135
     TOTAL RAINFALL   (mm)=      89.94        89.94         89.938
     RUNOFF COEFFICIENT   =        .98          .23           .813

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
R0003:C00006---------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
```



```
---------------------- OUTLFOW   STORAGE| OUTLFOW   STORAGE| OUTLFOW   STORAGE| OUTLFOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .165 .3746E+00|    .329 .5187E+00|    .495 .
                           .081 .2764E+00|    .329 .5187E+00|    .495 .6350E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     2.107    12.000     73.135
    OUTFLOW < 04:SWM1B         10.500      .237    12.683     73.134

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.265
                    TIME SHIFT OF PEAK FLOW         (min)=    41.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.4382E+00

-------------------------------------------------------------------------------------
R0003:C00007---------------------------------------------------------------------------
*POST1AB
-----------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
-----------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .332   12.683    73.134    .000
                       +ID 2 04:SWM1B         10.500      .237   12.683    73.134    .000
                       ==================================================================
                       SUM   05:POST1AB       25.200      .569   12.683    73.134    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
R0003:C00008---------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      99.25        20.04
                over (min)        6.00        21.00
     Storage Coeff.  (min)=       5.96 (ii)   21.31 (ii)
     Unit Hyd. Tpeak (min)=       6.00        21.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.24          .05          1.264 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.25         12.000
     RUNOFF VOLUME    (mm)=      87.93        20.66         73.135
     TOTAL RAINFALL   (mm)=      89.94        89.94         89.938
     RUNOFF COEFFICIENT   =        .98          .23           .813
```

```
       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0003:C00009----------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      99.25        20.04
                over (min)        6.00        21.00
     Storage Coeff.  (min)=       5.96 (ii)   21.31 (ii)
     Unit Hyd. Tpeak (min)=       6.00        21.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .20          .01          .201 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.25        12.000
     RUNOFF VOLUME    (mm)=      87.93        20.65        73.135
     TOTAL RAINFALL   (mm)=      89.94        89.94        89.938
     RUNOFF COEFFICIENT   =        .98          .23          .813

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0003:C00010----------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD               |
| 08:POST2AB            |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 06:POST2A         6.300     1.264   12.000    73.135    .000
                      +ID 2 07:POST2B         1.000      .201   12.000    73.135    .000
                      ==================================================================
                      SUM   08:POST2AB        7.300     1.465   12.000    73.135    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0003:C00011----------------------------------------------------------------------
```



```
--------------------------------------------------------------------------------
R0003:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0003:C00002----------------------------------------------------------------------
  ** END OF RUN :    2

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0004
    NSTORM=   1
           #  1=25Y24H.stm
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\24-hour_SCS\25Y24H.stm
| Ptotal= 107.47 mm|  Comments: 25yr/24hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   1.080|   4:15   1.720|   8:15   2.900|  12:15  15.480|  16:15   1.930|  20:15
      0:30   1.080|   4:30   1.720|   8:30   2.900|  12:30  15.480|  16:30   1.930|  20:30
      0:45   1.080|   4:45   1.720|   8:45   2.900|  12:45   7.950|  16:45   1.930|  20:45
      1:00   1.080|   5:00   1.720|   9:00   2.900|  13:00   7.950|  17:00   1.930|  21:00
      1:15   1.080|   5:15   1.720|   9:15   3.440|  13:15   1.500|  17:15   1.930|  21:15
      1:30   1.080|   5:30   1.720|   9:30   3.440|  13:30   1.500|  17:30   1.930|  21:30
      1:45   1.080|   5:45   1.720|   9:45   3.870|  13:45   8.820|  17:45   1.930|  21:45
      2:00   1.930|   6:00   1.720|  10:00   3.870|  14:00   8.820|  18:00   1.930|  22:00
      2:15   1.400|   6:15   2.150|  10:15   4.940|  14:15   3.220|  18:15   1.930|  22:15
      2:30   1.400|   6:30   2.150|  10:30   4.940|  14:30   3.220|  18:30   1.930|  22:30
      2:45   1.400|   6:45   2.150|  10:45   6.660|  14:45   3.220|  18:45   1.930|  22:45
```

```
       3:00   1.400|   7:00   2.150|  11:00   6.660|  15:00   3.220|  19:00   1.930|  23:00
       3:15   1.400|   7:15   2.150|  11:15  10.320|  15:15   3.220|  19:15   1.930|  23:15
       3:30   1.400|   7:30   2.150|  11:30  10.320|  15:30   3.220|  19:30   1.930|  23:30
       3:45   1.400|   7:45   2.150|  11:45  44.720|  15:45   3.220|  19:45   1.930|  23:45
       4:00   1.400|   8:00   2.150|  12:00 118.680|  16:00   3.220|  20:00   1.930|  24:00

  ------------------------------------------------------------------------------------------
  R0004:C00003-----------------------------------------------------------------------------
  * POST1A
  --------------------------
  | CALIB STANDHYD         |   Area    (ha)=   14.70
  | 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
  --------------------------
                               IMPERVIOUS    PERVIOUS (i)
       Surface Area     (ha)=      11.47         3.23
       Dep. Storage     (mm)=       2.00         5.00
       Average Slope     (%)=       1.50         2.00
       Length            (m)=     500.00        50.00
       Mannings n           =       .013         .250

       Max.eff.Inten.(mm/hr)=     118.68        29.97
                  over (min)        6.00        19.00
       Storage Coeff.  (min)=       5.55 (ii)   18.61 (ii)
       Unit Hyd. Tpeak (min)=       6.00        19.00
       Unit Hyd. peak  (cms)=        .20          .06
                                                          *TOTALS*
       PEAK FLOW       (cms)=       3.50          .17         3.601 (iii)
       TIME TO PEAK    (hrs)=      12.00        12.22        12.000
       RUNOFF VOLUME    (mm)=     105.47        28.62        88.566
       TOTAL RAINFALL   (mm)=     107.47       107.47       107.473
       RUNOFF COEFFICIENT   =        .98          .27          .824

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  49.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

  ------------------------------------------------------------------------------------------
  R0004:C00004-----------------------------------------------------------------------------
  *SWM1A
  -----------------------
  |  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
  |  IN>01:POST1A       |
  | OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
  ----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                            (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                             .000 .0000E+00|    .230 .5243E+00|    .461 .7257E+00|    .693 .
                             .114 .3865E+00|    .461 .7257E+00|    .693 .8885E+00|    .000 .

       ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
       -----------------------     (ha)     (cms)     (hrs)       (mm)
       INFLOW > 01:POST1A        14.700     3.601    12.000     88.566
      OUTFLOW < 02:SWM1A         14.700      .461    12.617     88.565
```



```
                      PEAK   FLOW   REDUCTION [Qout/Qin](%)=   12.800
                      TIME SHIFT OF PEAK FLOW         (min)=    37.00
                      MAXIMUM  STORAGE   USED       (ha.m.)=.7257E+00

  ------------------------------------------------------------------------------------------
  R0004:C00005-----------------------------------------------------------------------------
  * POST1B
  --------------------------
  | CALIB STANDHYD         |   Area    (ha)=   10.50
  | 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
  --------------------------
                               IMPERVIOUS    PERVIOUS (i)
       Surface Area     (ha)=       8.19         2.31
       Dep. Storage     (mm)=       2.00         5.00
       Average Slope     (%)=       1.50         2.00
       Length            (m)=     500.00        50.00
       Mannings n           =       .013         .250

       Max.eff.Inten.(mm/hr)=     118.68        29.97
                  over (min)        6.00        19.00
       Storage Coeff.  (min)=       5.55 (ii)   18.61 (ii)
       Unit Hyd. Tpeak (min)=       6.00        19.00
       Unit Hyd. peak  (cms)=        .20          .06
                                                          *TOTALS*
       PEAK FLOW       (cms)=       2.50          .12         2.572 (iii)
       TIME TO PEAK    (hrs)=      12.00        12.22        12.000
       RUNOFF VOLUME    (mm)=     105.47        28.62        88.566
       TOTAL RAINFALL   (mm)=     107.47       107.47       107.473
       RUNOFF COEFFICIENT   =        .98          .27          .824

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  49.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

  ------------------------------------------------------------------------------------------
  R0004:C00006-----------------------------------------------------------------------------
  *SWM1B
  -----------------------
  |  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
  |  IN>03:POST1B       |
  | OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
  ----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                            (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                             .000 .0000E+00|    .165 .3746E+00|    .329 .5187E+00|    .495 .
                             .081 .2764E+00|    .329 .5187E+00|    .495 .6350E+00|    .000 .

       ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
       -----------------------     (ha)     (cms)     (hrs)       (mm)
       INFLOW > 03:POST1B        10.500     2.572    12.000     88.566
      OUTFLOW < 04:SWM1B         10.500      .329    12.617     88.564
```

```
                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   12.788
                    TIME SHIFT OF PEAK FLOW         (min)=    37.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5187E+00

--------------------------------------------------------------------------------
R0004:C00007----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                      ID 1 02:SWM1A         14.700      .461   12.617    88.565    .000
                     +ID 2 04:SWM1B         10.500      .329   12.617    88.564    .000
                     ================================================================
                     SUM   05:POST1AB       25.200      .790   12.617    88.565    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0004:C00008----------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     118.68        29.97
                over (min)        6.00        19.00
     Storage Coeff.  (min)=       5.55 (ii)   18.61 (ii)
     Unit Hyd. Tpeak (min)=       6.00        19.00
     Unit Hyd. peak  (cms)=        .20          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.50          .07          1.544 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.22         12.000
     RUNOFF VOLUME    (mm)=     105.46        28.63         88.566
     TOTAL RAINFALL   (mm)=     107.47       107.47        107.473
     RUNOFF COEFFICIENT   =        .98          .27           .824

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0004:C00009----------------------------------------------------------------------
* POST2B
--------------------------
```



```
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     118.68        29.97
                over (min)        6.00        19.00
     Storage Coeff.  (min)=       5.55 (ii)   18.61 (ii)
     Unit Hyd. Tpeak (min)=       6.00        19.00
     Unit Hyd. peak  (cms)=        .20          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .24          .01           .245 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.22         12.000
     RUNOFF VOLUME    (mm)=     105.46        28.62         88.566
     TOTAL RAINFALL   (mm)=     107.47       107.47        107.473
     RUNOFF COEFFICIENT   =        .98          .27           .824

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0004:C00010----------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                      ID 1 06:POST2A         6.300      1.544   12.000    88.566    .000
                     +ID 2 07:POST2B         1.000       .245   12.000    88.566    .000
                     ================================================================
                     SUM   08:POST2AB        7.300      1.789   12.000    88.566    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0004:C00011----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
  ** END OF RUN :    3

********************************************************************************
```

```
--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0005
    NSTORM=   1
           #  1=50Y24H.stm
-------------------------------------------------------------------------------------
R0005:C00002-----------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------
R0005:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\24-hour_SCS\50Y24H.stm
| Ptotal= 120.63 mm|  Comments: 50yr/24hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   1.210|   4:15   1.930|   8:15   3.260|  12:15  17.370|  16:15   2.170|  20:15
      0:30   1.210|   4:30   1.930|   8:30   3.260|  12:30  17.370|  16:30   2.170|  20:30
      0:45   1.210|   4:45   1.930|   8:45   3.260|  12:45   8.920|  16:45   2.170|  20:45
      1:00   1.210|   5:00   1.930|   9:00   3.260|  13:00   8.920|  17:00   2.170|  21:00
      1:15   1.210|   5:15   1.930|   9:15   3.860|  13:15   1.690|  17:15   2.170|  21:15
      1:30   1.210|   5:30   1.930|   9:30   3.860|  13:30   1.690|  17:30   2.170|  21:30
      1:45   1.210|   5:45   1.930|   9:45   4.340|  13:45   9.890|  17:45   2.170|  21:45
      2:00   2.170|   6:00   1.930|  10:00   4.340|  14:00   9.890|  18:00   2.170|  22:00
      2:15   1.570|   6:15   2.410|  10:15   5.550|  14:15   3.620|  18:15   2.170|  22:15
      2:30   1.570|   6:30   2.410|  10:30   5.550|  14:30   3.620|  18:30   2.170|  22:30
      2:45   1.570|   6:45   2.410|  10:45   7.480|  14:45   3.620|  18:45   2.170|  22:45
      3:00   1.570|   7:00   2.410|  11:00   7.480|  15:00   3.620|  19:00   2.170|  23:00
      3:15   1.570|   7:15   2.410|  11:15  11.580|  15:15   3.620|  19:15   2.170|  23:15
      3:30   1.570|   7:30   2.410|  11:30  11.580|  15:30   3.620|  19:30   2.170|  23:30
      3:45   1.570|   7:45   2.410|  11:45  50.170|  15:45   3.620|  19:45   2.170|  23:45
      4:00   1.570|   8:00   2.410|  12:00 133.140|  16:00   3.620|  20:00   2.170|  24:00

-------------------------------------------------------------------------------------
R0005:C00003-----------------------------------------------------------------------------
```



```
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     133.14        39.90
                over (min)        5.00        17.00
     Storage Coeff.  (min)=       5.30 (ii)   16.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.99          .22          4.137 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.18         12.000
     RUNOFF VOLUME    (mm)=     118.62        35.18        100.269
     TOTAL RAINFALL   (mm)=     120.63       120.63        120.626
     RUNOFF COEFFICIENT   =        .98          .29           .831

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
R0005:C00004-----------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .230 .5243E+00|    .461 .7257E+00|    .693 .
                           .114 .3865E+00|    .461 .7257E+00|    .693 .8885E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     4.137    12.000    100.269
    OUTFLOW < 02:SWM1A         14.700      .578    12.583    100.266

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   13.970
                  TIME SHIFT OF PEAK FLOW         (min)=    35.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.8078E+00

-------------------------------------------------------------------------------------
R0005:C00005-----------------------------------------------------------------------------
* POST1B
```

```
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     133.14        39.90
                over (min)        5.00        17.00
     Storage Coeff.  (min)=       5.30 (ii)   16.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.85          .16          2.955 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.18         12.000
     RUNOFF VOLUME    (mm)=     118.60        35.18        100.269
     TOTAL RAINFALL   (mm)=     120.63       120.63        120.626
     RUNOFF COEFFICIENT   =        .98          .29           .831

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0005:C00006--------------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .165 .3746E+00|    .329 .5187E+00|    .495 .
                           .081 .2764E+00|    .329 .5187E+00|    .495 .6350E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     2.955    12.000    100.269
    OUTFLOW < 04:SWM1B         10.500      .413    12.583    100.267

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   13.966
                    TIME SHIFT OF PEAK FLOW         (min)=    35.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5773E+00

--------------------------------------------------------------------------------------------
R0005:C00007--------------------------------------------------------------------------------
*POST1AB
------------------------
```



```
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .578   12.583   100.266    .000
                       +ID 2 04:SWM1B         10.500      .413   12.583   100.267    .000
                       ================================================================
                       SUM   05:POST1AB       25.200      .991   12.583   100.267    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0005:C00008--------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     133.14        39.90
                over (min)        5.00        17.00
     Storage Coeff.  (min)=       5.30 (ii)   16.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.71          .09          1.773 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.18         12.000
     RUNOFF VOLUME    (mm)=     118.62        35.18        100.269
     TOTAL RAINFALL   (mm)=     120.63       120.63        120.626
     RUNOFF COEFFICIENT   =        .98          .29           .831

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0005:C00009--------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
```

```
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     133.14        39.90
                over (min)        5.00        17.00
     Storage Coeff.  (min)=       5.30 (ii)   16.95 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .27          .02          .282 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.18        12.000
     RUNOFF VOLUME    (mm)=     118.62        35.18       100.269
     TOTAL RAINFALL   (mm)=     120.63       120.63       120.626
     RUNOFF COEFFICIENT   =        .98          .29          .831

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0005:C00010----------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 06:POST2A         6.300     1.773   12.000   100.269    .000
                      +ID 2 07:POST2B         1.000      .282   12.000   100.269    .000
                      ================================================================
                      SUM   08:POST2AB        7.300     2.054   12.000   100.269    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0005:C00011----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
  ** END OF RUN :    4

********************************************************************************
```

```
--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\24-hour_SCS\
```



```
--------------------- Rainfall dir.:C:\Temp\19-540\PR\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0006
    NSTORM=   1
            #  1=100Y24H.stm
--------------------------------------------------------------------------------
R0006:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0006:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\24-hour_SCS\100Y24H.stm
| Ptotal= 133.60 mm|  Comments: 100yr/24hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   1.340|   4:15   2.140|   8:15   3.610|  12:15  19.240|  16:15   2.400|  20:15
      0:30   1.340|   4:30   2.140|   8:30   3.610|  12:30  19.240|  16:30   2.400|  20:30
      0:45   1.340|   4:45   2.140|   8:45   3.610|  12:45   9.890|  16:45   2.400|  20:45
      1:00   1.340|   5:00   2.140|   9:00   3.610|  13:00   9.890|  17:00   2.400|  21:00
      1:15   1.340|   5:15   2.140|   9:15   4.280|  13:15   1.870|  17:15   2.400|  21:15
      1:30   1.340|   5:30   2.140|   9:30   4.280|  13:30   1.870|  17:30   2.400|  21:30
      1:45   1.340|   5:45   2.140|   9:45   4.810|  13:45  10.960|  17:45   2.400|  21:45
      2:00   2.400|   6:00   2.140|  10:00   4.810|  14:00  10.960|  18:00   2.400|  22:00
      2:15   1.740|   6:15   2.670|  10:15   6.150|  14:15   4.010|  18:15   2.400|  22:15
      2:30   1.740|   6:30   2.670|  10:30   6.150|  14:30   4.010|  18:30   2.400|  22:30
      2:45   1.740|   6:45   2.670|  10:45   8.280|  14:45   4.010|  18:45   2.400|  22:45
      3:00   1.740|   7:00   2.670|  11:00   8.280|  15:00   4.010|  19:00   2.400|  23:00
      3:15   1.740|   7:15   2.670|  11:15  12.830|  15:15   4.010|  19:15   2.400|  23:15
      3:30   1.740|   7:30   2.670|  11:30  12.830|  15:30   4.010|  19:30   2.400|  23:30
      3:45   1.740|   7:45   2.670|  11:45  55.580|  15:45   4.010|  19:45   2.400|  23:45
      4:00   1.740|   8:00   2.670|  12:00 147.490|  16:00   4.010|  20:00   2.400|  24:00

--------------------------------------------------------------------------------
R0006:C00003----------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     147.49        49.96
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       5.09 (ii)   15.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                        *TOTALS*
     PEAK FLOW       (cms)=       4.44          .28          4.640 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.17         12.000
     RUNOFF VOLUME    (mm)=     131.58        42.08        111.906
     TOTAL RAINFALL   (mm)=     133.60       133.60        133.599
     RUNOFF COEFFICIENT   =        .98          .31           .838

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0006:C00004----------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .230 .5243E+00|    .461 .7257E+00|    .693 .
                           .114 .3865E+00|    .461 .7257E+00|    .693 .8885E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     4.640    12.000    111.906
    OUTFLOW < 02:SWM1A         14.700      .693    12.550    111.904

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   14.933
                    TIME SHIFT OF PEAK FLOW         (min)=    33.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.8885E+00

--------------------------------------------------------------------------------
R0006:C00005----------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
```



```
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     147.49        49.96
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       5.09 (ii)   15.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                        *TOTALS*
     PEAK FLOW       (cms)=       3.17          .20          3.315 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.17         12.000
     RUNOFF VOLUME    (mm)=     131.59        42.08        111.906
     TOTAL RAINFALL   (mm)=     133.60       133.60        133.599
     RUNOFF COEFFICIENT   =        .98          .31           .838

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0006:C00006----------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .165 .3746E+00|    .329 .5187E+00|    .495 .
                           .081 .2764E+00|    .329 .5187E+00|    .495 .6350E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     3.315    12.000    111.906
    OUTFLOW < 04:SWM1B         10.500      .495    12.550    111.905

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   14.933
                    TIME SHIFT OF PEAK FLOW         (min)=    33.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.6350E+00

--------------------------------------------------------------------------------
R0006:C00007----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                        (ha)     (cms)    (hrs)      (mm)   (cms)
                         ID 1 02:SWM1A         14.700      .693   12.550   111.904    .000
                        +ID 2 04:SWM1B         10.500      .495   12.550   111.905    .000
                        ==================================================================
```

```
                        SUM   05:POST1AB       25.200     1.188   12.550   111.903    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     147.49        49.96
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       5.09 (ii)   15.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.90          .12          1.989 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.17         12.000
     RUNOFF VOLUME    (mm)=     131.59        42.08        111.906
     TOTAL RAINFALL   (mm)=     133.60       133.60        133.599
     RUNOFF COEFFICIENT   =        .98          .31           .838

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     147.49        49.96
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       5.09 (ii)   15.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
```



```
     Unit Hyd. peak  (cms)=        .22          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .30          .02           .316 (iii)
     TIME TO PEAK    (hrs)=      12.00        12.17         12.000
     RUNOFF VOLUME    (mm)=     131.58        42.09        111.906
     TOTAL RAINFALL   (mm)=     133.60       133.60        133.599
     RUNOFF COEFFICIENT   =        .98          .32           .838

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 06:POST2A        6.300     1.989   12.000   111.906    .000
                       +ID 2 07:POST2B        1.000      .316   12.000   111.906    .000
                       ======================================================================
                       SUM   08:POST2AB       7.300     2.305   12.000   111.906    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00011-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------------
  ** END OF RUN :    5

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\24-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\24-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0007
```

```
    NSTORM=   1
            #  1=HAZEL.STM
-----------------------------------------------------------------------------------------
R0007:C00002-----------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
-----------------------------------------------------------------------------------------
R0007:C00002-----------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\24-hour_SCS\HAZEL.STM
| Ptotal= 212.00 mm|  Comments: * REGIONAL DESIGN STORM - HAZEL
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:12   6.000|   2:12   6.000|   4:12  17.000|   6:12  23.000|   8:12  13.000|  10:12
      0:24   6.000|   2:24   6.000|   4:24  17.000|   6:24  23.000|   8:24  13.000|  10:24
      0:36   6.000|   2:36   6.000|   4:36  17.000|   6:36  23.000|   8:36  13.000|  10:36
      0:48   6.000|   2:48   6.000|   4:48  17.000|   6:48  23.000|   8:48  13.000|  10:48
      1:00   6.000|   3:00   6.000|   5:00  17.000|   7:00  23.000|   9:00  13.000|  11:00
      1:12   4.000|   3:12  13.000|   5:12  13.000|   7:12  13.000|   9:12  53.000|  11:12
      1:24   4.000|   3:24  13.000|   5:24  13.000|   7:24  13.000|   9:24  53.000|  11:24
      1:36   4.000|   3:36  13.000|   5:36  13.000|   7:36  13.000|   9:36  53.000|  11:36
      1:48   4.000|   3:48  13.000|   5:48  13.000|   7:48  13.000|   9:48  53.000|  11:48
      2:00   4.000|   4:00  13.000|   6:00  13.000|   8:00  13.000|  10:00  53.000|  12:00

-----------------------------------------------------------------------------------------
R0007:C00003-----------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
```



```
     Unit Hyd. peak  (cms)=        .15          .05
                                                                  *TOTALS*
     PEAK FLOW       (cms)=       1.69          .25          1.931 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.000
     RUNOFF VOLUME    (mm)=     210.00        90.90        183.798
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =        .99          .43           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------------------
R0007:C00004-----------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .230 .5243E+00|    .461 .7257E+00|    .693 .
                          .114 .3865E+00|    .461 .7257E+00|    .693 .8885E+00|    .000 .
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     1.931    10.000    183.798
    OUTFLOW < 02:SWM1A         14.700     1.175    11.117    183.796

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   60.851
                     TIME SHIFT OF PEAK FLOW         (min)=    67.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=.1227E+01

-----------------------------------------------------------------------------------------
R0007:C00005-----------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
```

```
     Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.21          .18          1.380 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.000
     RUNOFF VOLUME    (mm)=     209.99        90.90        183.799
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =        .99          .43           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0007:C00006-------------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .165 .3746E+00|    .329 .5187E+00|    .495 .
                           .081 .2764E+00|    .329 .5187E+00|    .495 .6350E+00|    .000 .
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------     (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     1.380    10.000    183.799
    OUTFLOW < 04:SWM1B         10.500      .840    11.117    183.795

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   60.874
                    TIME SHIFT OF PEAK FLOW         (min)=    67.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.8766E+00

--------------------------------------------------------------------------------------------
R0007:C00007-------------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 02:SWM1A         14.700     1.175   11.117   183.796    .000
                      +ID 2 04:SWM1B         10.500      .840   11.117   183.795    .000
                      ==================================================================
                      SUM   05:POST1AB       25.200     2.015   11.117   183.796    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0007:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
```



```
     | CALIB STANDHYD         |   Area    (ha)=    6.30
     | 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
     --------------------------
                                  IMPERVIOUS    PERVIOUS (i)
          Surface Area     (ha)=       4.91         1.39
          Dep. Storage     (mm)=       2.00         5.00
          Average Slope     (%)=       1.50         2.00
          Length            (m)=     500.00        50.00
          Mannings n           =       .013         .250

          Max.eff.Inten.(mm/hr)=      53.00        31.07
                     over (min)        8.00        21.00
          Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
          Unit Hyd. Tpeak (min)=       8.00        21.00
          Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
          PEAK FLOW       (cms)=        .72          .11           .828 (iii)
          TIME TO PEAK    (hrs)=      10.00        10.17         10.000
          RUNOFF VOLUME    (mm)=     210.00        90.90        183.799
          TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
          RUNOFF COEFFICIENT   =        .99          .43           .867

            (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                CN* =  49.0    Ia = Dep. Storage  (Above)
           (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
          (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0007:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                                  IMPERVIOUS    PERVIOUS (i)
          Surface Area     (ha)=        .78          .22
          Dep. Storage     (mm)=       2.00         5.00
          Average Slope     (%)=       1.50         2.00
          Length            (m)=     500.00        50.00
          Mannings n           =       .013         .250

          Max.eff.Inten.(mm/hr)=      53.00        31.07
                     over (min)        8.00        21.00
          Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
          Unit Hyd. Tpeak (min)=       8.00        21.00
          Unit Hyd. peak  (cms)=        .15          .06
                                                          *TOTALS*
          PEAK FLOW       (cms)=        .11          .02           .132 (iii)
          TIME TO PEAK    (hrs)=      10.00        10.17         10.000
          RUNOFF VOLUME    (mm)=     210.00        90.90        183.798
          TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
          RUNOFF COEFFICIENT   =        .99          .43           .867
```

```
          (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
              CN* =  49.0    Ia = Dep. Storage  (Above)
         (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
        (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

     ------------------------------------------------------------------------------------------
     R0007:C00010-----------------------------------------------------------------------------
     *POST2AB
     ------------------------
     | ADD HYD              |
     | 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
     ------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                            ID 1 06:POST2A         6.300      .828   10.000   183.799    .000
                           +ID 2 07:POST2B         1.000      .132   10.000   183.798    .000
                           ================================================================
                           SUM   08:POST2AB        7.300      .959   10.000   183.799    .000

        NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

     ------------------------------------------------------------------------------------------
     R0007:C00011-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0007:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0007:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0007:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0007:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0007:C00002-----------------------------------------------------------------------------
     ------------------------------------------------------------------------------------------
     R0007:C00002-----------------------------------------------------------------------------
     --------------------
     | FINISH           |
     --------------------
     ------------------------------------------------------------------------------------------
     ******************************************************************************************
          WARNINGS / ERRORS / NOTES
          -------------------------
     R0007:C00004  ROUTE RESERVOIR
     *** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.
     R0007:C00006  ROUTE RESERVOIR
     *** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.
        Simulation ended on 2021-01-22     at 12:13:53
     ==========================================================================================
```

Post-Development Condition
12-hour SCS Type-II Storm Distribution

```
2     Metric units
*#*********************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*********************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*********************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
*% 2-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                    ["2Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
READ STORM           STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
* POST1A
CALIB STANDHYD       ID=[1], NHYD=["POST1A"], DT=[1](min), AREA=[14.7](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*SWM1A
ROUTE RESERVOIR      IDout=[2], NHYD=["SWM1A"], IDin=[1], RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                               [   0.0 ,  0.0 ]
                               [0.095 , 0.3786]
                               [0.195 , 0.5106]
                               [0.398 , 0.7067]
                               [0.603 , 0.8656]
                               [   -1  ,  -1  ]  (maximum one hundred pairs of points)
                               IDovf=[   ], NHYDovf=["      "],
*%-----------------|-------------------------------------------------------------------
* POST1B
CALIB STANDHYD       ID=[3], NHYD=["POST1B"], DT=[1](min), AREA=[10.5](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*SWM1B
ROUTE RESERVOIR      IDout=[4], NHYD=["SWM1B"], IDin=[3], RDT=[1](min),
```



```
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                               [   0.0 ,  0.0 ]
                               [0.068 , 0.2703]
                               [0.140 , 0.3645]
                               [0.284 , 0.5047]
                               [0.431 , 0.6182]
                               [   -1  ,  -1  ]  (maximum one hundred pairs of points)
                               IDovf=[   ], NHYDovf=["      "],
*%-----------------|-------------------------------------------------------------------
*POST1AB
ADD HYD              IDsum=[5], NHYD=["POST1AB"], IDs to add=[2+4](maximum ten)
*%-----------------|-------------------------------------------------------------------
* POST2A
CALIB STANDHYD       ID=[6], NHYD=["POST2A"], DT=[1](min), AREA=[6.3](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
* POST2B
CALIB STANDHYD       ID=[7], NHYD=["POST2B"], DT=[1](min), AREA=[1.0](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*POST2AB
ADD HYD              IDsum=[8], NHYD=["POST2AB"], IDs to add=[6+7](maximum ten)
*%-----------------|-------------------------------------------------------------------
*% 5-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*%                    ["5Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 10-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*%                    ["10Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*%                    ["25Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 50-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*%                    ["50Y12H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 100-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (12-hr)
```

```
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*%                   ["100Y12H.stm"] <--storm filename
*%-----------------|-----------------------------------------------------------|
*% Hurricane Hazel Regional Storm (48-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
*%                   ["HAZEL.STM"] <--storm filename
*%-----------------|-----------------------------------------------------------|
FINISH
```

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

  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   77777 ==
  S       W W W   MM MM   H   H    Y Y    MM MM   O   O           2    0   0   11   7   7
  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O           2    0   0   11       7
      S    W W    M   M   H   H     Y     M   M   O   O         222    0   0   11      7
  SSSSS     W W    M   M   H   H     Y     M   M    OOO          2      0   0   11     7   ==
                                                                 2      0   0   11    7    #
        StormWater Management HYdrologic Model                   222     000    11    7    ==

  ******************************************************************************************
  *************************************  SWMHYMO Ver4.05.0  ******************************
  ******************  A single event and continuous hydrologic simulation model  ************
  ******************     based on the principles of HYMO and its successors      ************
  ******************                 OTTHYMO-83 and OTTHYMO-89.                  ************
  ******************************************************************************************
  ****************** Distributed by:  J.F. Sabourin and Associates Inc.          ************
  ******************                  Ottawa,  Ontario: (613) 836-3884           ************
  ******************                  Gatineau, Quebec: (819) 243-6858           ************
  ******************                  E-Mail: swmhymo@jfsa.com                   ************
  ******************************************************************************************

  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  +++++++++++++++++++ Licensed user: WMI & Associates Ltd.                      +++++++++++
  +++++++++++++++++++                Barrie                SERIAL#:2880720       +++++++++++
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

  ******************************************************************************************
  ******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            ************
  ******************           Maximum value for ID numbers  :     11            ************
  ******************           Max. number of rainfall points: 105408            ************
  ******************           Max. number of flow points    : 105408            ************
  ******************************************************************************************


  ******************************   D E T A I L E D   O U T P U T   ************************
  ******************************************************************************************
  *                 RUN DATE: 2021-01-22     TIME: 12:01:47     RUN COUNTER: 000026
  ******************************************************************************************
  * Input   file: C:\Temp\19-540\PR\12-hour_SCS\2-CYRSCS.dat
  * Output  file: C:\Temp\19-540\PR\12-hour_SCS\2-CYRSCS.out
  * Summary file: C:\Temp\19-540\PR\12-hour_SCS\2-CYRSCS.sum
  * User comments:
  * 1:_____________________________________________________________________________________
  * 2:_____________________________________________________________________________________
  * 3:_____________________________________________________________________________________
  ******************************************************************************************

 ------------------------------------------------------------------------------------------
 R0001:C00001-----------------------------------------------------------------------------
 *#****************************************************************************************
 *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
 *#****************************************************************************************
```



```
 *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
 *#  Date        : 10-14-2020
 *#  Modeller    : [BD]
 *#  Company     : WMI & Associates Ltd.
 *#  License #   :  2880720
 *#****************************************************************************************
 *
 * Post-Development Condition - 140 Lockhart Road
 *
 --------------------
 | START            | Project  dir.:C:\Temp\19-540\PR\12-hour_SCS\
 -------------------- Rainfall dir.:C:\Temp\19-540\PR\12-hour_SCS\
     TZERO =   .00 hrs on        0
     METOUT=   2 (output = METRIC)
     NRUN  = 0001
     NSTORM=   1
            #  1=2Y12H.stm
 ------------------------------------------------------------------------------------------
 R0001:C00002-----------------------------------------------------------------------------
 --------------------
 | READ STORM       |  Filename: C:\Temp\19-540\PR\12-hour_SCS\2Y12H.stm
 | Ptotal=  46.69 mm|  Comments: 2yr/12hr Barrie Wpcc +15% SCS
 --------------------
       TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
      hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
       0:15   1.170|   2:15   1.400|   4:15   2.800|   6:15   8.410|   8:15   1.630|  10:15
       0:30   1.170|   2:30   1.400|   4:30   2.800|   6:30   8.410|   8:30   1.630|  10:30
       0:45   1.170|   2:45   1.400|   4:45   3.740|   6:45   3.740|   8:45   1.630|  10:45
       1:00   1.170|   3:00   1.400|   5:00   3.740|   7:00   3.740|   9:00   1.630|  11:00
       1:15   1.170|   3:15   1.870|   5:15   5.600|   7:15   2.800|   9:15   1.630|  11:15
       1:30   1.170|   3:30   1.870|   5:30   5.600|   7:30   2.800|   9:30   1.630|  11:30
       1:45   1.170|   3:45   1.870|   5:45  22.420|   7:45   2.800|   9:45   1.630|  11:45
       2:00   1.170|   4:00   1.870|   6:00  61.640|   8:00   2.800|  10:00   1.630|  12:00

 ------------------------------------------------------------------------------------------
 R0001:C00003-----------------------------------------------------------------------------
 * POST1A
 --------------------------
 | CALIB STANDHYD         |   Area    (ha)=   14.70
 | 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
 --------------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=      11.47         3.23
      Dep. Storage     (mm)=       2.00         5.00
      Average Slope     (%)=       1.50         2.00
      Length            (m)=     500.00        50.00
      Mannings n           =       .013         .250

      Max.eff.Inten.(mm/hr)=      61.64         4.50
                 over (min)        7.00        35.00
      Storage Coeff.  (min)=       7.21 (ii)   35.11 (ii)
      Unit Hyd. Tpeak (min)=       7.00        35.00
      Unit Hyd. peak  (cms)=        .16          .03
```

```
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.70          .03          1.713 (iii)
     TIME TO PEAK    (hrs)=       6.02         6.52          6.017
     RUNOFF VOLUME    (mm)=      44.69         5.68         36.107
     TOTAL RAINFALL   (mm)=      46.69        46.69         46.690
     RUNOFF COEFFICIENT   =        .96          .12           .773

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
R0001:C00004----------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .195 .5106E+00|    .398 .7067E+00|    .603 .
                           .095 .3786E+00|    .398 .7067E+00|    .603 .8656E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     1.713     6.017     36.107
    OUTFLOW < 02:SWM1A         14.700      .095     8.033     36.107

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.548
                    TIME SHIFT OF PEAK FLOW         (min)=   121.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3786E+00

--------------------------------------------------------------------------------------
R0001:C00005----------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      61.64         4.50
                over (min)       7.00        35.00
     Storage Coeff.  (min)=       7.21 (ii)   35.11 (ii)
     Unit Hyd. Tpeak (min)=       7.00        35.00
     Unit Hyd. peak  (cms)=        .16          .03
                                                          *TOTALS*
```



```
     PEAK FLOW       (cms)=       1.22          .02          1.223 (iii)
     TIME TO PEAK    (hrs)=       6.02         6.52          6.017
     RUNOFF VOLUME    (mm)=      44.69         5.68         36.107
     TOTAL RAINFALL   (mm)=      46.69        46.69         46.690
     RUNOFF COEFFICIENT   =        .96          .12           .773

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
R0001:C00006----------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .140 .3645E+00|    .284 .5047E+00|    .431 .
                           .068 .2703E+00|    .284 .5047E+00|    .431 .6182E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     1.223     6.017     36.107
    OUTFLOW < 04:SWM1B         10.500      .068     8.033     36.107

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.561
                    TIME SHIFT OF PEAK FLOW         (min)=   121.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2703E+00

--------------------------------------------------------------------------------------
R0001:C00007----------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .095    8.033    36.107    .000
                       +ID 2 04:SWM1B         10.500      .068    8.033    36.107    .000
                       ======================================================================
                       SUM   05:POST1AB       25.200      .163    8.033    36.107    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------
R0001:C00008----------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
```

```
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      61.64         4.50
                over (min)        7.00        35.00
     Storage Coeff.  (min)=       7.21 (ii)   35.11 (ii)
     Unit Hyd. Tpeak (min)=       7.00        35.00
     Unit Hyd. peak  (cms)=        .16          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .73          .01          .734 (iii)
     TIME TO PEAK    (hrs)=       6.02         6.52         6.017
     RUNOFF VOLUME    (mm)=      44.69         5.68        36.107
     TOTAL RAINFALL   (mm)=      46.69        46.69        46.690
     RUNOFF COEFFICIENT   =        .96          .12          .773

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0001:C00009--------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      61.64         4.50
                over (min)        7.00        35.00
     Storage Coeff.  (min)=       7.21 (ii)   35.11 (ii)
     Unit Hyd. Tpeak (min)=       7.00        35.00
     Unit Hyd. peak  (cms)=        .16          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .12          .00          .117 (iii)
     TIME TO PEAK    (hrs)=       6.02         6.52         6.017
     RUNOFF VOLUME    (mm)=      44.69         5.68        36.107
     TOTAL RAINFALL   (mm)=      46.69        46.69        46.690
     RUNOFF COEFFICIENT   =        .96          .12          .773

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
```



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

--------------------------------------------------------------------------------------------
R0001:C00010--------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 06:POST2A        6.300      .734    6.017    36.107    .000
                       +ID 2 07:POST2B        1.000      .117    6.017    36.107    .000
                       ================================================================
                       SUM   08:POST2AB       7.300      .851    6.017    36.107    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0001:C00011--------------------------------------------------------------------------------
  ** END OF RUN :    0

********************************************************************************************
```



```
--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\12-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\12-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0002
    NSTORM=   1
           #  1=5Y12H.stm
--------------------------------------------------------------------------------------------
R0002:C00002--------------------------------------------------------------------------------
*#******************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------------------
R0002:C00002--------------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\12-hour_SCS\5Y12H.stm
| Ptotal=  64.31 mm|  Comments: 5yr/12hr Barrie Wpcc +15% SCS
```

```
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   1.610|   2:15   1.930|   4:15   3.860|   6:15  11.570|   8:15   2.250|  10:15
      0:30   1.610|   2:30   1.930|   4:30   3.860|   6:30  11.570|   8:30   2.250|  10:30
      0:45   1.610|   2:45   1.930|   4:45   5.140|   6:45   5.140|   8:45   2.250|  10:45
      1:00   1.610|   3:00   1.930|   5:00   5.140|   7:00   5.140|   9:00   2.250|  11:00
      1:15   1.610|   3:15   2.570|   5:15   7.720|   7:15   3.860|   9:15   2.250|  11:15
      1:30   1.610|   3:30   2.570|   5:30   7.720|   7:30   3.860|   9:30   2.250|  11:30
      1:45   1.610|   3:45   2.570|   5:45  30.860|   7:45   3.860|   9:45   2.250|  11:45
      2:00   1.610|   4:00   2.570|   6:00  84.880|   8:00   3.860|  10:00   2.250|  12:00

-------------------------------------------------------------------------------------------
R0002:C00003-------------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      84.88        10.70
                over (min)        6.00        26.00
     Storage Coeff.  (min)=       6.34 (ii)   26.07 (ii)
     Unit Hyd. Tpeak (min)=       6.00        26.00
     Unit Hyd. peak  (cms)=        .18          .04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       2.43          .06          2.459 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.35          6.017
     RUNOFF VOLUME    (mm)=      62.31        10.87         50.992
     TOTAL RAINFALL   (mm)=      64.31        64.31         64.309
     RUNOFF COEFFICIENT   =        .97          .17           .793

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------------
R0002:C00004-------------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTLFOW   STORAGE| OUTLFOW   STORAGE| OUTLFOW   STORAGE| OUTLFOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .195 .5106E+00|    .398 .7067E+00|    .603 .
```



```
                                 .095 .3786E+00|    .398 .7067E+00|    .603 .8656E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     2.459     6.017     50.992
    OUTFLOW < 02:SWM1A         14.700      .195     7.017     50.991

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.930
                    TIME SHIFT OF PEAK FLOW         (min)=    60.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5106E+00

-------------------------------------------------------------------------------------------
R0002:C00005-------------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      84.88        10.70
                over (min)        6.00        26.00
     Storage Coeff.  (min)=       6.34 (ii)   26.07 (ii)
     Unit Hyd. Tpeak (min)=       6.00        26.00
     Unit Hyd. peak  (cms)=        .18          .04
                                                         *TOTALS*
     PEAK FLOW       (cms)=       1.74          .04          1.757 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.35          6.017
     RUNOFF VOLUME    (mm)=      62.30        10.87         50.992
     TOTAL RAINFALL   (mm)=      64.31        64.31         64.309
     RUNOFF COEFFICIENT   =        .97          .17           .793

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------------
R0002:C00006-------------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTLFOW   STORAGE| OUTLFOW   STORAGE| OUTLFOW   STORAGE| OUTLFOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .140 .3645E+00|    .284 .5047E+00|    .431 .
                           .068 .2703E+00|    .284 .5047E+00|    .431 .6182E+00|    .000 .
```

```
     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------     (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     1.757     6.017     50.992
    OUTFLOW < 04:SWM1B         10.500      .140     7.000     50.991

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.969
                    TIME SHIFT OF PEAK FLOW         (min)=    59.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3645E+00

--------------------------------------------------------------------------------
R0002:C00007----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 02:SWM1A         14.700      .195    7.017    50.991    .000
                      +ID 2 04:SWM1B         10.500      .140    7.000    50.991    .000
                      ==================================================================
                      SUM   05:POST1AB       25.200      .335    7.000    50.991    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0002:C00008----------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      84.88        10.70
                over (min)        6.00        26.00
     Storage Coeff.  (min)=       6.34 (ii)   26.07 (ii)
     Unit Hyd. Tpeak (min)=       6.00        26.00
     Unit Hyd. peak  (cms)=        .18          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.04          .03         1.054 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.35         6.017
     RUNOFF VOLUME    (mm)=      62.31        10.87        50.992
     TOTAL RAINFALL   (mm)=      64.31        64.31        64.309
     RUNOFF COEFFICIENT   =        .97          .17          .793

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
```



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

--------------------------------------------------------------------------------
R0002:C00009----------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      84.88        10.70
                over (min)        6.00        26.00
     Storage Coeff.  (min)=       6.34 (ii)   26.07 (ii)
     Unit Hyd. Tpeak (min)=       6.00        26.00
     Unit Hyd. peak  (cms)=        .18          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .17          .00          .167 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.35         6.017
     RUNOFF VOLUME    (mm)=      62.31        10.87        50.992
     TOTAL RAINFALL   (mm)=      64.31        64.31        64.309
     RUNOFF COEFFICIENT   =        .97          .17          .793

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0002:C00010----------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 06:POST2A         6.300     1.054    6.017    50.992    .000
                      +ID 2 07:POST2B         1.000      .167    6.017    50.992    .000
                      ==================================================================
                      SUM   08:POST2AB        7.300     1.221    6.017    50.992    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0002:C00011----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0002:C00002----------------------------------------------------------------------
  ** END OF RUN :    1
```

```
    ******************************************************************************************



    --------------------
    | START            | Project  dir.:C:\Temp\19-540\PR\12-hour_SCS\
    -------------------- Rainfall dir.:C:\Temp\19-540\PR\12-hour_SCS\
        TZERO =   .00 hrs on        0
        METOUT=   2 (output = METRIC)
        NRUN  = 0003
        NSTORM=   1
               #  1=10Y12H.stm
    ------------------------------------------------------------------------------------------
    R0003:C00002------------------------------------------------------------------------------
    *#**********************************************************************************
    *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
    *#**********************************************************************************
    *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
    *#  Date        : 10-14-2020
    *#  Modeller    : [BD]
    *#  Company     : WMI & Associates Ltd.
    *#  License #   :  2880720
    *#**********************************************************************************
    *
    * Post-Development Condition - 140 Lockhart Road
    *
    ------------------------------------------------------------------------------------------
    R0003:C00002------------------------------------------------------------------------------
    --------------------
    | READ STORM       |  Filename: C:\Temp\19-540\PR\12-hour_SCS\10Y12H.stm
    | Ptotal=  76.00 mm|  Comments: 10yr/12hr Barrie Wpcc +15% SCS
    --------------------
          TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
         hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
          0:15   1.900|   2:15   2.280|   4:15   4.560|   6:15  13.680|   8:15   2.660|  10:15
          0:30   1.900|   2:30   2.280|   4:30   4.560|   6:30  13.680|   8:30   2.660|  10:30
          0:45   1.900|   2:45   2.280|   4:45   6.080|   6:45   6.080|   8:45   2.660|  10:45
          1:00   1.900|   3:00   2.280|   5:00   6.080|   7:00   6.080|   9:00   2.660|  11:00
          1:15   1.900|   3:15   3.040|   5:15   9.120|   7:15   4.560|   9:15   2.660|  11:15
          1:30   1.900|   3:30   3.040|   5:30   9.120|   7:30   4.560|   9:30   2.660|  11:30
          1:45   1.900|   3:45   3.040|   5:45  36.480|   7:45   4.560|   9:45   2.660|  11:45
          2:00   1.900|   4:00   3.040|   6:00 100.320|   8:00   4.560|  10:00   2.660|  12:00

    ------------------------------------------------------------------------------------------
    R0003:C00003------------------------------------------------------------------------------
    * POST1A
    --------------------------
    | CALIB STANDHYD         |   Area    (ha)=   14.70
    | 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
    --------------------------
                                 IMPERVIOUS    PERVIOUS (i)
```



```
          Surface Area     (ha)=      11.47         3.23
          Dep. Storage     (mm)=       2.00         5.00
          Average Slope     (%)=       1.50         2.00
          Length            (m)=     500.00        50.00
          Mannings n           =       .013         .250

          Max.eff.Inten.(mm/hr)=     100.32        16.84
                     over (min)        6.00        22.00
          Storage Coeff.  (min)=       5.93 (ii)   22.39 (ii)
          Unit Hyd. Tpeak (min)=       6.00        22.00
          Unit Hyd. peak  (cms)=        .19          .05
                                                              *TOTALS*
          PEAK FLOW       (cms)=       2.91          .09          2.963 (iii)
          TIME TO PEAK    (hrs)=       6.00         6.28          6.000
          RUNOFF VOLUME    (mm)=      73.99        15.03         61.027
          TOTAL RAINFALL   (mm)=      76.00        76.00         76.000
          RUNOFF COEFFICIENT   =        .97          .20           .803

            (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
                CN* =  49.0    Ia = Dep. Storage  (Above)
           (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
          (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

    ------------------------------------------------------------------------------------------
    R0003:C00004------------------------------------------------------------------------------
    *SWM1A
    -----------------------
    |  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
    |  IN>01:POST1A       |
    | OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
    ----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                              (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                               .000 .0000E+00|    .195 .5106E+00|    .398 .7067E+00|    .603 .
                               .095 .3786E+00|    .398 .7067E+00|    .603 .8656E+00|    .000 .

          ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
          ----------------------      (ha)     (cms)     (hrs)       (mm)
          INFLOW > 01:POST1A        14.700     2.963     6.000     61.027
         OUTFLOW < 02:SWM1A         14.700      .284     6.733     61.026

                        PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.599
                        TIME SHIFT OF PEAK FLOW         (min)=    44.00
                        MAXIMUM  STORAGE   USED       (ha.m.)=.5970E+00

    ------------------------------------------------------------------------------------------
    R0003:C00005------------------------------------------------------------------------------
    * POST1B
    --------------------------
    | CALIB STANDHYD         |   Area    (ha)=   10.50
    | 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
    --------------------------
                                 IMPERVIOUS    PERVIOUS (i)
          Surface Area     (ha)=       8.19         2.31
```

```
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     100.32        16.84
                over (min)        6.00        22.00
     Storage Coeff.  (min)=       5.93 (ii)   22.39 (ii)
     Unit Hyd. Tpeak (min)=       6.00        22.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.08          .07          2.116 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.28          6.000
     RUNOFF VOLUME    (mm)=      74.00        15.03         61.027
     TOTAL RAINFALL   (mm)=      76.00        76.00         76.000
     RUNOFF COEFFICIENT   =        .97          .20           .803

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00006-------------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .140 .3645E+00|    .284 .5047E+00|    .431 .
                           .068 .2703E+00|    .284 .5047E+00|    .431 .6182E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------     (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     2.116     6.000     61.027
    OUTFLOW < 04:SWM1B         10.500      .203     6.733     61.026

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    9.612
                    TIME SHIFT OF PEAK FLOW         (min)=    44.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.4262E+00

--------------------------------------------------------------------------------------------
R0003:C00007-------------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .284    6.733    61.026    .000
                       +ID 2 04:SWM1B         10.500      .203    6.733    61.026    .000
                       ==================================================================
```



```
                        SUM   05:POST1AB       25.200      .488    6.733    61.025    .000

        NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     100.32        16.84
                over (min)        6.00        22.00
     Storage Coeff.  (min)=       5.93 (ii)   22.39 (ii)
     Unit Hyd. Tpeak (min)=       6.00        22.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.25          .04          1.270 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.28          6.000
     RUNOFF VOLUME    (mm)=      74.00        15.03         61.027
     TOTAL RAINFALL   (mm)=      76.00        76.00         76.000
     RUNOFF COEFFICIENT   =        .97          .20           .803

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     100.32        16.84
                over (min)        6.00        22.00
     Storage Coeff.  (min)=       5.93 (ii)   22.39 (ii)
     Unit Hyd. Tpeak (min)=       6.00        22.00
```

```
      Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .20          .01          .202 (iii)
      TIME TO PEAK    (hrs)=       6.00         6.28         6.000
      RUNOFF VOLUME    (mm)=      74.00        15.03        61.027
      TOTAL RAINFALL   (mm)=      76.00        76.00        76.000
      RUNOFF COEFFICIENT   =        .97          .20          .803

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  49.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00010--------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 06:POST2A        6.300     1.270    6.000    61.027    .000
                       +ID 2 07:POST2B        1.000      .202    6.000    61.027    .000
                       ==================================================================
                       SUM   08:POST2AB       7.300     1.471    6.000    61.027    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00011--------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0003:C00002--------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0003:C00002--------------------------------------------------------------------------------
  ** END OF RUN :    2

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





--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\12-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\12-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0004
    NSTORM=   1
           #  1=25Y12H.stm
--------------------------------------------------------------------------------------------
R0004:C00002--------------------------------------------------------------------------------
*#******************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
```



```
*#******************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------------------
R0004:C00002--------------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\12-hour_SCS\25Y12H.stm
| Ptotal=  90.69 mm|  Comments: 25yr/12hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   2.270|   2:15   2.720|   4:15   5.440|   6:15  16.330|   8:15   3.170|  10:15
      0:30   2.270|   2:30   2.720|   4:30   5.440|   6:30  16.330|   8:30   3.170|  10:30
      0:45   2.270|   2:45   2.720|   4:45   7.260|   6:45   7.260|   8:45   3.170|  10:45
      1:00   2.270|   3:00   2.720|   5:00   7.260|   7:00   7.260|   9:00   3.170|  11:00
      1:15   2.270|   3:15   3.630|   5:15  10.880|   7:15   5.440|   9:15   3.170|  11:15
      1:30   2.270|   3:30   3.630|   5:30  10.880|   7:30   5.440|   9:30   3.170|  11:30
      1:45   2.270|   3:45   3.630|   5:45  43.540|   7:45   5.440|   9:45   3.170|  11:45
      2:00   2.270|   4:00   3.630|   6:00 119.720|   8:00   5.440|  10:00   3.170|  12:00

--------------------------------------------------------------------------------------------
R0004:C00003--------------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     119.72        26.30
                over (min)        6.00        19.00
     Storage Coeff.  (min)=       5.53 (ii)   19.30 (ii)
     Unit Hyd. Tpeak (min)=       6.00        19.00
     Unit Hyd. peak  (cms)=        .20          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.52          .14         3.609 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.22         6.000
     RUNOFF VOLUME    (mm)=      88.69        20.98        73.793
     TOTAL RAINFALL   (mm)=      90.69        90.69        90.690
     RUNOFF COEFFICIENT   =        .98          .23          .814
```

```
        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
R0004:C00004----------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .195 .5106E+00|    .398 .7067E+00|    .603 .
                          .095 .3786E+00|    .398 .7067E+00|    .603 .8656E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     3.609     6.000     73.793
    OUTFLOW < 02:SWM1A         14.700      .398     6.667     73.791

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.028
                    TIME SHIFT OF PEAK FLOW         (min)=    40.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.7067E+00

--------------------------------------------------------------------------------------
R0004:C00005----------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     119.72        26.30
                over (min)        6.00        19.00
     Storage Coeff.  (min)=       5.53 (ii)   19.30 (ii)
     Unit Hyd. Tpeak (min)=       6.00        19.00
     Unit Hyd. peak  (cms)=        .20          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.52          .10          2.578 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.22          6.000
     RUNOFF VOLUME    (mm)=      88.68        20.98         73.793
     TOTAL RAINFALL   (mm)=      90.69        90.69         90.690
     RUNOFF COEFFICIENT   =        .98          .23           .814

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```



```
            CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
R0004:C00006----------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .140 .3645E+00|    .284 .5047E+00|    .431 .
                          .068 .2703E+00|    .284 .5047E+00|    .431 .6182E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     2.578     6.000     73.793
    OUTFLOW < 04:SWM1B         10.500      .284     6.667     73.791

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.018
                    TIME SHIFT OF PEAK FLOW         (min)=    40.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5047E+00

--------------------------------------------------------------------------------------
R0004:C00007----------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .398    6.667    73.791    .000
                       +ID 2 04:SWM1B         10.500      .284    6.667    73.791    .000
                       ==================================================================
                       SUM   05:POST1AB       25.200      .682    6.667    73.791    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------
R0004:C00008----------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250
```

```
      Max.eff.Inten.(mm/hr)=     119.72        26.30
                 over (min)        6.00        19.00
      Storage Coeff.  (min)=       5.53 (ii)   19.30 (ii)
      Unit Hyd. Tpeak (min)=       6.00        19.00
      Unit Hyd. peak  (cms)=        .20          .06
                                                          *TOTALS*
      PEAK FLOW       (cms)=       1.51          .06          1.547 (iii)
      TIME TO PEAK    (hrs)=       6.00         6.22          6.000
      RUNOFF VOLUME    (mm)=      88.69        20.98         73.793
      TOTAL RAINFALL   (mm)=      90.69        90.69         90.690
      RUNOFF COEFFICIENT   =        .98          .23           .814

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  49.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

  ------------------------------------------------------------------------------------------
  R0004:C00009------------------------------------------------------------------------------
  * POST2B
  --------------------------
  | CALIB STANDHYD         |   Area    (ha)=    1.00
  | 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
  --------------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .78          .22
      Dep. Storage     (mm)=       2.00         5.00
      Average Slope     (%)=       1.50         2.00
      Length            (m)=     500.00        50.00
      Mannings n           =       .013         .250

      Max.eff.Inten.(mm/hr)=     119.72        26.30
                 over (min)        6.00        19.00
      Storage Coeff.  (min)=       5.53 (ii)   19.30 (ii)
      Unit Hyd. Tpeak (min)=       6.00        19.00
      Unit Hyd. peak  (cms)=        .20          .06
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .24          .01           .246 (iii)
      TIME TO PEAK    (hrs)=       6.00         6.22          6.000
      RUNOFF VOLUME    (mm)=      88.69        20.98         73.792
      TOTAL RAINFALL   (mm)=      90.69        90.69         90.690
      RUNOFF COEFFICIENT   =        .98          .23           .814

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  49.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

  ------------------------------------------------------------------------------------------
  R0004:C00010------------------------------------------------------------------------------
  *POST2AB
  ------------------------
  | ADD HYD              |
```



```
      | 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
      ------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                              ID 1 06:POST2A        6.300     1.547    6.000    73.793    .000
                             +ID 2 07:POST2B        1.000      .246    6.000    73.792    .000
                             ==================================================================
                             SUM   08:POST2AB       7.300     1.792    6.000    73.793    .000

         NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

      ------------------------------------------------------------------------------------------
      R0004:C00011------------------------------------------------------------------------------
      ------------------------------------------------------------------------------------------
      R0004:C00002------------------------------------------------------------------------------
      ------------------------------------------------------------------------------------------
      R0004:C00002------------------------------------------------------------------------------
      ------------------------------------------------------------------------------------------
      R0004:C00002------------------------------------------------------------------------------
        ** END OF RUN :    3

      ******************************************************************************************
```

```
      --------------------
      | START            | Project  dir.:C:\Temp\19-540\PR\12-hour_SCS\
      -------------------- Rainfall dir.:C:\Temp\19-540\PR\12-hour_SCS\
          TZERO =   .00 hrs on        0
          METOUT=   2 (output = METRIC)
          NRUN  = 0005
          NSTORM=   1
                 #  1=50Y12H.stm
      ------------------------------------------------------------------------------------------
      R0005:C00002------------------------------------------------------------------------------
      *#**********************************************************************************
      *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
      *#**********************************************************************************
      *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
      *#  Date        : 10-14-2020
      *#  Modeller    : [BD]
      *#  Company     : WMI & Associates Ltd.
      *#  License #   :  2880720
      *#**********************************************************************************
      *
      * Post-Development Condition - 140 Lockhart Road
      *
      ------------------------------------------------------------------------------------------
      R0005:C00002------------------------------------------------------------------------------
      --------------------
      | READ STORM       |  Filename: C:\Temp\19-540\PR\12-hour_SCS\50Y12H.stm
      | Ptotal= 101.69 mm|  Comments: 50yr/12hr Barrie Wpcc +15% SCS
      --------------------
```

TIME hh:mm	RAIN mm/hr	TIME hh:mm	RAIN mm/hr	TIME hh:mm	RAIN mm/hr	TIME hh:mm	RAIN mm/hr	TIME hh:mm	RAIN mm/hr	TIME hh:mm
0:15	2.540	2:15	3.050	4:15	6.100	6:15	18.310	8:15	3.560	10:15
0:30	2.540	2:30	3.050	4:30	6.100	6:30	18.310	8:30	3.560	10:30
0:45	2.540	2:45	3.050	4:45	8.140	6:45	8.140	8:45	3.560	10:45
1:00	2.540	3:00	3.050	5:00	8.140	7:00	8.140	9:00	3.560	11:00
1:15	2.540	3:15	4.070	5:15	12.200	7:15	6.100	9:15	3.560	11:15
1:30	2.540	3:30	4.070	5:30	12.200	7:30	6.100	9:30	3.560	11:30
1:45	2.540	3:45	4.070	5:45	48.820	7:45	6.100	9:45	3.560	11:45
2:00	2.540	4:00	4.070	6:00	134.240	8:00	6.100	10:00	3.560	12:00

```
----------------------------------------------------------------------------------------
R0005:C00003----------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     134.24        33.86
                over (min)        5.00        18.00
     Storage Coeff.  (min)=       5.28 (ii)   17.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00        18.00
     Unit Hyd. peak  (cms)=        .22          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       4.02          .19          4.134 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.000
     RUNOFF VOLUME    (mm)=      99.68        25.89         83.455
     TOTAL RAINFALL   (mm)=     101.69       101.69        101.690
     RUNOFF COEFFICIENT   =        .98          .25           .821

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------------------
R0005:C00004----------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .195 .5106E+00|    .398 .7067E+00|    .603 .
                           .095 .3786E+00|    .398 .7067E+00|    .603 .8656E+00|    .000 .
```



```
     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     4.134     6.000     83.455
    OUTFLOW < 02:SWM1A         14.700      .501     6.617     83.454

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   12.126
                    TIME SHIFT OF PEAK FLOW         (min)=    37.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.7868E+00

----------------------------------------------------------------------------------------
R0005:C00005----------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     134.24        33.86
                over (min)        5.00        18.00
     Storage Coeff.  (min)=       5.28 (ii)   17.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00        18.00
     Unit Hyd. peak  (cms)=        .22          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.87          .13          2.953 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.000
     RUNOFF VOLUME    (mm)=      99.69        25.89         83.455
     TOTAL RAINFALL   (mm)=     101.69       101.69        101.690
     RUNOFF COEFFICIENT   =        .98          .25           .821

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------------------
R0005:C00006----------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .140 .3645E+00|    .284 .5047E+00|    .431 .
                           .068 .2703E+00|    .284 .5047E+00|    .431 .6182E+00|    .000 .
```

```
     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -----------------------    (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     2.953     6.000     83.455
    OUTFLOW < 04:SWM1B         10.500      .358     6.617     83.453

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   12.127
                    TIME SHIFT OF PEAK FLOW         (min)=    37.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5619E+00

--------------------------------------------------------------------------------
R0005:C00007----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 02:SWM1A         14.700      .501    6.617    83.454    .000
                      +ID 2 04:SWM1B         10.500      .358    6.617    83.453    .000
                      ==================================================================
                      SUM   05:POST1AB       25.200      .859    6.617    83.454    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0005:C00008----------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     134.24        33.86
                over (min)        5.00        18.00
     Storage Coeff.  (min)=       5.28 (ii)   17.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00        18.00
     Unit Hyd. peak  (cms)=        .22          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.72          .08          1.772 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.000
     RUNOFF VOLUME    (mm)=      99.69        25.89         83.455
     TOTAL RAINFALL   (mm)=     101.69       101.69        101.690
     RUNOFF COEFFICIENT   =        .98          .25           .821

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```



```
--------------------------------------------------------------------------------
R0005:C00009----------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     134.24        33.86
                over (min)        5.00        18.00
     Storage Coeff.  (min)=       5.28 (ii)   17.72 (ii)
     Unit Hyd. Tpeak (min)=       5.00        18.00
     Unit Hyd. peak  (cms)=        .22          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .27          .01           .281 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.20          6.000
     RUNOFF VOLUME    (mm)=      99.69        25.89         83.455
     TOTAL RAINFALL   (mm)=     101.69       101.69        101.690
     RUNOFF COEFFICIENT   =        .98          .25           .821

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0005:C00010----------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 06:POST2A         6.300     1.772    6.000    83.455    .000
                      +ID 2 07:POST2B         1.000      .281    6.000    83.455    .000
                      ==================================================================
                      SUM   08:POST2AB        7.300     2.053    6.000    83.455    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0005:C00011----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
```

```
R0005:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
  ** END OF RUN :    4

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\12-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\12-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0006
    NSTORM=   1
           #  1=100Y12H.stm
-------------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------------
*#***********************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#***********************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#***********************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\12-hour_SCS\100Y12H.stm
| Ptotal= 112.51 mm|  Comments: 100yr/12hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   2.810|   2:15   3.380|   4:15   6.750|   6:15  20.250|   8:15   3.940|  10:15
      0:30   2.810|   2:30   3.380|   4:30   6.750|   6:30  20.250|   8:30   3.940|  10:30
      0:45   2.810|   2:45   3.380|   4:45   9.000|   6:45   9.000|   8:45   3.940|  10:45
      1:00   2.810|   3:00   3.380|   5:00   9.000|   7:00   9.000|   9:00   3.940|  11:00
      1:15   2.810|   3:15   4.500|   5:15  13.500|   7:15   6.750|   9:15   3.940|  11:15
      1:30   2.810|   3:30   4.500|   5:30  13.500|   7:30   6.750|   9:30   3.940|  11:30
      1:45   2.810|   3:45   4.500|   5:45  54.000|   7:45   6.750|   9:45   3.940|  11:45
      2:00   2.810|   4:00   4.500|   6:00 148.500|   8:00   6.750|  10:00   3.940|  12:00

-------------------------------------------------------------------------------------------
R0006:C00003-------------------------------------------------------------------------------
* POST1A
```



```
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.50        44.38
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       5.07 (ii)   16.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .22         .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       4.47         .24          4.634 (iii)
     TIME TO PEAK    (hrs)=       6.00        6.17          6.000
     RUNOFF VOLUME    (mm)=     110.50        31.08         93.031
     TOTAL RAINFALL   (mm)=     112.51       112.51        112.505
     RUNOFF COEFFICIENT   =        .98         .28           .827

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------------
R0006:C00004-------------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .195 .5106E+00|    .398 .7067E+00|    .603 .
                          .095 .3786E+00|    .398 .7067E+00|    .603 .8656E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     4.634     6.000     93.031
    OUTFLOW < 02:SWM1A         14.700      .603     6.600     93.030

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   13.011
                     TIME SHIFT OF PEAK FLOW         (min)=    36.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=.8656E+00

-------------------------------------------------------------------------------------------
R0006:C00005-------------------------------------------------------------------------------
* POST1B
--------------------------
```

```
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.50        44.38
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       5.07 (ii)   16.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                         *TOTALS*
     PEAK FLOW       (cms)=       3.19          .17          3.310 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17          6.000
     RUNOFF VOLUME    (mm)=     110.50        31.08         93.031
     TOTAL RAINFALL   (mm)=     112.51       112.51        112.505
     RUNOFF COEFFICIENT   =        .98          .28           .827

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
R0006:C00006----------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .140 .3645E+00|    .284 .5047E+00|    .431 .
                           .068 .2703E+00|    .284 .5047E+00|    .431 .6182E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     3.310     6.000     93.031
    OUTFLOW < 04:SWM1B         10.500      .431     6.600     93.030

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   13.018
                     TIME SHIFT OF PEAK FLOW         (min)=    36.00
                     MAXIMUM  STORAGE   USED       (ha.m.)=.6182E+00

--------------------------------------------------------------------------------------
R0006:C00007----------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
```



```
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .603    6.600    93.030    .000
                       +ID 2 04:SWM1B         10.500      .431    6.600    93.030    .000
                       ====================================================================
                       SUM   05:POST1AB       25.200     1.034    6.600    93.030    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------
R0006:C00008----------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.50        44.38
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       5.07 (ii)   16.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                         *TOTALS*
     PEAK FLOW       (cms)=       1.92          .10          1.986 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17          6.000
     RUNOFF VOLUME    (mm)=     110.50        31.08         93.031
     TOTAL RAINFALL   (mm)=     112.51       112.51        112.505
     RUNOFF COEFFICIENT   =        .98          .28           .827

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------
R0006:C00009----------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250
```

```
     Max.eff.Inten.(mm/hr)=     148.50        44.38
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       5.07 (ii)   16.24 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .30          .02          .315 (iii)
     TIME TO PEAK    (hrs)=       6.00         6.17         6.000
     RUNOFF VOLUME    (mm)=     110.50        31.08        93.031
     TOTAL RAINFALL   (mm)=     112.51       112.51       112.505
     RUNOFF COEFFICIENT   =        .98          .28          .827

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

     ----------------------------------------------------------------------------------------
     R0006:C00010----------------------------------------------------------------------------
     *POST2AB
     ------------------------
     | ADD HYD              |
     | 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
     ------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                             ID 1 06:POST2A        6.300     1.986    6.000    93.031    .000
                            +ID 2 07:POST2B        1.000      .315    6.000    93.031    .000
                            ================================================================
                            SUM   08:POST2AB       7.300     2.301    6.000    93.031    .000

        NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

     ----------------------------------------------------------------------------------------
     R0006:C00011----------------------------------------------------------------------------
     ----------------------------------------------------------------------------------------
     R0006:C00002----------------------------------------------------------------------------
     ----------------------------------------------------------------------------------------
     R0006:C00002----------------------------------------------------------------------------
     ----------------------------------------------------------------------------------------
     R0006:C00002----------------------------------------------------------------------------
     ----------------------------------------------------------------------------------------
     R0006:C00002----------------------------------------------------------------------------
     ----------------------------------------------------------------------------------------
     R0006:C00002----------------------------------------------------------------------------
     ----------------------------------------------------------------------------------------
     R0006:C00002----------------------------------------------------------------------------
       ** END OF RUN :    5

     ****************************************************************************************
```



```
     | START            | Project  dir.:C:\Temp\19-540\PR\12-hour_SCS\
     -------------------- Rainfall dir.:C:\Temp\19-540\PR\12-hour_SCS\
         TZERO =   .00 hrs on        0
         METOUT=   2 (output = METRIC)
         NRUN  = 0007
         NSTORM=   1
                #  1=HAZEL.STM
     ----------------------------------------------------------------------------------------
     R0007:C00002----------------------------------------------------------------------------
     *#**************************************************************************************
     *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
     *#**************************************************************************************
     *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
     *#  Date        : 10-14-2020
     *#  Modeller    : [BD]
     *#  Company     : WMI & Associates Ltd.
     *#  License #   :  2880720
     *#**************************************************************************************
     *
     * Post-Development Condition - 140 Lockhart Road
     *
     ----------------------------------------------------------------------------------------
     R0007:C00002----------------------------------------------------------------------------
     --------------------
     | READ STORM       |  Filename: C:\Temp\19-540\PR\12-hour_SCS\HAZEL.STM
     | Ptotal= 212.00 mm|  Comments: * REGIONAL DESIGN STORM - HAZEL
     --------------------
           TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
          hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
           0:12   6.000|   2:12   6.000|   4:12  17.000|   6:12  23.000|   8:12  13.000|  10:12
           0:24   6.000|   2:24   6.000|   4:24  17.000|   6:24  23.000|   8:24  13.000|  10:24
           0:36   6.000|   2:36   6.000|   4:36  17.000|   6:36  23.000|   8:36  13.000|  10:36
           0:48   6.000|   2:48   6.000|   4:48  17.000|   6:48  23.000|   8:48  13.000|  10:48
           1:00   6.000|   3:00   6.000|   5:00  17.000|   7:00  23.000|   9:00  13.000|  11:00
           1:12   4.000|   3:12  13.000|   5:12  13.000|   7:12  13.000|   9:12  53.000|  11:12
           1:24   4.000|   3:24  13.000|   5:24  13.000|   7:24  13.000|   9:24  53.000|  11:24
           1:36   4.000|   3:36  13.000|   5:36  13.000|   7:36  13.000|   9:36  53.000|  11:36
           1:48   4.000|   3:48  13.000|   5:48  13.000|   7:48  13.000|   9:48  53.000|  11:48
           2:00   4.000|   4:00  13.000|   6:00  13.000|   8:00  13.000|  10:00  53.000|  12:00

     ----------------------------------------------------------------------------------------
     R0007:C00003----------------------------------------------------------------------------
     * POST1A
     --------------------------
     | CALIB STANDHYD         |   Area    (ha)=   14.70
     | 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
     --------------------------
                                  IMPERVIOUS    PERVIOUS (i)
          Surface Area     (ha)=      11.47         3.23
          Dep. Storage     (mm)=       2.00         5.00
          Average Slope     (%)=       1.50         2.00
          Length            (m)=     500.00        50.00
          Mannings n           =       .013         .250
```

```
     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
     Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.69          .25          1.931 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.000
     RUNOFF VOLUME    (mm)=     210.00        90.90        183.798
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =        .99          .43           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
R0007:C00004-------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .195 .5106E+00|    .398 .7067E+00|    .603 .
                          .095 .3786E+00|    .398 .7067E+00|    .603 .8656E+00|    .000 .
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     1.931    10.000    183.798
    OUTFLOW < 02:SWM1A         14.700     1.135    11.133    183.796

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   58.757
                    TIME SHIFT OF PEAK FLOW         (min)=    68.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.1278E+01

-------------------------------------------------------------------------------------
R0007:C00005-------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250
```



```
     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
     Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.21          .18          1.380 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.000
     RUNOFF VOLUME    (mm)=     209.99        90.90        183.799
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =        .99          .43           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
R0007:C00006-------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .140 .3645E+00|    .284 .5047E+00|    .431 .
                          .068 .2703E+00|    .284 .5047E+00|    .431 .6182E+00|    .000 .
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     1.380    10.000    183.799
    OUTFLOW < 04:SWM1B         10.500      .812    11.133    183.795

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   58.832
                    TIME SHIFT OF PEAK FLOW         (min)=    68.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.9122E+00

-------------------------------------------------------------------------------------
R0007:C00007-------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A        14.700     1.135   11.133   183.796    .000
                       +ID 2 04:SWM1B        10.500      .812   11.133   183.795    .000
                       ======================================================================
                       SUM   05:POST1AB      25.200     1.947   11.133   183.795    .000

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

```
--------------------------------------------------------------------------------------------
R0007:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
     Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .72          .11          .828 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.000
     RUNOFF VOLUME    (mm)=     210.00        90.90        183.799
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =        .99          .43           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0007:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
     Unit Hyd. peak  (cms)=        .15          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .11          .02          .132 (iii)
```



```
     TIME TO PEAK    (hrs)=      10.00        10.17         10.000
     RUNOFF VOLUME    (mm)=     210.00        90.90        183.798
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =        .99          .43           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0007:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 06:POST2A        6.300      .828   10.000   183.799    .000
                       +ID 2 07:POST2B        1.000      .132   10.000   183.798    .000
                       ==================================================================
                       SUM   08:POST2AB       7.300      .959   10.000   183.799    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0007:C00011-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
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R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------
| FINISH           |
--------------------
--------------------------------------------------------------------------------------------
********************************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
R0007:C00004  ROUTE RESERVOIR
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.
R0007:C00006  ROUTE RESERVOIR
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.
   Simulation ended on 2021-01-22     at 12:01:47
============================================================================================
```

Post-Development Condition
6-hour SCS Type-II Storm Distribution

```
2     Metric units
*#*********************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*********************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*********************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
*% 2-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                    ["2Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
READ STORM           STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
* POST1A
CALIB STANDHYD       ID=[1], NHYD=["POST1A"], DT=[1](min), AREA=[14.7](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*SWM1A
ROUTE RESERVOIR      IDout=[2], NHYD=["SWM1A"], IDin=[1], RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                 [   0.0 ,  0.0 ]
                                 [0.088 , 0.3831]
                                 [0.193 , 0.5224]
                                 [0.409 , 0.7281]
                                 [0.633 , 0.8982]
                                 [   -1  ,  -1  ]  (maximum one hundred pairs of points)
                                 IDovf=[   ], NHYDovf=["      "],
*%-----------------|-------------------------------------------------------------------
* POST1B
CALIB STANDHYD       ID=[3], NHYD=["POST1B"], DT=[1](min), AREA=[10.5](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*SWM1B
ROUTE RESERVOIR      IDout=[4], NHYD=["SWM1B"], IDin=[3], RDT=[1](min),
```



```
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    (cms) - (ha-m)
                                 [   0.0 ,  0.0 ]
                                 [0.063 , 0.2735]
                                 [0.138 , 0.3730]
                                 [0.292 , 0.5201]
                                 [0.452 , 0.6415]
                                 [   -1  ,  -1  ]  (maximum one hundred pairs of points)
                                 IDovf=[   ], NHYDovf=["      "],
*%-----------------|-------------------------------------------------------------------
*POST1AB
ADD HYD              IDsum=[5], NHYD=["POST1AB"], IDs to add=[2+4](maximum ten)
*%-----------------|-------------------------------------------------------------------
* POST2A
CALIB STANDHYD       ID=[6], NHYD=["POST2A"], DT=[1](min), AREA=[6.3](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
* POST2B
CALIB STANDHYD       ID=[7], NHYD=["POST2B"], DT=[1](min), AREA=[1.0](ha),
                     XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                     SCS curve number CN=[49],
                     Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                          LGP=[50](m), MNP=[0.25], SCP=[0](min),
                     Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                          LGI=[500](m), MNI=[0.013], SCI=[0](min),
                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*POST2AB
ADD HYD              IDsum=[8], NHYD=["POST2AB"], IDs to add=[6+7](maximum ten)
*%-----------------|-------------------------------------------------------------------
*% 5-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*%                    ["5Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 10-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*%                    ["10Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*%                    ["25Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 50-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
START                TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*%                    ["50Y6H.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 100-year SCS Type II Storm Dist. based on Barrie WPCC, ON. rainfall (6-hr)
```

```
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*%                   ["100Y6H.stm"] <--storm filename
*%-----------------|-----------------------------------------------------------|
*% Hurricane Hazel Regional Storm (48-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
*%                   ["HAZEL.STM"] <--storm filename
*%-----------------|-----------------------------------------------------------|
FINISH
```

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

  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   77777 ==
  S       W W W   MM MM   H   H    Y Y    MM MM   O   O           2    0   0   11   7   7
  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O           2    0   0   11       7
      S    W W    M   M   H   H     Y     M   M   O   O        222     0   0   11      7
  SSSSS     W W    M   M   H   H     Y     M   M    OOO         2       0   0   11     7   ==
                                                                2       0   0   11    7    #
        StormWater Management HYdrologic Model                  222     000    11    7    ==

  ******************************************************************************************
  *************************************  SWMHYMO Ver4.05.0  ******************************
  ******************  A single event and continuous hydrologic simulation model  ************
  ******************     based on the principles of HYMO and its successors      ************
  ******************                 OTTHYMO-83 and OTTHYMO-89.                  ************
  ******************************************************************************************
  ****************** Distributed by:  J.F. Sabourin and Associates Inc.          ************
  ******************                  Ottawa,  Ontario: (613) 836-3884           ************
  ******************                  Gatineau, Quebec: (819) 243-6858           ************
  ******************                  E-Mail: swmhymo@jfsa.com                   ************
  ******************************************************************************************

  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  +++++++++++++++++++ Licensed user: WMI & Associates Ltd.                       ++++++++++++
  +++++++++++++++++++                Barrie                SERIAL#:2880720       ++++++++++++
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

  ******************************************************************************************
  ******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            ************
  ******************           Maximum value for ID numbers  :     11            ************
  ******************           Max. number of rainfall points: 105408            ************
  ******************           Max. number of flow points    : 105408            ************
  ******************************************************************************************


  ******************************   D E T A I L E D   O U T P U T   ************************
  ******************************************************************************************
  *                  RUN DATE: 2021-01-22     TIME: 11:28:44     RUN COUNTER: 000020
  ******************************************************************************************
  * Input   file: C:\Temp\19-540\PR\6-hour_SCS\2-CYRSCS.dat
  * Output  file: C:\Temp\19-540\PR\6-hour_SCS\2-CYRSCS.out
  * Summary file: C:\Temp\19-540\PR\6-hour_SCS\2-CYRSCS.sum
  * User comments:
  * 1:_____________________________________________________________________________________
  * 2:_____________________________________________________________________________________
  * 3:_____________________________________________________________________________________
  ******************************************************************************************

 ------------------------------------------------------------------------------------------
 R0001:C00001-----------------------------------------------------------------------------
 *#****************************************************************************************
 *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
 *#****************************************************************************************
```



```
 *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
 *#  Date        : 10-14-2020
 *#  Modeller    : [BD]
 *#  Company     : WMI & Associates Ltd.
 *#  License #   :  2880720
 *#****************************************************************************************
 *
 * Post-Development Condition - 140 Lockhart Road
 *
 --------------------
 | START            | Project  dir.:C:\Temp\19-540\PR\6-hour_SCS\
 -------------------- Rainfall dir.:C:\Temp\19-540\PR\6-hour_SCS\
     TZERO =   .00 hrs on        0
     METOUT=   2 (output = METRIC)
     NRUN  = 0001
     NSTORM=   1
            #  1=2Y6H.stm
 ------------------------------------------------------------------------------------------
 R0001:C00002-----------------------------------------------------------------------------
 --------------------
 | READ STORM       |  Filename: C:\Temp\19-540\PR\6-hour_SCS\2Y6H.stm
 | Ptotal=  42.30 mm|  Comments: 2yr/6hr Barrie Wpcc +15% SCS
 --------------------
       TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
      hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
       0:15   1.690|   1:15   2.540|   2:15   5.080|   3:15   9.310|   4:15   3.380|   5:15
       0:30   1.690|   1:30   2.540|   2:30   5.080|   3:30   9.310|   4:30   3.380|   5:30
       0:45   2.540|   1:45   4.230|   2:45  25.380|   3:45   4.230|   4:45   2.540|   5:45
       1:00   2.540|   2:00   4.230|   3:00  65.990|   4:00   4.230|   5:00   2.540|   6:00

 ------------------------------------------------------------------------------------------
 R0001:C00003-----------------------------------------------------------------------------
 * POST1A
 --------------------------
 | CALIB STANDHYD         |   Area    (ha)=   14.70
 | 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
 --------------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=      11.47         3.23
      Dep. Storage     (mm)=       2.00         5.00
      Average Slope     (%)=       1.50         2.00
      Length            (m)=     500.00        50.00
      Mannings n           =       .013         .250

      Max.eff.Inten.(mm/hr)=      65.99         4.36
                 over (min)        7.00        35.00
      Storage Coeff.  (min)=       7.02 (ii)   35.27 (ii)
      Unit Hyd. Tpeak (min)=       7.00        35.00
      Unit Hyd. peak  (cms)=        .16          .03
                                                          *TOTALS*
      PEAK FLOW       (cms)=       1.84          .02        1.849 (iii)
      TIME TO PEAK    (hrs)=       3.02         3.52        3.017
      RUNOFF VOLUME    (mm)=      40.30         4.61       32.451
```

```
     TOTAL RAINFALL   (mm)=      42.30        42.30         42.302
     RUNOFF COEFFICIENT   =        .95          .11           .767

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
R0001:C00004-----------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .193 .5224E+00|    .409 .7281E+00|    .633 .
                           .088 .3831E+00|    .409 .7281E+00|    .633 .8982E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     1.849     3.017     32.451
    OUTFLOW < 02:SWM1A         14.700      .088     5.033     32.450

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.760
                    TIME SHIFT OF PEAK FLOW         (min)=   121.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3831E+00

-------------------------------------------------------------------------------------
R0001:C00005-----------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      65.99         4.36
                over (min)        7.00        35.00
     Storage Coeff.  (min)=       7.02 (ii)   35.27 (ii)
     Unit Hyd. Tpeak (min)=       7.00        35.00
     Unit Hyd. peak  (cms)=        .16          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.32          .02         1.321 (iii)
     TIME TO PEAK    (hrs)=       3.02         3.52         3.017
     RUNOFF VOLUME    (mm)=      40.30         4.61        32.451
     TOTAL RAINFALL   (mm)=      42.30        42.30        42.302
```



```
     RUNOFF COEFFICIENT   =        .95          .11           .767

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
R0001:C00006-----------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .138 .3730E+00|    .292 .5201E+00|    .452 .
                           .063 .2735E+00|    .292 .5201E+00|    .452 .6415E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     1.321     3.017     32.451
    OUTFLOW < 04:SWM1B         10.500      .063     5.033     32.450

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.772
                    TIME SHIFT OF PEAK FLOW         (min)=   121.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2735E+00

-------------------------------------------------------------------------------------
R0001:C00007-----------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .088    5.033    32.450    .000
                       +ID 2 04:SWM1B         10.500      .063    5.033    32.450    .000
                       ======================================================================
                       SUM   05:POST1AB       25.200      .151    5.033    32.450    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
R0001:C00008-----------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
```

```
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      65.99         4.36
                over (min)        7.00        35.00
     Storage Coeff.  (min)=       7.02 (ii)   35.27 (ii)
     Unit Hyd. Tpeak (min)=       7.00        35.00
     Unit Hyd. peak  (cms)=        .16          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .79          .01          .792 (iii)
     TIME TO PEAK    (hrs)=       3.02         3.52         3.017
     RUNOFF VOLUME    (mm)=      40.30         4.61        32.451
     TOTAL RAINFALL   (mm)=      42.30        42.30        42.302
     RUNOFF COEFFICIENT   =        .95          .11          .767

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0001:C00009--------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      65.99         4.36
                over (min)        7.00        35.00
     Storage Coeff.  (min)=       7.02 (ii)   35.27 (ii)
     Unit Hyd. Tpeak (min)=       7.00        35.00
     Unit Hyd. peak  (cms)=        .16          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .13          .00          .126 (iii)
     TIME TO PEAK    (hrs)=       3.02         3.52         3.017
     RUNOFF VOLUME    (mm)=      40.30         4.61        32.451
     TOTAL RAINFALL   (mm)=      42.30        42.30        42.302
     RUNOFF COEFFICIENT   =        .95          .11          .767

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0001:C00010--------------------------------------------------------------------------------
```



```
     *POST2AB
     ------------------------
     | ADD HYD              |
     | 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
     ------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                              ID 1 06:POST2A        6.300      .792    3.017    32.451    .000
                             +ID 2 07:POST2B        1.000      .126    3.017    32.451    .000
                             ==================================================================
                             SUM   08:POST2AB       7.300      .918    3.017    32.451    .000

        NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

     --------------------------------------------------------------------------------------------
     R0001:C00011--------------------------------------------------------------------------------
       ** END OF RUN :    0

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




     --------------------
     | START            | Project  dir.:C:\Temp\19-540\PR\6-hour_SCS\
     -------------------- Rainfall dir.:C:\Temp\19-540\PR\6-hour_SCS\
         TZERO =   .00 hrs on        0
         METOUT=   2 (output = METRIC)
         NRUN  = 0002
         NSTORM=   1
                #  1=5Y6H.stm
     --------------------------------------------------------------------------------------------
     R0002:C00002--------------------------------------------------------------------------------
     *#******************************************************************************************
     *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
     *#******************************************************************************************
     *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
     *#  Date        : 10-14-2020
     *#  Modeller    : [BD]
     *#  Company     : WMI & Associates Ltd.
     *#  License #   :  2880720
     *#******************************************************************************************
     *
     * Post-Development Condition - 140 Lockhart Road
     *
     --------------------------------------------------------------------------------------------
     R0002:C00002--------------------------------------------------------------------------------
     --------------------
     | READ STORM       |  Filename: C:\Temp\19-540\PR\6-hour_SCS\5Y6H.stm
     | Ptotal=  59.50 mm|  Comments: 5yr/6hr Barrie Wpcc +15% SCS
     --------------------
           TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
          hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
           0:15   2.380|   1:15   3.570|   2:15   7.140|   3:15  13.090|   4:15   4.760|   5:15
```

```
      0:30   2.380|   1:30   3.570|   2:30   7.140|   3:30  13.090|   4:30   4.760|   5:30
      0:45   3.570|   1:45   5.950|   2:45  35.700|   3:45   5.950|   4:45   3.570|   5:45
      1:00   3.570|   2:00   5.950|   3:00  92.820|   4:00   5.950|   5:00   3.570|   6:00

--------------------------------------------------------------------------------------------
R0002:C00003-------------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      92.82        10.74
                over (min)        6.00        26.00
     Storage Coeff.  (min)=       6.12 (ii)   25.82 (ii)
     Unit Hyd. Tpeak (min)=       6.00        26.00
     Unit Hyd. peak  (cms)=        .19          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.69          .06          2.711 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.35          3.000
     RUNOFF VOLUME    (mm)=      57.50         9.32         46.899
     TOTAL RAINFALL   (mm)=      59.50        59.50         59.500
     RUNOFF COEFFICIENT   =        .97          .16           .788

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0002:C00004-------------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .193 .5224E+00|    .409 .7281E+00|    .633 .
                          .088 .3831E+00|    .409 .7281E+00|    .633 .8982E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     2.711     3.000     46.899
    OUTFLOW < 02:SWM1A         14.700      .193     4.150     46.899

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.117
```



```
                    TIME SHIFT OF PEAK FLOW         (min)=    69.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5224E+00

--------------------------------------------------------------------------------------------
R0002:C00005-------------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      92.82        10.74
                over (min)        6.00        26.00
     Storage Coeff.  (min)=       6.12 (ii)   25.82 (ii)
     Unit Hyd. Tpeak (min)=       6.00        26.00
     Unit Hyd. peak  (cms)=        .19          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.92          .04          1.937 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.35          3.000
     RUNOFF VOLUME    (mm)=      57.50         9.31         46.899
     TOTAL RAINFALL   (mm)=      59.50        59.50         59.500
     RUNOFF COEFFICIENT   =        .97          .16           .788

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0002:C00006-------------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .138 .3730E+00|    .292 .5201E+00|    .452 .
                          .063 .2735E+00|    .292 .5201E+00|    .452 .6415E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     1.937     3.000     46.899
    OUTFLOW < 04:SWM1B         10.500      .138     4.150     46.898

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.127
                    TIME SHIFT OF PEAK FLOW         (min)=    69.00
```

```
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3730E+00

--------------------------------------------------------------------------------
R0002:C00007-----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                      ID 1 02:SWM1A         14.700      .193    4.150    46.899    .000
                     +ID 2 04:SWM1B         10.500      .138    4.150    46.898    .000
                     ================================================================
                     SUM   05:POST1AB       25.200      .331    4.150    46.898    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0002:C00008-----------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      92.82        10.74
                over (min)        6.00        26.00
     Storage Coeff.  (min)=       6.12 (ii)   25.82 (ii)
     Unit Hyd. Tpeak (min)=       6.00        26.00
     Unit Hyd. peak  (cms)=        .19          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.15          .03          1.162 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.35          3.000
     RUNOFF VOLUME    (mm)=      57.50         9.31         46.899
     TOTAL RAINFALL   (mm)=      59.50        59.50         59.500
     RUNOFF COEFFICIENT   =        .97          .16           .788

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0002:C00009-----------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
```



```
--------------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .78          .22
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.50         2.00
     Length            (m)=    500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      92.82        10.74
                over (min)        6.00        26.00
     Storage Coeff.  (min)=       6.12 (ii)   25.82 (ii)
     Unit Hyd. Tpeak (min)=       6.00        26.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .18          .00           .185 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.35          3.000
     RUNOFF VOLUME    (mm)=      57.50         9.31         46.899
     TOTAL RAINFALL   (mm)=      59.50        59.50         59.500
     RUNOFF COEFFICIENT   =        .97          .16           .788

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0002:C00010-----------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                      ID 1 06:POST2A         6.300     1.162    3.000    46.899    .000
                     +ID 2 07:POST2B         1.000      .185    3.000    46.899    .000
                     ================================================================
                     SUM   08:POST2AB        7.300     1.347    3.000    46.899    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0002:C00011-----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0002:C00002-----------------------------------------------------------------------
  ** END OF RUN :    1

********************************************************************************
```

```
--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\6-hour_SCS\
```

```
-------------------- Rainfall dir.:C:\Temp\19-540\PR\6-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0003
    NSTORM=   1
           #  1=10Y6H.stm
--------------------------------------------------------------------------------------------
R0003:C00002-------------------------------------------------------------------------------
*#******************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------------------
R0003:C00002-------------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\6-hour_SCS\10Y6H.stm
| Ptotal=  70.80 mm|  Comments: 10yr/6hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   2.830|   1:15   4.250|   2:15   8.500|   3:15  15.580|   4:15   5.660|   5:15
      0:30   2.830|   1:30   4.250|   2:30   8.500|   3:30  15.580|   4:30   5.660|   5:30
      0:45   4.250|   1:45   7.080|   2:45  42.480|   3:45   7.080|   4:45   4.250|   5:45
      1:00   4.250|   2:00   7.080|   3:00 110.450|   4:00   7.080|   5:00   4.250|   6:00

--------------------------------------------------------------------------------------------
R0003:C00003-------------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     110.45        17.16
                over (min)        6.00        22.00
     Storage Coeff.  (min)=       5.71 (ii)   22.04 (ii)
     Unit Hyd. Tpeak (min)=       6.00        22.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
```



```
     PEAK FLOW       (cms)=       3.24          .10          3.286 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.28          3.000
     RUNOFF VOLUME    (mm)=      68.80        13.11         56.551
     TOTAL RAINFALL   (mm)=      70.80        70.80         70.803
     RUNOFF COEFFICIENT   =        .97          .19           .799

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00004-------------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .193 .5224E+00|    .409 .7281E+00|    .633 .
                           .088 .3831E+00|    .409 .7281E+00|    .633 .8982E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------     (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     3.286     3.000     56.551
    OUTFLOW < 02:SWM1A         14.700      .286     3.850     56.550

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    8.719
                  TIME SHIFT OF PEAK FLOW         (min)=    51.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.6114E+00

--------------------------------------------------------------------------------------------
R0003:C00005-------------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     110.45        17.16
                over (min)        6.00        22.00
     Storage Coeff.  (min)=       5.71 (ii)   22.04 (ii)
     Unit Hyd. Tpeak (min)=       6.00        22.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.31          .07          2.347 (iii)
```

```
     TIME TO PEAK    (hrs)=       3.00         3.28          3.000
     RUNOFF VOLUME    (mm)=      68.80        13.11         56.551
     TOTAL RAINFALL   (mm)=      70.80        70.80         70.803
     RUNOFF COEFFICIENT   =        .97          .19           .799

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00006-------------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .138 .3730E+00|    .292 .5201E+00|    .452 .
                           .063 .2735E+00|    .292 .5201E+00|    .452 .6415E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     2.347     3.000     56.551
    OUTFLOW < 04:SWM1B         10.500      .205     3.850     56.550

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    8.720
                    TIME SHIFT OF PEAK FLOW         (min)=    51.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.4367E+00

--------------------------------------------------------------------------------------------
R0003:C00007-------------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                      ID 1 02:SWM1A         14.700      .286    3.850    56.550    .000
                     +ID 2 04:SWM1B         10.500      .205    3.850    56.550    .000
                     ==============================================================
                     SUM   05:POST1AB       25.200      .491    3.850    56.550    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
```



```
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     110.45        17.16
                over (min)        6.00        22.00
     Storage Coeff.  (min)=       5.71 (ii)   22.04 (ii)
     Unit Hyd. Tpeak (min)=       6.00        22.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.39          .04          1.408 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.28          3.000
     RUNOFF VOLUME    (mm)=      68.80        13.11         56.551
     TOTAL RAINFALL   (mm)=      70.80        70.80         70.803
     RUNOFF COEFFICIENT   =        .97          .19           .799

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     110.45        17.16
                over (min)        6.00        22.00
     Storage Coeff.  (min)=       5.71 (ii)   22.04 (ii)
     Unit Hyd. Tpeak (min)=       6.00        22.00
     Unit Hyd. peak  (cms)=        .19          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .22          .01           .224 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.28          3.000
     RUNOFF VOLUME    (mm)=      68.80        13.11         56.551
     TOTAL RAINFALL   (mm)=      70.80        70.80         70.803
     RUNOFF COEFFICIENT   =        .97          .19           .799

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------------------
R0003:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 06:POST2A        6.300     1.408    3.000    56.551    .000
                       +ID 2 07:POST2B        1.000      .224    3.000    56.551    .000
                       ==================================================================
                       SUM   08:POST2AB       7.300     1.632    3.000    56.551    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00011-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0003:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0003:C00002-------------------------------------------------------------------------------
  ** END OF RUN :    2

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\6-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\6-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0004
    NSTORM=   1
           #  1=25Y6H.stm
--------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
*#******************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
```



```
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\6-hour_SCS\25Y6H.stm
| Ptotal=  85.20 mm|  Comments: 25yr/6hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   3.410|   1:15   5.110|   2:15  10.220|   3:15  18.740|   4:15   6.820|   5:15
      0:30   3.410|   1:30   5.110|   2:30  10.220|   3:30  18.740|   4:30   6.820|   5:30
      0:45   5.110|   1:45   8.520|   2:45  51.120|   3:45   8.520|   4:45   5.110|   5:45
      1:00   5.110|   2:00   8.520|   3:00 132.910|   4:00   8.520|   5:00   5.110|   6:00

--------------------------------------------------------------------------------------------
R0004:C00003-------------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     132.91        27.44
                over (min)        5.00        19.00
     Storage Coeff.  (min)=       5.30 (ii)   18.84 (ii)
     Unit Hyd. Tpeak (min)=       5.00        19.00
     Unit Hyd. peak  (cms)=        .22          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.98          .15          4.067 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.23          3.000
     RUNOFF VOLUME    (mm)=      83.20        18.67         69.001
     TOTAL RAINFALL   (mm)=      85.20        85.20         85.198
     RUNOFF COEFFICIENT   =        .98          .22           .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0004:C00004-------------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .193 .5224E+00|    .409 .7281E+00|    .633 .
                           .088 .3831E+00|    .409 .7281E+00|    .633 .8982E+00|    .000 .
```

```
     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     4.067     3.000     69.001
    OUTFLOW < 02:SWM1A         14.700      .409     3.700     68.999

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   10.056
                   TIME SHIFT OF PEAK FLOW         (min)=    42.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.7281E+00

-------------------------------------------------------------------------------
R0004:C00005-----------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     132.91        27.44
                over (min)        5.00        19.00
     Storage Coeff.  (min)=       5.30 (ii)   18.84 (ii)
     Unit Hyd. Tpeak (min)=       5.00        19.00
     Unit Hyd. peak  (cms)=        .22          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.84          .11          2.905 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.23          3.000
     RUNOFF VOLUME    (mm)=      83.20        18.67         69.001
     TOTAL RAINFALL   (mm)=      85.20        85.20         85.198
     RUNOFF COEFFICIENT   =        .98          .22           .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
R0004:C00006-----------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .138 .3730E+00|    .292 .5201E+00|    .452 .
                           .063 .2735E+00|    .292 .5201E+00|    .452 .6415E+00|    .000 .
```



```
     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     2.905     3.000     69.001
    OUTFLOW < 04:SWM1B         10.500      .292     3.700     68.999

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   10.050
                   TIME SHIFT OF PEAK FLOW         (min)=    42.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.5201E+00

-------------------------------------------------------------------------------
R0004:C00007-----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                         ID 1 02:SWM1A         14.700      .409    3.700    68.999    .000
                        +ID 2 04:SWM1B         10.500      .292    3.700    68.999    .000
                        ==================================================================
                        SUM   05:POST1AB       25.200      .701    3.700    68.999    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
R0004:C00008-----------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     132.91        27.44
                over (min)        5.00        19.00
     Storage Coeff.  (min)=       5.30 (ii)   18.84 (ii)
     Unit Hyd. Tpeak (min)=       5.00        19.00
     Unit Hyd. peak  (cms)=        .22          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.71          .07          1.743 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.23          3.000
     RUNOFF VOLUME    (mm)=      83.19        18.67         69.001
     TOTAL RAINFALL   (mm)=      85.20        85.20         85.198
     RUNOFF COEFFICIENT   =        .98          .22           .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
-------------------------------------------------------------------------------------
R0004:C00009-------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     132.91        27.44
                over (min)        5.00        19.00
     Storage Coeff.  (min)=       5.30 (ii)   18.84 (ii)
     Unit Hyd. Tpeak (min)=       5.00        19.00
     Unit Hyd. peak  (cms)=        .22          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .27          .01          .277 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.23         3.000
     RUNOFF VOLUME    (mm)=      83.20        18.67        69.001
     TOTAL RAINFALL   (mm)=      85.20        85.20        85.198
     RUNOFF COEFFICIENT   =        .98          .22          .810

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
R0004:C00010-------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 06:POST2A         6.300     1.743    3.000    69.001    .000
                      +ID 2 07:POST2B         1.000      .277    3.000    69.001    .000
                      ===================================================================
                      SUM   08:POST2AB        7.300     2.020    3.000    69.001    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
R0004:C00011-------------------------------------------------------------------------
-------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------
-------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------
-------------------------------------------------------------------------------------
```



```
R0004:C00002-------------------------------------------------------------------------
  ** END OF RUN :    3

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\6-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\6-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0005
    NSTORM=   1
           #  1=50Y6H.stm
-------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------
*#***********************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#***********************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#***********************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\6-hour_SCS\50Y6H.stm
| Ptotal=  95.90 mm|  Comments: 50yr/6hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
    hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
     0:15   3.840|   1:15   5.750|   2:15  11.510|   3:15  21.100|   4:15   7.670|   5:15
     0:30   3.840|   1:30   5.750|   2:30  11.510|   3:30  21.100|   4:30   7.670|   5:30
     0:45   5.750|   1:45   9.590|   2:45  57.540|   3:45   9.590|   4:45   5.750|   5:45
     1:00   5.750|   2:00   9.590|   3:00 149.600|   4:00   9.590|   5:00   5.750|   6:00

-------------------------------------------------------------------------------------
R0005:C00003-------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
```

```
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     149.60        37.25
                over (min)        5.00        17.00
     Storage Coeff.  (min)=       5.06 (ii)   17.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       4.51          .20          4.638 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.20          3.000
     RUNOFF VOLUME    (mm)=      93.90        23.26         78.359
     TOTAL RAINFALL   (mm)=      95.90        95.90         95.900
     RUNOFF COEFFICIENT   =        .98          .24           .817

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0005:C00004----------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .193 .5224E+00|    .409 .7281E+00|    .633 .
                          .088 .3831E+00|    .409 .7281E+00|    .633 .8982E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     4.638     3.000     78.359
    OUTFLOW < 02:SWM1A         14.700      .522     3.633     78.357

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.252
                    TIME SHIFT OF PEAK FLOW         (min)=    38.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.8139E+00

--------------------------------------------------------------------------------
R0005:C00005----------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
```



```
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     149.60        37.25
                over (min)        5.00        17.00
     Storage Coeff.  (min)=       5.06 (ii)   17.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.22          .14          3.313 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.20          3.000
     RUNOFF VOLUME    (mm)=      93.90        23.26         78.359
     TOTAL RAINFALL   (mm)=      95.90        95.90         95.900
     RUNOFF COEFFICIENT   =        .98          .24           .817

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0005:C00006----------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .138 .3730E+00|    .292 .5201E+00|    .452 .
                          .063 .2735E+00|    .292 .5201E+00|    .452 .6415E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     3.313     3.000     78.359
    OUTFLOW < 04:SWM1B         10.500      .373     3.633     78.357

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   11.248
                    TIME SHIFT OF PEAK FLOW         (min)=    38.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5813E+00

--------------------------------------------------------------------------------
R0005:C00007----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                         ID 1 02:SWM1A         14.700      .522    3.633    78.357    .000
                        +ID 2 04:SWM1B         10.500      .373    3.633    78.357    .000
                        ==================================================================
                        SUM   05:POST1AB       25.200      .895    3.633    78.357    .000
```

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

--------------------------------------------------------------------------------------------
R0005:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     149.60        37.25
                over (min)        5.00        17.00
     Storage Coeff.  (min)=       5.06 (ii)   17.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=        .22          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.93          .09         1.988 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.20         3.000
     RUNOFF VOLUME    (mm)=      93.90        23.26        78.359
     TOTAL RAINFALL   (mm)=      95.90        95.90        95.900
     RUNOFF COEFFICIENT   =        .98          .24          .817

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0005:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     149.60        37.25
                over (min)        5.00        17.00
     Storage Coeff.  (min)=       5.06 (ii)   17.03 (ii)
     Unit Hyd. Tpeak (min)=       5.00        17.00
     Unit Hyd. peak  (cms)=        .22          .07
```



```
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .31          .01          .316 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.20         3.000
     RUNOFF VOLUME    (mm)=      93.90        23.26        78.359
     TOTAL RAINFALL   (mm)=      95.90        95.90        95.900
     RUNOFF COEFFICIENT   =        .98          .24          .817

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0005:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 06:POST2A        6.300     1.988    3.000    78.359    .000
                       +ID 2 07:POST2B        1.000      .316    3.000    78.359    .000
                       ==================================================================
                       SUM   08:POST2AB       7.300     2.304    3.000    78.359    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0005:C00011-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
  ** END OF RUN :    4

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\6-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\6-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0006
    NSTORM=   1
           #  1=100Y6H.stm
--------------------------------------------------------------------------------------------
```

```
R0006:C00002-------------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\6-hour_SCS\100Y6H.stm
| Ptotal= 106.50 mm|  Comments: 100yr/6hr Barrie Wpcc +15% SCS
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:15   4.260|   1:15   6.390|   2:15  12.780|   3:15  23.430|   4:15   8.520|   5:15
      0:30   4.260|   1:30   6.390|   2:30  12.780|   3:30  23.430|   4:30   8.520|   5:30
      0:45   6.390|   1:45  10.650|   2:45  63.900|   3:45  10.650|   4:45   6.390|   5:45
      1:00   6.390|   2:00  10.650|   3:00 166.140|   4:00  10.650|   5:00   6.390|   6:00

-------------------------------------------------------------------------------------------
R0006:C00003-------------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     166.14        47.30
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       4.85 (ii)   15.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .23          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       5.04          .26         5.209 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.17         3.000
     RUNOFF VOLUME    (mm)=     104.50        28.16        87.705
     TOTAL RAINFALL   (mm)=     106.50       106.50       106.500
     RUNOFF COEFFICIENT   =        .98          .26          .824

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```



```
            CN* =  49.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------------
R0006:C00004-------------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .193 .5224E+00|    .409 .7281E+00|    .633 .
                           .088 .3831E+00|    .409 .7281E+00|    .633 .8982E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     5.209     3.000     87.705
    OUTFLOW < 02:SWM1A         14.700      .633     3.617     87.703

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=   12.149
                   TIME SHIFT OF PEAK FLOW         (min)=    37.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.8982E+00

-------------------------------------------------------------------------------------------
R0006:C00005-------------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     166.14        47.30
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       4.85 (ii)   15.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .23          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.60          .18         3.721 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.17         3.000
     RUNOFF VOLUME    (mm)=     104.50        28.16        87.705
     TOTAL RAINFALL   (mm)=     106.50       106.50       106.500
     RUNOFF COEFFICIENT   =        .98          .26          .824

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  49.0    Ia = Dep. Storage  (Above)
```

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00006-------------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .138 .3730E+00|    .292 .5201E+00|    .452 .
                           .063 .2735E+00|    .292 .5201E+00|    .452 .6415E+00|    .000 .
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     3.721     3.000     87.705
    OUTFLOW < 04:SWM1B         10.500      .452     3.617     87.703

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   12.148
                    TIME SHIFT OF PEAK FLOW         (min)=    37.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.6415E+00

--------------------------------------------------------------------------------------------
R0006:C00007-------------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD               |
| 05:POST1AB            |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 02:SWM1A         14.700      .633    3.617    87.703    .000
                      +ID 2 04:SWM1B         10.500      .452    3.617    87.703    .000
                      ==================================================================
                      SUM   05:POST1AB       25.200     1.085    3.617    87.703    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250
```



```
     Max.eff.Inten.(mm/hr)=     166.14        47.30
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       4.85 (ii)   15.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .23          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.16          .11          2.233 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.17          3.000
     RUNOFF VOLUME    (mm)=     104.50        28.16         87.705
     TOTAL RAINFALL   (mm)=     106.50       106.50        106.500
     RUNOFF COEFFICIENT   =        .98          .26           .824

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     166.14        47.30
                over (min)        5.00        16.00
     Storage Coeff.  (min)=       4.85 (ii)   15.74 (ii)
     Unit Hyd. Tpeak (min)=       5.00        16.00
     Unit Hyd. peak  (cms)=        .23          .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .34          .02           .354 (iii)
     TIME TO PEAK    (hrs)=       3.00         3.17          3.000
     RUNOFF VOLUME    (mm)=     104.50        28.16         87.705
     TOTAL RAINFALL   (mm)=     106.50       106.50        106.500
     RUNOFF COEFFICIENT   =        .98          .26           .824

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD               |
```

```
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 06:POST2A         6.300     2.233    3.000    87.705    .000
                      +ID 2 07:POST2B         1.000      .354    3.000    87.705    .000
                      ================================================================
                      SUM   08:POST2AB        7.300     2.587    3.000    87.705    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00011--------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0006:C00002--------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0006:C00002--------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0006:C00002--------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0006:C00002--------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0006:C00002--------------------------------------------------------------------------------
  ** END OF RUN :    5

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\6-hour_SCS\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\6-hour_SCS\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0007
    NSTORM=   1
           #  1=HAZEL.STM
--------------------------------------------------------------------------------------------
R0007:C00002--------------------------------------------------------------------------------
*#******************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------------------
R0007:C00002--------------------------------------------------------------------------------
```



```
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\6-hour_SCS\HAZEL.STM
| Ptotal= 212.00 mm|  Comments: * REGIONAL DESIGN STORM - HAZEL
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:12   6.000|   2:12   6.000|   4:12  17.000|   6:12  23.000|   8:12  13.000|  10:12
      0:24   6.000|   2:24   6.000|   4:24  17.000|   6:24  23.000|   8:24  13.000|  10:24
      0:36   6.000|   2:36   6.000|   4:36  17.000|   6:36  23.000|   8:36  13.000|  10:36
      0:48   6.000|   2:48   6.000|   4:48  17.000|   6:48  23.000|   8:48  13.000|  10:48
      1:00   6.000|   3:00   6.000|   5:00  17.000|   7:00  23.000|   9:00  13.000|  11:00
      1:12   4.000|   3:12  13.000|   5:12  13.000|   7:12  13.000|   9:12  53.000|  11:12
      1:24   4.000|   3:24  13.000|   5:24  13.000|   7:24  13.000|   9:24  53.000|  11:24
      1:36   4.000|   3:36  13.000|   5:36  13.000|   7:36  13.000|   9:36  53.000|  11:36
      1:48   4.000|   3:48  13.000|   5:48  13.000|   7:48  13.000|   9:48  53.000|  11:48
      2:00   4.000|   4:00  13.000|   6:00  13.000|   8:00  13.000|  10:00  53.000|  12:00

--------------------------------------------------------------------------------------------
R0007:C00003--------------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
     Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.69          .25          1.931 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.000
     RUNOFF VOLUME    (mm)=     210.00        90.90        183.798
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =        .99          .43           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0007:C00004--------------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
```

```
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .193 .5224E+00|    .409 .7281E+00|    .633 .
                           .088 .3831E+00|    .409 .7281E+00|    .633 .8982E+00|    .000 .
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     1.931    10.000    183.798
    OUTFLOW < 02:SWM1A         14.700     1.142    11.133    183.795

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   59.144
                    TIME SHIFT OF PEAK FLOW         (min)=    68.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.1285E+01

-------------------------------------------------------------------------------------
R0007:C00005-----------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
     Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.21          .18          1.380 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.000
     RUNOFF VOLUME    (mm)=     209.99        90.90        183.799
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =        .99          .43           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------
R0007:C00006-----------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
```



```
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .138 .3730E+00|    .292 .5201E+00|    .452 .
                           .063 .2735E+00|    .292 .5201E+00|    .452 .6415E+00|    .000 .
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     1.380    10.000    183.799
    OUTFLOW < 04:SWM1B         10.500      .816    11.133    183.795

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   59.156
                    TIME SHIFT OF PEAK FLOW         (min)=    68.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.9179E+00

-------------------------------------------------------------------------------------
R0007:C00007-----------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700     1.142   11.133   183.795    .000
                       +ID 2 04:SWM1B         10.500      .816   11.133   183.795    .000
                       ====================================================================
                       SUM   05:POST1AB       25.200     1.959   11.133   183.795    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------
R0007:C00008-----------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
     Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .72          .11           .828 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.000
```

```
     RUNOFF VOLUME    (mm)=     210.00        90.90        183.799
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =        .99          .43           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0007:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
     Unit Hyd. peak  (cms)=        .15          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .11          .02           .132 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17         10.000
     RUNOFF VOLUME    (mm)=     210.00        90.90        183.798
     TOTAL RAINFALL   (mm)=     212.00       212.00        212.000
     RUNOFF COEFFICIENT   =        .99          .43           .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0007:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                      ID 1 06:POST2A         6.300      .828   10.000   183.799    .000
                     +ID 2 07:POST2B         1.000      .132   10.000   183.798    .000
                     ===================================================================
                     SUM   08:POST2AB        7.300      .959   10.000   183.799    .000

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



```
--------------------------------------------------------------------------------------------
R0007:C00011-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0007:C00002-------------------------------------------------------------------------------
--------------------
| FINISH           |
--------------------
--------------------------------------------------------------------------------------------
********************************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
R0006:C00006  ROUTE RESERVOIR
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.
R0007:C00004  ROUTE RESERVOIR
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.
R0007:C00006  ROUTE RESERVOIR
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.
   Simulation ended on 2021-01-22     at 11:28:44
============================================================================================
```

Post-Development Condition
4-hour Chicago Storm Distribution

```
2     Metric units
*#*********************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*********************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*********************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
*% 2-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
*%                   ["CHI2YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
READ STORM          STORM_FILENAME=["STORM.001"]
*%-----------------|-------------------------------------------------------|
* POST1A
CALIB STANDHYD      ID=[1], NHYD=["POST1A"], DT=[1](min), AREA=[14.7](ha),
                    XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[49],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                         LGP=[50](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                         LGI=[500](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*SWM1A
ROUTE RESERVOIR     IDout=[2], NHYD=["SWM1A"], IDin=[1], RDT=[1](min),
                         TABLE of ( OUTFLOW-STORAGE ) values
                                   (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [0.058 , 0.3567]
                                [0.121 , 0.4721]
                                [0.255 , 0.6287]
                                [0.391 , 0.7496]
                                [   -1  ,  -1  ]  (maximum one hundred pairs of points)
                                IDovf=[   ], NHYDovf=["      "],
*%-----------------|-------------------------------------------------------|
* POST1B
CALIB STANDHYD      ID=[3], NHYD=["POST1B"], DT=[1](min), AREA=[10.5](ha),
                    XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[49],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                         LGP=[50](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                         LGI=[500](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*SWM1B
ROUTE RESERVOIR     IDout=[4], NHYD=["SWM1B"], IDin=[3], RDT=[1](min),
```



```
                         TABLE of ( OUTFLOW-STORAGE ) values
                                   (cms) - (ha-m)
                                [   0.0 ,  0.0 ]
                                [0.041 , 0.2552]
                                [0.086 , 0.3377]
                                [0.182 , 0.4493]
                                [0.279 , 0.5356]
                                [   -1  ,  -1  ]  (maximum one hundred pairs of points)
                                IDovf=[   ], NHYDovf=["      "],
*%-----------------|-------------------------------------------------------|
*POST1AB
ADD HYD             IDsum=[5], NHYD=["POST1AB"], IDs to add=[2+4](maximum ten)
*%-----------------|-------------------------------------------------------|
* POST2A
CALIB STANDHYD      ID=[6], NHYD=["POST2A"], DT=[1](min), AREA=[6.3](ha),
                    XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[49],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                         LGP=[50](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                         LGI=[500](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
* POST2B
CALIB STANDHYD      ID=[7], NHYD=["POST2B"], DT=[1](min), AREA=[1.0](ha),
                    XIMP=[0.78], TIMP=[0.78], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[49],
                    Pervious   surfaces: IAper=[5.0](mm), SLPP=[2.0](%),
                                         LGP=[50](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[2.0](mm), SLPI=[1.5](%),
                                         LGI=[500](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*POST2AB
ADD HYD             IDsum=[8], NHYD=["POST2AB"], IDs to add=[6+7](maximum ten)
*%-----------------|-------------------------------------------------------|
*% 5-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*%                   ["CHI5YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 10-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[3]
*%                   ["CHI10YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 25-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[4]
*%                   ["CHI25YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 50-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*%                   ["CHI50YR.stm"] <--storm filename
*%-----------------|-------------------------------------------------------|
*% 100-year Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
```

```
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[6]
*%                   ["CHI100YR.stm"] <--storm filename
*%-----------------|-----------------------------------------------------------|
*% 25mm Chicago Storm Dist. based on Barrie WPCC, ON. rainfall (4-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[7]
*%                   ["25mm4hr.stm"] <--storm filename
*%-----------------|-----------------------------------------------------------|
*% Hurricane Hazel Regional Storm (48-hr)
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[8]
*%                   ["HAZEL.STM"] <--storm filename
*%-----------------|-----------------------------------------------------------|
FINISH
```

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

  SSSSS   W   W   M   M   H   H   Y   Y   M   M    OOO          222     000    11   77777 ==
  S       W W W   MM MM   H   H    Y Y    MM MM   O   O           2    0   0   11   7   7
  SSSSS   W W W   M M M   HHHHH     Y     M M M   O   O           2    0   0   11       7
      S    W W    M   M   H   H     Y     M   M   O   O         222    0   0   11      7
  SSSSS     W W    M   M   H   H     Y     M   M    OOO          2      0   0   11     7   ==
                                                                 2      0   0   11    7    #
        StormWater Management HYdrologic Model                   222     000    11    7    ==

  ******************************************************************************************
  ************************************** SWMHYMO Ver4.05.0 ******************************
  ******************* A single event and continuous hydrologic simulation model ************
  *******************     based on the principles of HYMO and its successors      ************
  *******************                OTTHYMO-83 and OTTHYMO-89.                   ************
  ******************************************************************************************
  ****************** Distributed by:  J.F. Sabourin and Associates Inc.           ************
  *******************                 Ottawa,  Ontario: (613) 836-3884             ************
  *******************                 Gatineau, Quebec: (819) 243-6858             ************
  *******************                 E-Mail: swmhymo@jfsa.com                     ************
  ******************************************************************************************

  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  ++++++++++++++++++ Licensed user: WMI & Associates Ltd.                       +++++++++++
  ++++++++++++++++++                Barrie                SERIAL#:2880720        +++++++++++
  ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

  ******************************************************************************************
  *******************           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            ************
  *******************           Maximum value for ID numbers  :     11            ************
  *******************           Max. number of rainfall points: 105408            ************
  *******************           Max. number of flow points    : 105408            ************
  ******************************************************************************************


  ******************************   D E T A I L E D   O U T P U T   ************************
  ******************************************************************************************
  *                  RUN DATE: 2021-01-22     TIME: 10:32:21     RUN COUNTER: 000012
  ******************************************************************************************
  * Input   file: C:\Temp\19-540\PR\4-hour_Chic\2-CYRCHI.dat
  * Output  file: C:\Temp\19-540\PR\4-hour_Chic\2-CYRCHI.out
  * Summary file: C:\Temp\19-540\PR\4-hour_Chic\2-CYRCHI.sum
  * User comments:
  * 1:_____________________________________________________________________________________
  * 2:_____________________________________________________________________________________
  * 3:_____________________________________________________________________________________
  ******************************************************************************************

 ----------------------------------------------------------------------------------------
 R0001:C00001-------------------------------------------------------------------------------
 *#*****************************************************************************************
 *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
 *#*****************************************************************************************
```



```
 *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
 *#  Date        : 10-14-2020
 *#  Modeller    : [BD]
 *#  Company     : WMI & Associates Ltd.
 *#  License #   :  2880720
 *#*****************************************************************************************
 *
 * Post-Development Condition - 140 Lockhart Road
 *
 --------------------
 | START            | Project  dir.:C:\Temp\19-540\PR\4-hour_Chic\
 -------------------- Rainfall dir.:C:\Temp\19-540\PR\4-hour_Chic\
     TZERO =   .00 hrs on        0
     METOUT=   2 (output = METRIC)
     NRUN  = 0001
     NSTORM=   1
            #  1=CHI2YR.stm
 ----------------------------------------------------------------------------------------
 R0001:C00002-------------------------------------------------------------------------------
 --------------------
 | READ STORM       |  Filename: C:\Temp\19-540\PR\4-hour_Chic\CHI2YR.stm
 | Ptotal=  36.95 mm|  Comments: * City of Barrie - 2 yr Chicago (4hr) + 15%
 --------------------
       TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
      hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
       0:10   2.470|   0:50   5.300|   1:30  24.570|   2:10   5.730|   2:50   3.460|   3:30
       0:20   2.820|   1:00   7.980|   1:40  13.010|   2:20   4.890|   3:00   3.170|   3:40
       0:30   3.310|   1:10  18.780|   1:50   9.010|   2:30   4.280|   3:10   2.930|   3:50
       0:40   4.050|   1:20  83.110|   2:00   6.970|   2:40   3.820|   3:20   2.720|   4:00

 ----------------------------------------------------------------------------------------
 R0001:C00003-------------------------------------------------------------------------------
 * POST1A
 --------------------------
 | CALIB STANDHYD         |   Area    (ha)=   14.70
 | 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
 --------------------------
                                IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=      11.47         3.23
      Dep. Storage     (mm)=       2.00         5.00
      Average Slope     (%)=       1.50         2.00
      Length            (m)=     500.00        50.00
      Mannings n           =       .013         .250

      Max.eff.Inten.(mm/hr)=      83.11         3.02
                 over (min)        6.00        39.00
      Storage Coeff.  (min)=       6.40 (ii)   39.12 (ii)
      Unit Hyd. Tpeak (min)=       6.00        39.00
      Unit Hyd. peak  (cms)=        .18          .03
                                                          *TOTALS*
      PEAK FLOW       (cms)=       2.03          .02        2.027 (iii)
      TIME TO PEAK    (hrs)=       1.37         2.08        1.367
      RUNOFF VOLUME    (mm)=      34.95         3.45       28.023
```

```
     TOTAL RAINFALL   (mm)=      36.96        36.96         36.955
     RUNOFF COEFFICIENT   =        .95          .09           .758

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0001:C00004----------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .121 .4721E+00|    .255 .6287E+00|    .391 .
                           .058 .3567E+00|    .255 .6287E+00|    .391 .7496E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     2.027     1.367     28.023
    OUTFLOW < 02:SWM1A         14.700      .058     4.083     28.022

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.862
                    TIME SHIFT OF PEAK FLOW         (min)=   163.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3567E+00

--------------------------------------------------------------------------------
R0001:C00005----------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.11         3.02
                over (min)        6.00        39.00
     Storage Coeff.  (min)=       6.40 (ii)   39.12 (ii)
     Unit Hyd. Tpeak (min)=       6.00        39.00
     Unit Hyd. peak  (cms)=        .18          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.45          .01         1.448 (iii)
     TIME TO PEAK    (hrs)=       1.37         2.08         1.367
     RUNOFF VOLUME    (mm)=      34.95         3.45        28.023
     TOTAL RAINFALL   (mm)=      36.96        36.96        36.955
```



```
     RUNOFF COEFFICIENT   =        .95          .09           .758

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0001:C00006----------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .086 .3377E+00|    .182 .4493E+00|    .279 .
                           .041 .2552E+00|    .182 .4493E+00|    .279 .5356E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     1.448     1.367     28.023
    OUTFLOW < 04:SWM1B         10.500      .041     4.083     28.022

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.834
                    TIME SHIFT OF PEAK FLOW         (min)=   163.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.2552E+00

--------------------------------------------------------------------------------
R0001:C00007----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .058    4.083    28.022    .000
                       +ID 2 04:SWM1B         10.500      .041    4.083    28.022    .000
                       ======================================================================
                       SUM   05:POST1AB       25.200      .099    4.083    28.022    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0001:C00008----------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
```

```
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.11         3.02
                over (min)        6.00        39.00
     Storage Coeff.  (min)=       6.40 (ii)   39.12 (ii)
     Unit Hyd. Tpeak (min)=       6.00        39.00
     Unit Hyd. peak  (cms)=        .18          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .87          .01          .869 (iii)
     TIME TO PEAK    (hrs)=       1.37         2.08         1.367
     RUNOFF VOLUME    (mm)=      34.95         3.45        28.023
     TOTAL RAINFALL   (mm)=      36.96        36.96        36.955
     RUNOFF COEFFICIENT   =        .95          .09          .758

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0001:C00009--------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      83.11         3.02
                over (min)        6.00        39.00
     Storage Coeff.  (min)=       6.40 (ii)   39.12 (ii)
     Unit Hyd. Tpeak (min)=       6.00        39.00
     Unit Hyd. peak  (cms)=        .18          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .14          .00          .138 (iii)
     TIME TO PEAK    (hrs)=       1.37         2.08         1.367
     RUNOFF VOLUME    (mm)=      34.96         3.45        28.023
     TOTAL RAINFALL   (mm)=      36.96        36.96        36.955
     RUNOFF COEFFICIENT   =        .95          .09          .758

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0001:C00010--------------------------------------------------------------------------------
```



```
     *POST2AB
     ------------------------
     | ADD HYD              |
     | 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
     ------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                              ID 1 06:POST2A        6.300      .869    1.367    28.023    .000
                             +ID 2 07:POST2B        1.000      .138    1.367    28.023    .000
                             ==================================================================
                             SUM   08:POST2AB       7.300     1.007    1.367    28.023    .000

        NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

     --------------------------------------------------------------------------------------------
     R0001:C00011--------------------------------------------------------------------------------
       ** END OF RUN :    0

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



     --------------------
     | START            | Project  dir.:C:\Temp\19-540\PR\4-hour_Chic\
     -------------------- Rainfall dir.:C:\Temp\19-540\PR\4-hour_Chic\
         TZERO =   .00 hrs on        0
         METOUT=   2 (output = METRIC)
         NRUN  = 0002
         NSTORM=   1
                #  1=CHI5YR.stm
     --------------------------------------------------------------------------------------------
     R0002:C00002--------------------------------------------------------------------------------
     *#******************************************************************************************
     *#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
     *#******************************************************************************************
     *#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
     *#  Date        : 10-14-2020
     *#  Modeller    : [BD]
     *#  Company     : WMI & Associates Ltd.
     *#  License #   :  2880720
     *#******************************************************************************************
     *
     * Post-Development Condition - 140 Lockhart Road
     *
     --------------------------------------------------------------------------------------------
     R0002:C00002--------------------------------------------------------------------------------
     --------------------
     | READ STORM       |  Filename: C:\Temp\19-540\PR\4-hour_Chic\CHI5YR.stm
     | Ptotal=  50.52 mm|  Comments: * City of Barrie - 5 yr Chicago (4hr) + 15%
     --------------------
           TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
          hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
           0:10   3.570|   0:50   7.530|   1:30  33.310|   2:10   8.120|   2:50   4.970|   3:30
```

```
      0:20   4.070|   1:00  11.200|   1:40  17.990|   2:20   6.960|   3:00   4.560|   3:40
      0:30   4.760|   1:10  25.640|   1:50  12.600|   2:30   6.120|   3:10   4.220|   3:50
      0:40   5.790|   1:20 108.920|   2:00   9.820|   2:40   5.480|   3:20   3.930|   4:00

    ------------------------------------------------------------------------------------------
    R0002:C00003-------------------------------------------------------------------------------
    * POST1A
    --------------------------
    | CALIB STANDHYD         |   Area    (ha)=   14.70
    | 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
    --------------------------
                                IMPERVIOUS    PERVIOUS (i)
         Surface Area     (ha)=      11.47         3.23
         Dep. Storage     (mm)=       2.00         5.00
         Average Slope     (%)=       1.50         2.00
         Length            (m)=     500.00        50.00
         Mannings n           =       .013         .250

         Max.eff.Inten.(mm/hr)=     108.92         6.85
                    over (min)        6.00        29.00
         Storage Coeff.  (min)=       5.74 (ii)   29.32 (ii)
         Unit Hyd. Tpeak (min)=       6.00        29.00
         Unit Hyd. peak  (cms)=        .19          .04
                                                          *TOTALS*
         PEAK FLOW       (cms)=       2.75          .03         2.760 (iii)
         TIME TO PEAK    (hrs)=       1.37         1.87         1.367
         RUNOFF VOLUME    (mm)=      48.52         6.69        39.315
         TOTAL RAINFALL   (mm)=      50.52        50.52        50.518
         RUNOFF COEFFICIENT   =        .96          .13          .778

           (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN* =  49.0    Ia = Dep. Storage  (Above)
          (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
         (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

    ------------------------------------------------------------------------------------------
    R0002:C00004-------------------------------------------------------------------------------
    *SWM1A
    -----------------------
    |  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
    |  IN>01:POST1A       |
    | OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
    ---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                              (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                               .000 .0000E+00|    .121 .4721E+00|    .255 .6287E+00|    .391 .
                               .058 .3567E+00|    .255 .6287E+00|    .391 .7496E+00|    .000 .

         ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
         ----------------------      (ha)     (cms)     (hrs)       (mm)
         INFLOW > 01:POST1A        14.700     2.760     1.367     39.315
        OUTFLOW < 02:SWM1A         14.700      .121     3.750     39.314

                        PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.385
```



```
                        TIME SHIFT OF PEAK FLOW         (min)=   143.00
                        MAXIMUM  STORAGE   USED       (ha.m.)=.4721E+00

    ------------------------------------------------------------------------------------------
    R0002:C00005-------------------------------------------------------------------------------
    * POST1B
    --------------------------
    | CALIB STANDHYD         |   Area    (ha)=   10.50
    | 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
    --------------------------
                                IMPERVIOUS    PERVIOUS (i)
         Surface Area     (ha)=       8.19         2.31
         Dep. Storage     (mm)=       2.00         5.00
         Average Slope     (%)=       1.50         2.00
         Length            (m)=     500.00        50.00
         Mannings n           =       .013         .250

         Max.eff.Inten.(mm/hr)=     108.92         6.85
                    over (min)        6.00        29.00
         Storage Coeff.  (min)=       5.74 (ii)   29.32 (ii)
         Unit Hyd. Tpeak (min)=       6.00        29.00
         Unit Hyd. peak  (cms)=        .19          .04
                                                          *TOTALS*
         PEAK FLOW       (cms)=       1.97          .02         1.971 (iii)
         TIME TO PEAK    (hrs)=       1.37         1.87         1.367
         RUNOFF VOLUME    (mm)=      48.52         6.69        39.315
         TOTAL RAINFALL   (mm)=      50.52        50.52        50.518
         RUNOFF COEFFICIENT   =        .96          .13          .778

           (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
               CN* =  49.0    Ia = Dep. Storage  (Above)
          (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
         (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

    ------------------------------------------------------------------------------------------
    R0002:C00006-------------------------------------------------------------------------------
    *SWM1B
    -----------------------
    |  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
    |  IN>03:POST1B       |
    | OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
    ---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                              (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                               .000 .0000E+00|    .086 .3377E+00|    .182 .4493E+00|    .279 .
                               .041 .2552E+00|    .182 .4493E+00|    .279 .5356E+00|    .000 .

         ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
         ----------------------      (ha)     (cms)     (hrs)       (mm)
         INFLOW > 03:POST1B        10.500     1.971     1.367     39.315
        OUTFLOW < 04:SWM1B         10.500      .086     3.750     39.314

                        PEAK   FLOW   REDUCTION [Qout/Qin](%)=    4.363
                        TIME SHIFT OF PEAK FLOW         (min)=   143.00
```

```
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3377E+00

--------------------------------------------------------------------------------
R0002:C00007-----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                      ID 1 02:SWM1A         14.700      .121    3.750    39.314    .000
                     +ID 2 04:SWM1B         10.500      .086    3.750    39.314    .000
                     ================================================================
                     SUM   05:POST1AB       25.200      .207    3.750    39.314    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0002:C00008-----------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     108.92         6.85
                over (min)        6.00        29.00
     Storage Coeff.  (min)=       5.74 (ii)   29.32 (ii)
     Unit Hyd. Tpeak (min)=       6.00        29.00
     Unit Hyd. peak  (cms)=        .19          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.18          .02          1.183 (iii)
     TIME TO PEAK    (hrs)=       1.37         1.87          1.367
     RUNOFF VOLUME    (mm)=      48.52         6.69         39.315
     TOTAL RAINFALL   (mm)=      50.52        50.52         50.518
     RUNOFF COEFFICIENT   =        .96          .13           .778

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0002:C00009-----------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
```



```
--------------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     108.92         6.85
                over (min)        6.00        29.00
     Storage Coeff.  (min)=       5.74 (ii)   29.32 (ii)
     Unit Hyd. Tpeak (min)=       6.00        29.00
     Unit Hyd. peak  (cms)=        .19          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .19          .00           .188 (iii)
     TIME TO PEAK    (hrs)=       1.37         1.87          1.367
     RUNOFF VOLUME    (mm)=      48.52         6.69         39.315
     TOTAL RAINFALL   (mm)=      50.52        50.52         50.518
     RUNOFF COEFFICIENT   =        .96          .13           .778

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0002:C00010-----------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                      ID 1 06:POST2A         6.300     1.183    1.367    39.315    .000
                     +ID 2 07:POST2B         1.000      .188    1.367    39.315    .000
                     ================================================================
                     SUM   08:POST2AB        7.300     1.371    1.367    39.315    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0002:C00011-----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0002:C00002-----------------------------------------------------------------------
  ** END OF RUN :    1

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

--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\4-hour_Chic\
```

```
-------------------- Rainfall dir.:C:\Temp\19-540\PR\4-hour_Chic\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0003
    NSTORM=   1
           #  1=CHI10YR.stm
--------------------------------------------------------------------------------
R0003:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0003:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\4-hour_Chic\CHI10YR.stm
| Ptotal=  59.69 mm|  Comments: * City of Barrie - 10 yr Chicago (4hr) + 15%
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:10   4.320|   0:50   9.030|   1:30  39.220|   2:10   9.720|   2:50   5.990|   3:30
      0:20   4.910|   1:00  13.360|   1:40  21.350|   2:20   8.350|   3:00   5.500|   3:40
      0:30   5.730|   1:10  30.270|   1:50  15.010|   2:30   7.350|   3:10   5.090|   3:50
      0:40   6.960|   1:20 126.550|   2:00  11.740|   2:40   6.590|   3:20   4.740|   4:00

--------------------------------------------------------------------------------
R0003:C00003----------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     126.55        10.33
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       5.41 (ii)   25.42 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .21          .04
                                                          *TOTALS*
```



```
     PEAK FLOW       (cms)=       3.31          .05          3.324 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.77          1.350
     RUNOFF VOLUME    (mm)=      57.69         9.38         47.063
     TOTAL RAINFALL   (mm)=      59.69        59.69         59.693
     RUNOFF COEFFICIENT   =        .97          .16           .788

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0003:C00004----------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .121 .4721E+00|    .255 .6287E+00|    .391 .
                           .058 .3567E+00|    .255 .6287E+00|    .391 .7496E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     3.324     1.350     47.063
    OUTFLOW < 02:SWM1A         14.700      .180     3.233     47.062

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.415
                  TIME SHIFT OF PEAK FLOW         (min)=   113.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.5411E+00

--------------------------------------------------------------------------------
R0003:C00005----------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     126.55        10.33
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       5.41 (ii)   25.42 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .21          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.37          .04          2.375 (iii)
```

```
     TIME TO PEAK    (hrs)=       1.35         1.77          1.350
     RUNOFF VOLUME    (mm)=      57.69         9.38         47.063
     TOTAL RAINFALL   (mm)=      59.69        59.69         59.693
     RUNOFF COEFFICIENT   =        .97          .16           .788

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00006-------------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .086 .3377E+00|    .182 .4493E+00|    .279 .
                           .041 .2552E+00|    .182 .4493E+00|    .279 .5356E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------     (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     2.375     1.350     47.063
    OUTFLOW < 04:SWM1B         10.500      .128     3.233     47.062

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    5.402
                    TIME SHIFT OF PEAK FLOW         (min)=   113.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3868E+00

--------------------------------------------------------------------------------------------
R0003:C00007-------------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                      ID 1 02:SWM1A         14.700      .180    3.233    47.062    .000
                     +ID 2 04:SWM1B         10.500      .128    3.233    47.062    .000
                     ==============================================================
                     SUM   05:POST1AB       25.200      .308    3.233    47.062    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
```



```
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     126.55        10.33
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       5.41 (ii)   25.42 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .21          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.42          .02          1.425 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.77          1.350
     RUNOFF VOLUME    (mm)=      57.69         9.38         47.063
     TOTAL RAINFALL   (mm)=      59.69        59.69         59.693
     RUNOFF COEFFICIENT   =        .97          .16           .788

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     126.55        10.33
                over (min)        5.00        25.00
     Storage Coeff.  (min)=       5.41 (ii)   25.42 (ii)
     Unit Hyd. Tpeak (min)=       5.00        25.00
     Unit Hyd. peak  (cms)=        .21          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .23          .00           .226 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.77          1.350
     RUNOFF VOLUME    (mm)=      57.69         9.38         47.063
     TOTAL RAINFALL   (mm)=      59.69        59.69         59.693
     RUNOFF COEFFICIENT   =        .97          .16           .788

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------------------
R0003:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 06:POST2A         6.300     1.425    1.350    47.063    .000
                       +ID 2 07:POST2B         1.000      .226    1.350    47.063    .000
                       ==================================================================
                       SUM   08:POST2AB        7.300     1.651    1.350    47.063    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0003:C00011-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0003:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0003:C00002-------------------------------------------------------------------------------
  ** END OF RUN :    2

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\4-hour_Chic\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\4-hour_Chic\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0004
    NSTORM=   1
           #  1=CHI25YR.stm
--------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
*#******************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------------------
R0004:C00002-------------------------------------------------------------------------------
```



```
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\4-hour_Chic\CHI25YR.stm
| Ptotal=  71.24 mm|  Comments: * City of Barrie - 25 yr Chicago (4hr) + 15%
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:10   5.220|   0:50  10.910|   1:30  47.060|   2:10  11.740|   2:50   7.240|   3:30
      0:20   5.940|   1:00  16.130|   1:40  25.720|   2:20  10.090|   3:00   6.650|   3:40
      0:30   6.930|   1:10  36.370|   1:50  18.110|   2:30   8.890|   3:10   6.150|   3:50
      0:40   8.420|   1:20 148.150|   2:00  14.170|   2:40   7.960|   3:20   5.740|   4:00

--------------------------------------------------------------------------------------------
R0004:C00003-------------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.15        15.68
                over (min)        5.00        22.00
     Storage Coeff.  (min)=       5.08 (ii)   22.01 (ii)
     Unit Hyd. Tpeak (min)=       5.00        22.00
     Unit Hyd. peak  (cms)=        .22          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.96          .08          3.976 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.68          1.350
     RUNOFF VOLUME    (mm)=      69.24        13.27         56.924
     TOTAL RAINFALL   (mm)=      71.24        71.24         71.237
     RUNOFF COEFFICIENT   =        .97          .19           .799

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0004:C00004-------------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .121 .4721E+00|    .255 .6287E+00|    .391 .
                           .058 .3567E+00|    .255 .6287E+00|    .391 .7496E+00|    .000 .
```

```
     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     3.976     1.350     56.924
    OUTFLOW < 02:SWM1A         14.700      .255     2.917     56.922

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.413
                   TIME SHIFT OF PEAK FLOW         (min)=    94.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.6287E+00

-------------------------------------------------------------------------------
R0004:C00005-----------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.15        15.68
                over (min)        5.00        22.00
     Storage Coeff.  (min)=       5.08 (ii)   22.01 (ii)
     Unit Hyd. Tpeak (min)=       5.00        22.00
     Unit Hyd. peak  (cms)=        .22          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.83          .06          2.840 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.68          1.350
     RUNOFF VOLUME    (mm)=      69.24        13.27         56.924
     TOTAL RAINFALL   (mm)=      71.24        71.24         71.237
     RUNOFF COEFFICIENT   =        .97          .19           .799

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
R0004:C00006-----------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .086 .3377E+00|    .182 .4493E+00|    .279 .
                           .041 .2552E+00|    .182 .4493E+00|    .279 .5356E+00|    .000 .
```



```
     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     2.840     1.350     56.924
    OUTFLOW < 04:SWM1B         10.500      .182     2.917     56.923

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    6.408
                   TIME SHIFT OF PEAK FLOW         (min)=    94.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.4493E+00

-------------------------------------------------------------------------------
R0004:C00007-----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .255    2.917    56.922    .000
                       +ID 2 04:SWM1B         10.500      .182    2.917    56.923    .000
                       ======================================================================
                       SUM   05:POST1AB       25.200      .437    2.917    56.922    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
R0004:C00008-----------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.15        15.68
                over (min)        5.00        22.00
     Storage Coeff.  (min)=       5.08 (ii)   22.01 (ii)
     Unit Hyd. Tpeak (min)=       5.00        22.00
     Unit Hyd. peak  (cms)=        .22          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.70          .04          1.704 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.68          1.350
     RUNOFF VOLUME    (mm)=      69.24        13.27         56.924
     TOTAL RAINFALL   (mm)=      71.24        71.24         71.237
     RUNOFF COEFFICIENT   =        .97          .19           .799

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
R0004:C00009----------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     148.15        15.68
                over (min)        5.00        22.00
     Storage Coeff.  (min)=       5.08 (ii)   22.01 (ii)
     Unit Hyd. Tpeak (min)=       5.00        22.00
     Unit Hyd. peak  (cms)=        .22          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .27          .01          .271 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.68         1.350
     RUNOFF VOLUME    (mm)=      69.24        13.27        56.924
     TOTAL RAINFALL   (mm)=      71.24        71.24        71.237
     RUNOFF COEFFICIENT   =        .97          .19          .799

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0004:C00010----------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 06:POST2A         6.300     1.704    1.350    56.924    .000
                      +ID 2 07:POST2B         1.000      .271    1.350    56.924    .000
                      ===================================================================
                      SUM   08:POST2AB        7.300     1.975    1.350    56.924    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0004:C00011----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0004:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
```



```
R0004:C00002----------------------------------------------------------------------
  ** END OF RUN :    3

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\4-hour_Chic\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\4-hour_Chic\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0005
    NSTORM=   1
           #  1=CHI50YR.stm
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0005:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\4-hour_Chic\CHI50YR.stm
| Ptotal=  79.45 mm|  Comments: * City of Barrie - 50 yr Chicago (4hr) + 15%
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:10   5.930|   0:50  12.270|   1:30  51.920|   2:10  13.200|   2:50   8.190|   3:30
      0:20   6.740|   1:00  18.040|   1:40  28.580|   2:20  11.370|   3:00   7.530|   3:40
      0:30   7.850|   1:10  40.220|   1:50  20.230|   2:30  10.030|   3:10   6.980|   3:50
      0:40   9.500|   1:20 164.220|   2:00  15.880|   2:40   9.000|   3:20   6.510|   4:00

--------------------------------------------------------------------------------
R0005:C00003----------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
```

```
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     164.22        20.44
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.87 (ii)   20.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .23          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       4.43          .11          4.463 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.65          1.350
     RUNOFF VOLUME    (mm)=      77.45        16.36         64.013
     TOTAL RAINFALL   (mm)=      79.45        79.45         79.453
     RUNOFF COEFFICIENT   =        .97          .21           .806

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0005:C00004----------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .121 .4721E+00|    .255 .6287E+00|    .391 .
                          .058 .3567E+00|    .255 .6287E+00|    .391 .7496E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     4.463     1.350     64.013
    OUTFLOW < 02:SWM1A         14.700      .322     2.733     64.011

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.213
                    TIME SHIFT OF PEAK FLOW         (min)=    83.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.6882E+00

--------------------------------------------------------------------------------
R0005:C00005----------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
```



```
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     164.22        20.44
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.87 (ii)   20.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .23          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.17          .08          3.188 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.65          1.350
     RUNOFF VOLUME    (mm)=      77.45        16.36         64.013
     TOTAL RAINFALL   (mm)=      79.45        79.45         79.453
     RUNOFF COEFFICIENT   =        .97          .21           .806

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0005:C00006----------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
---------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                         (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                          .000 .0000E+00|    .086 .3377E+00|    .182 .4493E+00|    .279 .
                          .041 .2552E+00|    .182 .4493E+00|    .279 .5356E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     3.188     1.350     64.013
    OUTFLOW < 04:SWM1B         10.500      .230     2.733     64.012

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.206
                    TIME SHIFT OF PEAK FLOW         (min)=    83.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.4918E+00

--------------------------------------------------------------------------------
R0005:C00007----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                         ID 1 02:SWM1A         14.700      .322    2.733    64.011    .000
                        +ID 2 04:SWM1B         10.500      .230    2.733    64.012    .000
                        ==================================================================
                        SUM   05:POST1AB       25.200      .552    2.733    64.011    .000
```

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

--------------------------------------------------------------------------------------------
R0005:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     164.22        20.44
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.87 (ii)   20.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .23          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.90          .05         1.913 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.65         1.350
     RUNOFF VOLUME    (mm)=      77.45        16.36        64.013
     TOTAL RAINFALL   (mm)=      79.45        79.45        79.453
     RUNOFF COEFFICIENT   =        .97          .21          .806

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0005:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     164.22        20.44
                over (min)        5.00        20.00
     Storage Coeff.  (min)=       4.87 (ii)   20.10 (ii)
     Unit Hyd. Tpeak (min)=       5.00        20.00
     Unit Hyd. peak  (cms)=        .23          .06
```



```
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .30          .01          .304 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.65         1.350
     RUNOFF VOLUME    (mm)=      77.45        16.36        64.013
     TOTAL RAINFALL   (mm)=      79.45        79.45        79.453
     RUNOFF COEFFICIENT   =        .97          .21          .806

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0005:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 06:POST2A         6.300     1.913    1.350    64.013    .000
                       +ID 2 07:POST2B         1.000      .304    1.350    64.013    .000
                       ==================================================================
                       SUM   08:POST2AB        7.300     2.216    1.350    64.013    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0005:C00011-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
--------------------------------------------------------------------------------------------
R0005:C00002-------------------------------------------------------------------------------
  ** END OF RUN :    4

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\4-hour_Chic\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\4-hour_Chic\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0006
    NSTORM=   1
           #  1=CHI100YR.stm
--------------------------------------------------------------------------------------------
```

```
R0006:C00002-------------------------------------------------------------------------------
*#*****************************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#*****************************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#*****************************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------------
R0006:C00002-------------------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\4-hour_Chic\CHI100YR.stm
| Ptotal=  87.58 mm|  Comments: * City of Barrie - 100 yr Chicago (4hr) + 15%
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:10   6.410|   0:50  13.450|   1:30  58.540|   2:10  14.500|   2:50   8.900|   3:30
      0:20   7.290|   1:00  19.960|   1:40  31.960|   2:20  12.440|   3:00   8.160|   3:40
      0:30   8.520|   1:10  45.220|   1:50  22.450|   2:30  10.940|   3:10   7.560|   3:50
      0:40  10.360|   1:20 180.150|   2:00  17.520|   2:40   9.800|   3:20   7.040|   4:00

-------------------------------------------------------------------------------------------
R0006:C00003-------------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     180.15        25.23
                over (min)        5.00        19.00
     Storage Coeff.  (min)=       4.70 (ii)   18.69 (ii)
     Unit Hyd. Tpeak (min)=       5.00        19.00
     Unit Hyd. peak  (cms)=        .24          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       4.92          .14          4.957 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.63          1.350
     RUNOFF VOLUME    (mm)=      85.58        19.65         71.075
     TOTAL RAINFALL   (mm)=      87.58        87.58         87.578
     RUNOFF COEFFICIENT   =        .98          .22           .812

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
```



```
            CN* =  49.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------------
R0006:C00004-------------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .121 .4721E+00|    .255 .6287E+00|    .391 .
                           .058 .3567E+00|    .255 .6287E+00|    .391 .7496E+00|    .000 .

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     4.957     1.350     71.075
    OUTFLOW < 02:SWM1A         14.700      .391     2.583     71.073

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.887
                   TIME SHIFT OF PEAK FLOW         (min)=    74.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.7496E+00

-------------------------------------------------------------------------------------------
R0006:C00005-------------------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     180.15        25.23
                over (min)        5.00        19.00
     Storage Coeff.  (min)=       4.70 (ii)   18.69 (ii)
     Unit Hyd. Tpeak (min)=       5.00        19.00
     Unit Hyd. peak  (cms)=        .24          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       3.51          .10          3.541 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.63          1.350
     RUNOFF VOLUME    (mm)=      85.58        19.65         71.075
     TOTAL RAINFALL   (mm)=      87.58        87.58         87.578
     RUNOFF COEFFICIENT   =        .98          .22           .812

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  49.0    Ia = Dep. Storage  (Above)
```

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00006-------------------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .086 .3377E+00|    .182 .4493E+00|    .279 .
                           .041 .2552E+00|    .182 .4493E+00|    .279 .5356E+00|    .000 .
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     -----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500     3.541     1.350     71.075
    OUTFLOW < 04:SWM1B         10.500      .279     2.583     71.072

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    7.880
                    TIME SHIFT OF PEAK FLOW         (min)=    74.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5356E+00

--------------------------------------------------------------------------------------------
R0006:C00007-------------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD               |
| 05:POST1AB            |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 02:SWM1A         14.700      .391    2.583    71.073    .000
                      +ID 2 04:SWM1B         10.500      .279    2.583    71.072    .000
                      ==================================================================
                      SUM   05:POST1AB       25.200      .670    2.583    71.073    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00008-------------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250
```



```
     Max.eff.Inten.(mm/hr)=     180.15        25.23
                over (min)        5.00        19.00
     Storage Coeff.  (min)=       4.70 (ii)   18.69 (ii)
     Unit Hyd. Tpeak (min)=       5.00        19.00
     Unit Hyd. peak  (cms)=        .24          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=       2.11          .06         2.124 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.63         1.350
     RUNOFF VOLUME    (mm)=      85.58        19.65        71.075
     TOTAL RAINFALL   (mm)=      87.58        87.58        87.578
     RUNOFF COEFFICIENT   =        .98          .22          .812

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00009-------------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     180.15        25.23
                over (min)        5.00        19.00
     Storage Coeff.  (min)=       4.70 (ii)   18.69 (ii)
     Unit Hyd. Tpeak (min)=       5.00        19.00
     Unit Hyd. peak  (cms)=        .24          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .33          .01          .337 (iii)
     TIME TO PEAK    (hrs)=       1.35         1.63         1.350
     RUNOFF VOLUME    (mm)=      85.58        19.65        71.075
     TOTAL RAINFALL   (mm)=      87.58        87.58        87.578
     RUNOFF COEFFICIENT   =        .98          .22          .812

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------------------
R0006:C00010-------------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD               |
```

```
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                       ID 1 06:POST2A         6.300     2.124    1.350    71.075    .000
                      +ID 2 07:POST2B         1.000      .337    1.350    71.075    .000
                      ================================================================
                      SUM   08:POST2AB        7.300     2.462    1.350    71.075    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------------------
R0006:C00011-----------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0006:C00002-----------------------------------------------------------------------------
  ** END OF RUN :    5

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



--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\4-hour_Chic\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\4-hour_Chic\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0007
    NSTORM=   1
           #  1=25mm4hr.stm
-------------------------------------------------------------------------------------------
R0007:C00002-----------------------------------------------------------------------------
*#***********************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#***********************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#***********************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
-------------------------------------------------------------------------------------------
R0007:C00002-----------------------------------------------------------------------------
```



```
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\4-hour_Chic\25mm4hr.stm
| Ptotal=  24.99 mm|  Comments: * City of Barrie - 25mm Chicago (4hr) + 15%
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:10   1.670|   0:50   3.580|   1:30  16.620|   2:10   3.880|   2:50   2.340|   3:30
      0:20   1.910|   1:00   5.400|   1:40   8.800|   2:20   3.310|   3:00   2.140|   3:40
      0:30   2.240|   1:10  12.700|   1:50   6.090|   2:30   2.900|   3:10   1.980|   3:50
      0:40   2.740|   1:20  56.220|   2:00   4.710|   2:40   2.580|   3:20   1.840|   4:00

-------------------------------------------------------------------------------------------
R0007:C00003-----------------------------------------------------------------------------
* POST1A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   14.70
| 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                                IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      11.47         3.23
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      56.22         2.70
                over (min)        7.00        42.00
     Storage Coeff.  (min)=       7.48 (ii)   41.70 (ii)
     Unit Hyd. Tpeak (min)=       7.00        42.00
     Unit Hyd. peak  (cms)=        .15          .03
                                                        *TOTALS*
     PEAK FLOW       (cms)=       1.28          .01        1.277 (iii)
     TIME TO PEAK    (hrs)=       1.38         2.18        1.383
     RUNOFF VOLUME    (mm)=      22.99         1.41       18.245
     TOTAL RAINFALL   (mm)=      25.00        25.00       24.995
     RUNOFF COEFFICIENT   =        .92          .06         .730

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------------------
R0007:C00004-----------------------------------------------------------------------------
*SWM1A
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>01:POST1A       |
| OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .121 .4721E+00|    .255 .6287E+00|    .391 .
                           .058 .3567E+00|    .255 .6287E+00|    .391 .7496E+00|    .000 .
```

```
     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 01:POST1A        14.700     1.277     1.383     18.245
    OUTFLOW < 02:SWM1A         14.700      .038     4.100     18.245

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.962
                   TIME SHIFT OF PEAK FLOW         (min)=   163.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.2326E+00

-------------------------------------------------------------------------------
R0007:C00005-----------------------------------------------------------------------
* POST1B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=   10.50
| 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.19         2.31
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      56.22         2.70
                over (min)        7.00        42.00
     Storage Coeff.  (min)=       7.48 (ii)   41.70 (ii)
     Unit Hyd. Tpeak (min)=       7.00        42.00
     Unit Hyd. peak  (cms)=        .15          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .91          .00           .912 (iii)
     TIME TO PEAK    (hrs)=       1.38         2.18          1.383
     RUNOFF VOLUME    (mm)=      22.99         1.41         18.245
     TOTAL RAINFALL   (mm)=      25.00        25.00         24.995
     RUNOFF COEFFICIENT   =        .92          .06           .730

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-------------------------------------------------------------------------------
R0007:C00006-----------------------------------------------------------------------
*SWM1B
-----------------------
|  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
|  IN>03:POST1B       |
| OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                          (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                           .000 .0000E+00|    .086 .3377E+00|    .182 .4493E+00|    .279 .
                           .041 .2552E+00|    .182 .4493E+00|    .279 .5356E+00|    .000 .
```



```
     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ----------------------      (ha)     (cms)     (hrs)       (mm)
     INFLOW > 03:POST1B        10.500      .912     1.383     18.245
    OUTFLOW < 04:SWM1B         10.500      .027     4.100     18.245

                   PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.932
                   TIME SHIFT OF PEAK FLOW         (min)=   163.00
                   MAXIMUM  STORAGE   USED       (ha.m.)=.1664E+00

-------------------------------------------------------------------------------
R0007:C00007-----------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                       (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700      .038    4.100    18.245    .000
                       +ID 2 04:SWM1B         10.500      .027    4.100    18.245    .000
                       ======================================================================
                       SUM   05:POST1AB       25.200      .065    4.100    18.245    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
R0007:C00008-----------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      56.22         2.70
                over (min)        7.00        42.00
     Storage Coeff.  (min)=       7.48 (ii)   41.70 (ii)
     Unit Hyd. Tpeak (min)=       7.00        42.00
     Unit Hyd. peak  (cms)=        .15          .03
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .55          .00           .547 (iii)
     TIME TO PEAK    (hrs)=       1.38         2.18          1.383
     RUNOFF VOLUME    (mm)=      22.99         1.41         18.245
     TOTAL RAINFALL   (mm)=      25.00        25.00         24.995
     RUNOFF COEFFICIENT   =        .92          .06           .730

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
--------------------------------------------------------------------------------
R0007:C00009----------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      56.22         2.70
                over (min)        7.00        42.00
     Storage Coeff.  (min)=       7.48 (ii)   41.70 (ii)
     Unit Hyd. Tpeak (min)=       7.00        42.00
     Unit Hyd. peak  (cms)=        .15          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .09          .00           .087 (iii)
     TIME TO PEAK    (hrs)=       1.38         2.18          1.383
     RUNOFF VOLUME    (mm)=      22.99         1.41         18.245
     TOTAL RAINFALL   (mm)=      25.00        25.00         24.995
     RUNOFF COEFFICIENT   =        .92          .06           .730

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
R0007:C00010----------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                      (ha)     (cms)    (hrs)      (mm)   (cms)
                      ID 1 06:POST2A         6.300      .547    1.383    18.245    .000
                     +ID 2 07:POST2B         1.000      .087    1.383    18.245    .000
                     ====================================================================
                     SUM   08:POST2AB        7.300      .634    1.383    18.245    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
R0007:C00011----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
```



```
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
--------------------------------------------------------------------------------
R0007:C00002----------------------------------------------------------------------
  ** END OF RUN :    6

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




--------------------
| START            | Project  dir.:C:\Temp\19-540\PR\4-hour_Chic\
-------------------- Rainfall dir.:C:\Temp\19-540\PR\4-hour_Chic\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 0008
    NSTORM=   1
           #  1=HAZEL.STM
--------------------------------------------------------------------------------
R0008:C00002----------------------------------------------------------------------
*#******************************************************************************
*#  SWMHYMO Ver:4.05.03/Aug 2017 / INPUT DATA FILE
*#******************************************************************************
*#  Project Name: [140 Lockhart Road, Barrie]    Project Number: [19-540]
*#  Date        : 10-14-2020
*#  Modeller    : [BD]
*#  Company     : WMI & Associates Ltd.
*#  License #   :  2880720
*#******************************************************************************
*
* Post-Development Condition - 140 Lockhart Road
*
--------------------------------------------------------------------------------
R0008:C00002----------------------------------------------------------------------
--------------------
| READ STORM       |  Filename: C:\Temp\19-540\PR\4-hour_Chic\HAZEL.STM
| Ptotal= 212.00 mm|  Comments: * REGIONAL DESIGN STORM - HAZEL
--------------------
      TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME    RAIN|   TIME
     hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm   mm/hr|  hh:mm
      0:12   6.000|   2:12   6.000|   4:12  17.000|   6:12  23.000|   8:12  13.000|  10:12
      0:24   6.000|   2:24   6.000|   4:24  17.000|   6:24  23.000|   8:24  13.000|  10:24
      0:36   6.000|   2:36   6.000|   4:36  17.000|   6:36  23.000|   8:36  13.000|  10:36
      0:48   6.000|   2:48   6.000|   4:48  17.000|   6:48  23.000|   8:48  13.000|  10:48
      1:00   6.000|   3:00   6.000|   5:00  17.000|   7:00  23.000|   9:00  13.000|  11:00
      1:12   4.000|   3:12  13.000|   5:12  13.000|   7:12  13.000|   9:12  53.000|  11:12
      1:24   4.000|   3:24  13.000|   5:24  13.000|   7:24  13.000|   9:24  53.000|  11:24
      1:36   4.000|   3:36  13.000|   5:36  13.000|   7:36  13.000|   9:36  53.000|  11:36
```

```
      1:48   4.000|   3:48  13.000|   5:48  13.000|   7:48  13.000|   9:48  53.000|  11:48
      2:00   4.000|   4:00  13.000|   6:00  13.000|   8:00  13.000|  10:00  53.000|  12:00

  ----------------------------------------------------------------------------------------
  R0008:C00003-------------------------------------------------------------------------------
  * POST1A
  --------------------------
  | CALIB STANDHYD         |   Area    (ha)=   14.70
  | 01:POST1A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
  --------------------------
                                IMPERVIOUS    PERVIOUS (i)
       Surface Area     (ha)=      11.47         3.23
       Dep. Storage     (mm)=       2.00         5.00
       Average Slope     (%)=       1.50         2.00
       Length            (m)=     500.00        50.00
       Mannings n           =       .013         .250

       Max.eff.Inten.(mm/hr)=      53.00        31.07
                  over (min)        8.00        21.00
       Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
       Unit Hyd. Tpeak (min)=       8.00        21.00
       Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
       PEAK FLOW       (cms)=       1.69          .25         1.931 (iii)
       TIME TO PEAK    (hrs)=      10.00        10.17        10.000
       RUNOFF VOLUME    (mm)=     210.00        90.90       183.798
       TOTAL RAINFALL   (mm)=     212.00       212.00       212.000
       RUNOFF COEFFICIENT   =        .99          .43          .867

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  49.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

  ----------------------------------------------------------------------------------------
  R0008:C00004-------------------------------------------------------------------------------
  *SWM1A
  -----------------------
  |  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
  |  IN>01:POST1A       |
  | OUT<02:SWM1A        | ========================  OUTLFOW STORAGE TABLE  =================
  ----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                            (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                             .000 .0000E+00|    .121 .4721E+00|    .255 .6287E+00|    .391 .
                             .058 .3567E+00|    .255 .6287E+00|    .391 .7496E+00|    .000 .
  *** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.

       ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
       ----------------------      (ha)     (cms)     (hrs)       (mm)
       INFLOW > 01:POST1A        14.700     1.931    10.000    183.798
      OUTFLOW < 02:SWM1A         14.700     1.076    11.150    183.794

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   55.717
```



```
                       TIME SHIFT OF PEAK FLOW         (min)=    69.00
                       MAXIMUM  STORAGE   USED       (ha.m.)=.1359E+01

  ----------------------------------------------------------------------------------------
  R0008:C00005-------------------------------------------------------------------------------
  * POST1B
  --------------------------
  | CALIB STANDHYD         |   Area    (ha)=   10.50
  | 03:POST1B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
  --------------------------
                                IMPERVIOUS    PERVIOUS (i)
       Surface Area     (ha)=       8.19         2.31
       Dep. Storage     (mm)=       2.00         5.00
       Average Slope     (%)=       1.50         2.00
       Length            (m)=     500.00        50.00
       Mannings n           =       .013         .250

       Max.eff.Inten.(mm/hr)=      53.00        31.07
                  over (min)        8.00        21.00
       Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
       Unit Hyd. Tpeak (min)=       8.00        21.00
       Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
       PEAK FLOW       (cms)=       1.21          .18         1.380 (iii)
       TIME TO PEAK    (hrs)=      10.00        10.17        10.000
       RUNOFF VOLUME    (mm)=     209.99        90.90       183.799
       TOTAL RAINFALL   (mm)=     212.00       212.00       212.000
       RUNOFF COEFFICIENT   =        .99          .43          .867

         (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
             CN* =  49.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

  ----------------------------------------------------------------------------------------
  R0008:C00006-------------------------------------------------------------------------------
  *SWM1B
  -----------------------
  |  ROUTE RESERVOIR -> |    Requested routing time step =  1.0 min.
  |  IN>03:POST1B       |
  | OUT<04:SWM1B        | ========================  OUTLFOW STORAGE TABLE  =================
  ----------------------- OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW   STORAGE| OUTFLOW
                            (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)   (ha.m.)|   (cms)
                             .000 .0000E+00|    .086 .3377E+00|    .182 .4493E+00|    .279 .
                             .041 .2552E+00|    .182 .4493E+00|    .279 .5356E+00|    .000 .
  *** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.

       ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
       ----------------------      (ha)     (cms)     (hrs)       (mm)
       INFLOW > 03:POST1B        10.500     1.380    10.000    183.799
      OUTFLOW < 04:SWM1B         10.500      .768    11.150    183.793

                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=   55.700
```

```
                    TIME SHIFT OF PEAK FLOW         (min)=    69.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.9711E+00

-----------------------------------------------------------------------------------------
R0008:C00007-----------------------------------------------------------------------------
*POST1AB
------------------------
| ADD HYD              |
| 05:POST1AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                        (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 02:SWM1A         14.700     1.076   11.150   183.794    .000
                       +ID 2 04:SWM1B         10.500      .768   11.150   183.793    .000
                       ================================================================
                       SUM   05:POST1AB       25.200     1.845   11.150   183.794    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------------
R0008:C00008-----------------------------------------------------------------------------
* POST2A
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    6.30
| 06:POST2A     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.91         1.39
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
     Unit Hyd. peak  (cms)=        .15          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .72          .11          .828 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17        10.000
     RUNOFF VOLUME    (mm)=     210.00        90.90       183.799
     TOTAL RAINFALL   (mm)=     212.00       212.00       212.000
     RUNOFF COEFFICIENT   =        .99          .43          .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------------------
R0008:C00009-----------------------------------------------------------------------------
* POST2B
--------------------------
| CALIB STANDHYD         |   Area    (ha)=    1.00
```



```
| 07:POST2B     DT= 1.00 |   Total Imp(%)=   78.00   Dir. Conn.(%)=   78.00
--------------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .78          .22
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=     500.00        50.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        31.07
                over (min)        8.00        21.00
     Storage Coeff.  (min)=       7.66 (ii)   20.54 (ii)
     Unit Hyd. Tpeak (min)=       8.00        21.00
     Unit Hyd. peak  (cms)=        .15          .06
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .11          .02          .132 (iii)
     TIME TO PEAK    (hrs)=      10.00        10.17        10.000
     RUNOFF VOLUME    (mm)=     210.00        90.90       183.798
     TOTAL RAINFALL   (mm)=     212.00       212.00       212.000
     RUNOFF COEFFICIENT   =        .99          .43          .867

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  49.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

-----------------------------------------------------------------------------------------
R0008:C00010-----------------------------------------------------------------------------
*POST2AB
------------------------
| ADD HYD              |
| 08:POST2AB           |   ID:NHYD            AREA     QPEAK    TPEAK      R.V.     DWF
------------------------                        (ha)     (cms)    (hrs)      (mm)   (cms)
                        ID 1 06:POST2A         6.300      .828   10.000   183.799    .000
                       +ID 2 07:POST2B         1.000      .132   10.000   183.798    .000
                       ================================================================
                       SUM   08:POST2AB        7.300      .959   10.000   183.799    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-----------------------------------------------------------------------------------------
R0008:C00011-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0008:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0008:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0008:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0008:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
R0008:C00002-----------------------------------------------------------------------------
-----------------------------------------------------------------------------------------
```

```
R0008:C00002-------------------------------------------------------------------------------
-------------------------------------------------------------------------------------------
R0008:C00002-------------------------------------------------------------------------------
--------------------
| FINISH           |
--------------------
-------------------------------------------------------------------------------------------
*******************************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
R0006:C00006  ROUTE RESERVOIR
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.
R0008:C00004  ROUTE RESERVOIR
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.
R0008:C00006  ROUTE RESERVOIR
*** WARNING: STORAGE-Q values were extrapolated. Increase curve or use overflow option.
   Simulation ended on 2021-01-22     at 10:32:22
===========================================================================================
```

APPENDIX E

GEOTECHNICAL SUPPORTING INFORMATION

Preliminary Geotechnical Investigation Report - 140 Lockhart Road, Barrie

CAMBIUM

2020-12-04

Prepared for:
2640085 Ontario Inc.

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Peterborough | Barrie | Oshawa | Kingston

Table of Contents

1.0 Introduction 1

2.0 Investigation Methodology 2

2.1 Field Work 2

2.2 Physical Laboratory Testing 3

3.0 Subsurface Conditions 4

3.1 Stratigraphy 4

3.1.1 Topsoil 4

3.1.2 Earth Fill 4

3.1.3 Sand/Silty Sand 4

3.1.4 Clayey Silt 5

3.1.5 Glacial Till 5

3.2 Groundwater 6

4.0 Preliminary Geotechnical Recommendations 8

4.1 Excavations 8

4.2 Groundwater Control 9

4.3 Earth Pressure Design Parameters 9

4.4 Preliminary Foundation Design 11

4.5 Frost Penetration of Foundations 12

4.6 Earthquake Design Parameters 12

4.7 Foundation Wall Backfill 14

4.8 Slab on Grade Design Parameters 14

4.9 Perimeter Drainage 15

4.10 Site Servicing 15

4.10.1 Excavation 15

4.10.2 Bedding 15

4.10.3 Trench Backfill 16

4.11 Pavement Design Consideration 16

4.11.1 Subgrade Preparation 16
4.11.2 Typical Flexible Pavement Structure 17

5.0 Limitations 19
5.1 Design Review and Inspections 19
5.2 Changes in Site and Project Scope 19

6.0 Closing 20

List of Appended Figures

Figure 1 Borehole Location Plan

List of Inserted Tables

Table 1 Particle Size Distribution Results 6
Table 2 Groundwater Observations 7
Table 3 Earth Pressure Design Values 10
Table 4 Acceleration Based Seismic Coefficients 13
Table 5 Velocity Based Seismic Coefficients 13
Table 6 Recommended Minimum Pavement Structure 17

List of APPENDICES

Appendix A Borehole Logs
Appendix B Physical Lab Results

1.0 Introduction

Cambium Inc. (Cambium) was retained by Innovative Planning Solutions, representing 2640085 Ontario Inc. (the Client) to complete a preliminary geotechnical investigation in support of the design and construction of the proposed industrial subdivision development located at 140 Lockhart Road in Barrie, Ontario. The Site is bounded to the east, north, and west by industrial developments and to the south by Lockhart Road. A Site Plan, including borehole locations, is included as Figure 1 of this report.

Preliminary site plans indicate that the proposed development is to include approximately 58 lots zoned for industrial use and internal roadways.

This report presents the methodology and findings of a preliminary geotechnical investigation of the subject site to determine the subsurface soil and groundwater conditions and provide preliminary design recommendations. Based on the results of this investigation, the report provides preliminary geotechnical engineering recommendations pertaining to the proposed development. It is assumed that all the proposed lots will be developed with slab on grade single storey structures and municipally serviced. A detailed geotechnical investigation, including additional boreholes across the site is required once the details of the individual structures are known.

2.0 Investigation Methodology

2.1 Field Work

The field investigation involved advancing a total of seven boreholes (numbered BH101-20 through BH107-20) across the site from September 3rd to 4th, 2020. The boreholes were advanced from grade to depths ranging from 2.6 to 8.0 meters below ground surface (mbgs). The location of the boreholes relative to existing site conditions are provided on the attached Figure 1.

Drilling and sampling was completed using a track-mounted drill rig operating under the supervision of a Cambium geotechnical analyst. The boreholes were advanced to the sampling depths by means of continuous flight solid stem augers and 50 mm O.D. split spoon samplers. Standard Penetration Test (SPT) results (N-values) were recorded for the sampled intervals as the number of blows required to drive a split spoon sampler 305 mm in to the soil, using a 63.5 kg drop hammer falling 750 mm, as per ASTM D1586 procedures. The SPT N-values are used in this report to assess consistency of cohesive soils and relative density of non-cohesive soils.

Borehole and monitoring well samples were inspected and logged in the field using visual and tactile methods. Soil samples were placed in labelled plastic containers for transport, review, potential laboratory testing, and temporary storage. Open boreholes were checked for groundwater and stability prior to backfilling and were backfilled in accordance with O.Reg. 903, as amended. One groundwater monitoring well was installed in Borehole BH106-20 to measure stabilized groundwater readings.

GPS coordinates of each borehole were obtained using a handheld GPS device. Boreholes were survey using real-time kinematic (RTK) surveying equipment systems, the boreholes are referenced based on geodetic elevations UTM zone 17T.

Records of the individual Borehole Logs are provided in Appendix A.

2.2 Physical Laboratory Testing

Physical laboratory testing was completed on select soil samples to confirm textural classification and to assess geotechnical parameters. The results are summarized in the respective soil stratigraphy sections in Section 3.0 and included in detail in Appendix B.

3.0 Subsurface Conditions

The subsurface soil and groundwater conditions encountered in the boreholes are presented on the attached Borehole Logs in Appendix A. The stratigraphic boundaries indicated on the logs are inferred from non-continuous samples and observations of drilling resistance and typically represent a transition from one soil type to another, sometime gradually. The boundaries should not be interpreted to represent exact planes of geologic change. The subsurface conditions have been confirmed in a series of widely spaced boreholes, and will vary between and beyond the borehole locations.

3.1 Stratigraphy

The following stratigraphy is based on the borehole findings, as well as the geotechnical laboratory testing conducted on representative soil samples.

3.1.1 Topsoil

Topsoil was encountered from the surface at all borehole locations. The topsoil ranges in thickness from 0.1 to 1.1 m. Assessments of organic matter content or other topsoil quality tests were beyond the scope of this study. Proper delineation of the average topsoil thickness at the site would require many additional test holes on a grid pattern.

3.1.2 Earth Fill

A layer of fill material was encountered underlying the topsoil in BH102-20. The earth fill was composed of grey silty sand, with rootlets, and extended to a depth of 0.8 mbgs and was approximately 0.7 m thick.

3.1.3 Sand/Silty Sand

Native deposits of sand and silty sand were encountered underlying the fill material in BH102-20 and underlying the topsoil in BH103-20 and BH106-20. The sand deposit in BH102-20 is composed of a brown sand, trace silt. The silty sand deposit encountered in BH103-20 and

BH106-20 is composed of brown silty sand, with trace clay and trace gravel encountered in BH103-20.

The sand deposits were encountered at depths ranging from 0.8 to 1.1 mbgs and extend to depths ranging from 1.1 to 2.3 mbgs. The measured thicknesses of the deposits range from 0.4 to 2.1 m.

SPT N-values measured in the sand deposits range from 25 to 38 blows per 305 mm of penetration, reflective of a compact to dense relative density.

3.1.4 Clayey Silt

A native deposit of cohesive clayey silt was encountered underlying the silty sand in BH103-20 and BH106-20. The deposits are composed of grey or grey brown clayey silt with trace sand.

The clayey silt deposit was encountered at depths ranging between 1.9 and 2.3 mbgs and extended to depths between 3.0 and 4.6 mbgs. The thickness of the deposit measured 2.3 and 1.1 m at BH103-20 and BH106-20, respectively.

SPT N-values measured in the clayey silt deposits range from 7 to 15, indicative of a firm to very stiff consistency.

3.1.5 Glacial Till

Glacial till was encountered at all borehole locations underlying the clayey silty and/or topsoil and/or sand deposits at all borehole locations. Glacial till is typically a heterogeneous mixture of all grain sizes. At this site the glacial till is predominantly composed of grey or grey brown silty sand to silt and sand with trace clay and trace gravel. Based on drilling observations there is likely the presence cobbles and boulders within the glacial till, typically found in glacial till deposits.

The glacial till was encountered at depths ranging from 0.1 to 4.5 mbgs. It should be noted that the upper portions of the glacial till in BH101-20, BH104-20, BH105-20, and BH107-20 have been disturbed. Where observed, the disturbed material extends to an approximate depth of 1.5 mbgs. All boreholes were terminated within the glacial till deposit at variable depths ranging from

2.6 to 8.0 mbgs. It should be noted that BH102-20, BH104-20, and BH105-20 terminated due to auger refusal at depths ranging from 2.6 to 4.6 mbgs. Auger refusal can sometimes be encountered on cobbles and boulders within the glacial till.

SPT N-values measured within the glacial till range from 11 to over 50, reflective of a compact to very dense relative density.

Grain size analysis was completed on five (5) samples of the glacial till and the results are summarized in Table 1. Detailed results are provided in Appendix B.

Table 1 Particle Size Distribution Results

Borehole	Depth (m)	Soil	% Gravel	% Sand	% Silt	% Clay
BH101-20 SS2	0.6 to 1.2	Sand and Silt	3	43	41	13
BH102-20 SS3	1.5 to 2.0	Silty Sand	10	42	33	15
BH104-20 SS5	3.0 to 3.5	Silty Sand	15	49	27	9
BH105-20 SS3	1.5 to 2.0	Silty Sand	18	46	27	9
BH107-20 SS7	6.1 to 6.6	Silty Sand	3	61	31	5

3.2 Groundwater

The depth of groundwater was measured in each borehole immediately following drilling field work. One (1) groundwater monitoring well was installed in BH106-20 in order to measure stabilized groundwater conditions. The groundwater and caving (sloughing) observations are shown on the respective Borehole Logs and summarized in Table 2.

Table 2 Groundwater Observations

Borehole No.	Depth of Borehole (mbgs)	Groundwater / Wet Soils Depth Encountered During Drilling (mbgs)	Caving Depth (mbgs)	Groundwater Level (mbgs) 22/09/2020
BH101-20	5.0	Dry	-	-
BH102-20	2.6	1.5	2.3	-
BH103-20	8.0	Dry	-	-
BH104-20	4.6	Dry	-	-
BH105-20	3.1	Dry	-	-
BH106-20	5.0	2.3	-	3.7
BH107-20	7.7	Dry	-	-

Based on the groundwater levels measured in BH106-20 on September 22, 2020, the preliminary design groundwater table is estimated at ±273.5 metres above sea level (mASL). Further groundwater readings from multiple monitoring wells across the site will be required at the detailed design stage. Perched water should also be anticipated in the overlying earth fill and disturbed material.

Groundwater levels may fluctuate with time, and seasonally, depending on the amount of precipitation and surface runoff.

4.0 Preliminary Geotechnical Recommendations

The following preliminary discussion and recommendations are based on the factual data obtained from this investigation and are intended for use by the owner and the design engineer. Contractors bidding or providing services on this project should review the factual data and determine their own conclusions regarding the construction methods and scheduling.

This report is based on the assumption that the design features relevant to the geotechnical analysis will be completed in accordance with applicable codes, standards, and guidelines of practice. If there are changes to the site development features, or there is any significant variations in the subsurface conditions that are found before or during construction, Cambium should be retained to review the implications of these changes with respect to the contents of this report.

It is assumed that all the proposed lots will be developed with slab on grade single storey structures and municipally serviced. A detailed geotechnical investigation, including additional boreholes across the site is required once more design details are provided.

Based on site observations the existing elevations of the surrounding roadways and boreholes, significant grade raise is not anticipated at this site. Site grading recommendations can be provided depending on need and upon request.

4.1 Excavations

Temporary excavations must be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA), Ontario Regulation 213/91 (as amended). For practical purposes, the overburden soils at the site above the water table can be considered to be Type 3 soils, as such excavation side slopes should be no steeper than 1H:1V. Below the water table soils at the site would be considered as Type 4 soils and would require side slopes of no steeper than 3H:1V. Minimum support system requirements (shoring) for steeper excavations are stipulated in Sections 235 through 238 of the Occupational Health and Safety Act (OHSA), Construction Projects, Part III.

Excavation side slopes should be protected from exposure to precipitation and associated ground surface runoff and should be inspected regularly for signs of instability. If localized instability is noted during excavation or if wet conditions are encountered, the side slopes should be flattened as required to maintain safe working conditions or the excavation sidewalls must be fully supported (shored).

Larger size particles, such as cobbles and boulders) will be encountered within the glacial till deposit. The size and distribution of such obstructions cannot be predicted with boreholes, as the sampler size in insufficient to secure representative particles of this size. Provisions should be made in excavation contracts to allocate risks associated with the time spent and the equipment utilized to remove or penetration such obstructions, when encountered.

4.2 Groundwater Control

No groundwater was observed in the boreholes immediately following drilling field work in September, 2020. Stabilized groundwater levels measured in the BH106-20 monitoring well in September, 2020 indicate a groundwater level at a depth of 3.7 mbgs (±273.5 mASL). Perched water should also be anticipated within the subsurface deposits, such as fill, sand, and disturbed glacial till.

Further hydrogeological data will be required in order to provide accurate groundwater control measures and determine Ministry of the Environment, Conservation, and Parks (MECP) requirements.

Agricultural drainage pipes may be encountered during the excavation of the proposed structures. Any drainage pipes could be a source of significant volumes of water, which could impact construction work and subgrades. It is recommended that any drainage pipe encountered during the excavation be removed a horizontal distance of 2 m from the edge of the excavation and appropriately sealed.

4.3 Earth Pressure Design Parameters

The appropriate values for use in the design of structures subject to unbalanced earth pressures at this site are tabulated as follows in Table 3:

Table 3 Earth Pressure Design Values

Stratum/Parameter	γ	φ	Ka	Ko	Kp
Earth Fill	19	30	0.33	0.50	3.00
Native Undisturbed Sands, Glacial Till	21	34	0.28	0.44	3.54
Native Undisturbed Clayey Silt	19	30	0.33	0.50	3.00
Granular Backfill	22	35	0.27	0.42	3.70

Where: γ = bulk unit weight of soil (kN/m^3)

φ = internal angle of friction (degrees)

K_a = Rankine active earth pressure coefficient (dimensionless)

K_o = Rankine at-rest earth pressure coefficient (dimensionless)

K_p = Rankine passive earth pressure coefficient (dimensionless)

The above earth pressure parameters pertain to a horizontal grade condition behind a retaining structure. Values of earth pressure parameters for an inclined retained grade condition will vary.

Walls subject to unbalanced earth pressures must be designed to resist a pressure that can be calculated based on the following equation:

$$P = K[\gamma(h - h_w) + \gamma' h_w + q] + \gamma_w h_w$$

Where, P = the horizontal pressure at depth, h (m)

K = the earth pressure coefficient

hw = the depth below the ground water level (m)

γ = the bulk unit weight of soil, (kN/m3)

γ' = the submerged unit weight of the exterior soil, (γ - 9.8 kN/m3)

q = the complete surcharge loading (kPa)

The wall backfill must be drained effectively to eliminate hydrostatic pressures on the wall that would otherwise act in conjunction with the earth pressure. In this case, the above equation is simplified to:

$$P = K[\gamma h + q]$$

The factored geotechnical resistance to sliding of foundation elements is developed by friction between the base of the footing and the soil. This friction (**R**) depends on the normal load at the soil contact (**N**) and the frictional resistance of the soil (**tan φ**) expressed as $R_f = N\ tan\varphi$, which is the unfactored resistance. The factored geotechnical resistance at ULS is $R_f = 0.8\ N\ tan\varphi$.

4.4 Preliminary Foundation Design

As previously indicated, it is assumed that the proposed development will consist predominantly of single storey structures of slab on grade design (i.e. no basement). Foundations for such structures at this site may consist of shallow spread footings founded directly on native, undisturbed deposits of sand, clayey silt, or silty sand glacial till.

Foundations constructed on undisturbed, compact sands, or firm clayey silts, can be designed using a net geotechnical reaction at Serviceability Limit State (SLS) of 175 kPa for an estimated total settlement of 25 mm of less. The maximum factored geotechnical resistance at Ultimate Limit State (ULS) for foundations constructed on the undisturbed soil is 250 kPa. The settlement at SLS will occur as the load is applied, and is linear and non-recoverable. Differential settlement is a function of spacing, loading, and foundation size.

Alternatively, in areas where the proposed founding levels are above the level of competent native soil, or where subexcavation is required, footings can be made to bear directly on a pad of Engineered Fill such as that conforming to Ontario Provincial Standards Specification (OPSS) 1010.MUNI Granular B Type II. Any engineered fill placed below proposed foundations should be placed directly on undisturbed native sands or clayey silt. The imported engineered fill should be placed in maximum 200 mm thick lifts to at least 98 % of the standard proctor maximum dry density (SPMDD) value. To allow for adequate spread of the loading below and beyond the footings, the engineered fill should extend a horizontal distance of at least 300 mm beyond the

edge of the footings and then down and away from the edges at an angle of 1 horizontal to 1 vertical, or flatter. Excavations should be sized to accommodate fill placement. Foundations made on top of adequately compacted engineered fill should be sized using a net reaction at SLS of 150 kPa, and factored geotechnical resistance at ULS of 225 kPa.

Settlement potential at the above-noted SLS loadings is less than 25 mm and differential settlement should be less than 20 mm.

To reduce cracking in the footings, foundation walls, and concrete slab on grades where footings change between different subgrade materials, suitable transition zones should be created and the footings suitably reinforced.

4.5 Frost Penetration of Foundations

All exterior footings of the proposed building should be provided with at least 1.5 m of earth cover for frost protection purposes. If the required depth of earth cover is not practicable, a combination of earth cover and polystyrene insulation could be considered. An insulation detail could be provided upon request.

4.6 Earthquake Design Parameters

The Ontario Building Code (2012) stipulates the methodology for earthquake design analysis, as set out in Subsection 4.1.8.7. The determination of the type of analysis is predicated on the importance of the structure, the spectral response acceleration and the site classification.

The parameters for determination of Site Classification for Seismic Site Response are set out in Table 4.1.8.4A of the Ontario Building Code (2012). The classification is based on the determination of the average shear wave velocity in the top 30 metres of the site stratigraphy, where shear wave velocity (v_s) measurements have been taken. Alternatively, the classification is estimated on the basis of rational analysis of undrained shear strength (s_u) or penetration resistance (N-values).

$$\upsilon_{s-avg} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{\upsilon_{si}}}$$

Shear wave velocity

$$S_{u-avg} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{s_{ui}}}$$

Undrained shear strength

$$N_{avg} = \frac{\sum_{i=1}^{n} d_i}{\sum_{i=1}^{n} \frac{d_i}{N_i}}$$

SPT N-values

Beneath the foundations for this site, there will exist compact to very dense sands and/or firm to hard clayey silts. Boreholes were advanced to a maximum depth of 8.0 m and bedrock was not proven. It is therefore recommended that the site designation for seismic analysis is conservatively Class D as per Table 4.1.8.4.A of the Ontario Building Code (2012). Tables 4.1.8.4.B and 4.1.8.4.C. of the same code provide the applicable acceleration (Table 4) and velocity (Table 5) based site coefficients.

Table 4 Acceleration Based Seismic Coefficients

Site Class	Values of F_a				
	$S_a(0.2) \leq 0.25$	$S_a(0.2) = 0.50$	$S_a(0.2) = 0.75$	$S_a(0.2) = 1.00$	$S_a(0.2) \geq 1.25$
D	1.3	1.2	1.1	1.1	1.0

Table 5 Velocity Based Seismic Coefficients

Site Class	Values of F_v				
	$S_a(1.0) \leq 0.1$	$S_a(1.0) = 0.2$	$S_a(1.0) = 0.3$	$S_a(1.0) = 0.4$	$S_a(1.0) \geq 0.5$
D	1.4	1.3	1.2	1.1	1.1

Consideration could be given to carrying out shear wave velocity testing ("MASW") to evaluate whether an improved seismic site class can be obtained. Additionally, deeper boreholes may also provide more accurate results. Further details regarding shear wave velocity testing could be provided upon request.

4.7 Foundation Wall Backfill

To avoid frost adhesion and possible heaving, it is recommended that all foundation walls are backfilled with non-frost susceptible granular material such as imported material meeting OPSS Granular B Type I or II.

It is possible to reuse some of the existing cohesionless material as backfill such as in areas underlying landscaped areas and those not sensitive to excess settlement. The reused material should be tested by Cambium to determine if the level of frost susceptibility is within adequate tolerance.

Where backfill will support areas of hard surfacing (pavements, walkways, etc.) the backfill should be placed in maximum 200 mm thick lifts and compacted to at least 95% of the SPMDD value.

4.8 Slab on Grade Design Parameters

All organic material and deleterious material must be removed prior to constructing the slab on grade. These materials do not constitute an adequate subgrade for support of a slab on grade. Compacted earth fill, engineered fill, the native sands, clayey silts, or glacial tills are suitable for the support of a conventional slab on grade provided they are approved by Cambium.

The moduli of subgrade reaction appropriate for slab on grade design on the soils at the site are as follows:

- Compacted earth fill: 16,000 kPa/m
- Engineered Fill: 22,000 kPa/m
- Native, undisturbed soils: 30,000 kPa/m

The subgrade for the slab must be cut-neat, proof rolled, and inspected by Cambium, prior to the placement of an aggregate base. The subgrade should be proof rolled using a static smooth drum roller. If any soft or weak subgrade areas are identified, or if there are areas containing excessive amounts of deleterious/organic material or moisture, they must be locally sub-

excavated and backfilled with approved clean earth fill or Engineered Fill such as OPSS Granular B (Type I or II) and compacted to a minimum of 98% Standard Proctor Maximum Dry Density (SPMDD).

It is necessary that the slab be provided with a capillary moisture barrier and drainage layer. This is made by placing the slab on a minimum 200 mm layer of clear stone and nominally compacted by vibration to a dense state. The upper 50 mm of clear stone may be replaced with 50 mm of OPSS Granular A to create a working surface.

4.9 Perimeter Drainage

Perimeter foundation drainage is not considered necessary for slab-on-grade structures provided that the finished floor slab elevation is set above the exterior surface grades.

4.10 Site Servicing

4.10.1 Excavation

Excavations for proposed site services should adhere to the recommendations provided in Section 4.1.

4.10.2 Bedding

The existing native soils and glacial till will provide adequate support for buried services on conventional well graded granular base material. Where disturbance to the trench base has occurred, such as due to groundwater inflow or construction activities, the disturbed materials should be sub-excavated and replaced with suitably compacted granular fill.

Granular bedding material should consist of a conventional Class 'B' bedding, such as OPSS.MUNI 1010 Granular A. The use of 19 mm clear stone (OPSS.MUNI 1004) as bedding is also acceptable provided that the bedding is wrapped in suitable geotextile filter (Terrafix 360R or equivalent). The bedding materials should be compacted to a minimum 95% of SPMDD. Clear stone bedding material should be nominally compacted to a dense state.

4.10.3 Trench Backfill

In general, excavated soils encountered on site may be re-used as backfill, provided the moisture content of these materials is within 2% of optimum to ensure adequate compaction, the trenches are wide enough to accommodate large compaction equipment, and the soil is free of any organic material. Soils with elevated moisture could be put aside to dry, tilled to reduce the moisture content so that they can be effectively compacted, or could be mixed with dryer material. Alternatively, materials of higher moisture content could be wasted and replaced with imported material which can be readily compacted.

The backfill should consist of clean earth fill and should be placed in lifts of 150 mm thickness or less and compacted to a minimum 95% of SPMMD (in settlement sensitive areas) and 90% of SPMDD (in non-settlement sensitive areas) at a water content within 2% of optimum. Existing earth fill and native soils will be difficult to place and compact successfully in narrow trench excavations, where large compaction equipment could not operate. For narrow trench excavations, it is recommended that free draining granular material, such as OPSS 1010 Granular 'B' be used in order to allow for adequate compaction using vibratory equipment. The placement and inspection of any earth fill as backfill must be conducted under the full time observation of Cambium.

4.11 Pavement Design Consideration

4.11.1 Subgrade Preparation

The performance of the pavement is dependent upon proper subgrade preparation. All topsoil and organic materials should be removed. The subgrade should be proof rolled and inspected by Cambium personnel. Any areas where rutting or appreciable deflection is noted should be sub-excavated and replaced with suitable earth fill. The fill should be compacted to at least 98% of SPMDD.

4.11.2 Typical Flexible Pavement Structure

The performance of the pavement is dependent upon proper subgrade preparation and drainage. All fill materials should be removed down to native material and backfilled with approved engineered fill or native material, compacted to 98% of SPMDD. The subgrade should be proof rolled and inspected by a Geotechnical Engineer prior to placing the granular fill. Any areas where rutting or appreciable deflection is noted should be subexcavated and replaced with suitable fill. The fill should be compacted to at least 98% of SPMDD.

The recommended minimum pavement structure design has been developed for two traffic loading scenarios; light duty and heavy duty. The light duty design is appropriate for areas where no truck traffic is anticipated. The heavy duty design should meet the City of Barrie Transportation Design Manual (2020) requirements and as a minimum, consist of the pavement layers identified in Table 6. The heavy duty pavement structure recommended below assumes that the annual average daily traffic (AADT) is less than 2,500, and is appropriate for areas where heavy traffic or heavy loads are anticipated. If the predicted AADT is higher than that assumed, Cambium should be contacted to reassess this recommendation.

It is noted that the minimum pavement structure may be reassessed following further geotechnical investigations.

Table 6 Recommended Minimum Pavement Structure

Pavement Layer	Light Duty (Light Vehicle Parking)	Heavy Duty (City of Barrie Designated Routes or Fire Truck Routes)
Surface Course Asphalt	40 mm HL3 or HL4	40 mm HL3 or SP 12.5
Binder Course Asphalt	50 mm HL8	70 mm HL8 or SP 19
Granular Base	150 mm OPSS 1010 Granular A	150 mm OPSS 1010 Granular A
Granular Subbase	300 mm OPSS 1010 Granular B	450 mm OPSS 1010 Granular B

Material and thickness substitutions must be approved by the Design Engineer. The thickness of the subbase layer could be increased at the discretion of the Engineer, to accommodate site conditions at the time of construction, including soft or weak subgrade soil replacement.

Granular layers should be placed in no more than 300 mm thick lifts and compacted to at least 98% of SPMDD (ASTM D698) standard. The granular materials specified should conform to OPSS standards, as confirmed by appropriate materials testing.

The final asphalt surface should be sloped at a minimum of 2% to shed runoff. Abutting pavements should be sawcut to provide clean vertical joints with new pavement areas.

5.0 Limitations

5.1 Design Review and Inspections

Cambium should be contacted to review and approve design drawings, prior to tendering or commencing construction, to ensure that all pertinent geotechnical-related factors have been addressed. It is important that onsite geotechnical supervision be provided at this site for excavation and backfill procedures, deleterious soil removal, subgrade inspections and compaction testing.

5.2 Changes in Site and Project Scope

This is a preliminary geotechnical engineering report intended for planning and preliminary design purposes only. Additional boreholes and a detailed geotechnical engineering report are required for detailed designs.

Subsurface conditions can be altered by the passage of sufficient time, natural occurrences, and human intervention. In particular, consideration should be given to contractual responsibilities as they relate to control of groundwater seepage, disturbance of soils, and frost protection.

The preliminary design parameters provided and the preliminary engineering advice offered in this report are intended for use by the owner and its retained design consultants. These interpretations made of the subsurface information, for preliminary geotechnical design parameters, advice, and comments relating to constructability issues and quality control are not complete for the project. Cambium should be retained to conduct further investigation at the site for detailed designs.

6.0 Closing

We trust that the information contained in this report meets your current requirements. If you have questions or comments regarding this document, please do not hesitate to contact the undersigned reviewer at (705) 719-0700.

Respectfully submitted,

CAMBIUM INC.

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SEB/RG/BV

Appended Figures

GEOTECHNICAL INVESTIGATION

2640085 ONTARIO LTD.
140 Lockhart Road,
Barrie, Ontario

LEGEND

- Borehole Location
- Site (approximate)

Notes:
Site is approximate and was obtained from the County of Simcoe online GIS.
Base mapping features are © Queen's Printer of Ontario, 2010 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.

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BOREHOLE LOCATION PLAN

Project No.: 10957-002		Date: September 2020	Rev.:
Scale: 1:3,000		Projection: NAD 1983 UTM Zone 17N	
Created by: TLC	Checked by: RG	Figure: 1	

Appendix A
Borehole Logs

CAMBIUM
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Log of Borehole: BH101-20

Client: 2640085 Ontario Inc.
Contractor: Walker Drilling Ltd.
Location: 140 Lockhart Raod, Barrie

Project Name: Geotech Investigation - 140 Lockhart Road
Method: Hollow Stem Augers
UTM: 17T: 606098m E, 4909398m N

Project No.: 10957-002
Date Completed: September 3, 2020
Elevation: 280.5

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
0		Topsoil: Dark brown silty sand, with organics, moist	~~1A~~							
280		Till: Weathered/disturbed	1B	SS	50	4				
1		Grey below	2	SS	100	9				GSA SS2: Gravel 3% Sand 43% Silt 41% Clay 13%
279		Till: Grey silt and sand, some clay, some gravel, dense to very dense, moist								
2			3	SS	0	40				
278			4	SS	100	50/280 mm				
3			5	SS	70	50				
277										
4										
276			6	SS	70	35				Borehole open and dry upon completion.
5		Borehole terminated at 5.0 mbgs.								
275										
6										
274										
7										
273										
8										

Logged By: BW **Input By:** BW

CAMBIUM
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Kingston
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Log of Borehole: BH102-20

Client:	2640085 Ontario Inc.	**Project Name:**	Geotech Investigation - 140 Lockhart Road	**Project No.:**	10957-002
Contractor:	Walker Drilling Ltd.	**Method:**	Hollow Stem Augers	**Date Completed:**	September 3, 2020
Location:	140 Lockhart Raod, Barrie	**UTM:**	17T: 605925m E, 4909558m N	**Elevation:**	287.6

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
287 / 0		Topsoil: Dark brown silty sand, with organics, moist	~~1A~~ 1B	SS	90	12				
		Fill: Grey silty sand, with rootlets, compact, moist	~~2A~~ 2B	SS	90	28				GSA SS3: Gravel 10% Sand 42% Silt 33% Clay 15%
286 / 1		Sand: Brown sand, trace silt, compact, moist	~~2C~~							
		Till: Grey silty sand, some clay, trace gravel, dense to very dense, moist	3	SS	100	44				Cobbles notted in cuttings at 2.3 mbgs.
285 / 2			4	SS	20	~~50/~~ 125 mm				Wet soils measured at 1.5 mbgs, caving at 2.3 mbgs.
284 / 3		Borehole terminated at 2.6 mbgs due to auger refusal.								
283 / 4										
282 / 5										
281 / 6										
280 / 7										
8										

Logged By: BW **Input By:** BW

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Log of Borehole: BH103-20

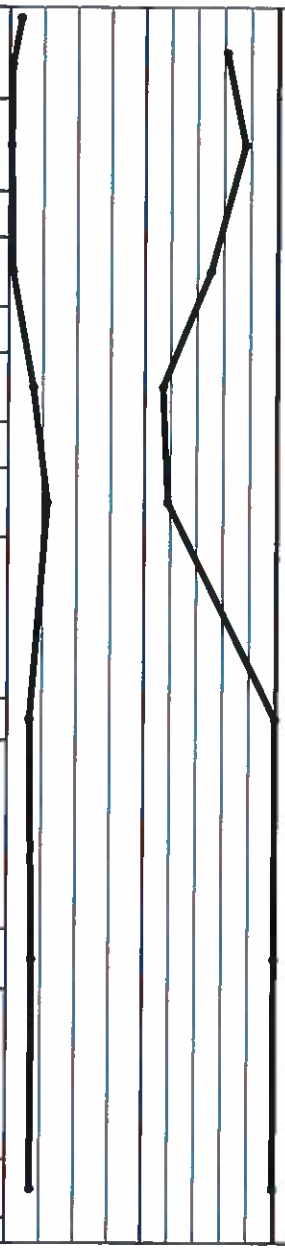
Client: 2640085 Ontario Inc.
Contractor: Walker Drilling Ltd.
Location: 140 Lockhart Raod, Barrie

Project Name: Geotech Investigation - 140 Lockhart Road
Method: Hollow Stem Augers
UTM: 17T: 605786m E, 4909107m N

Project No.: 10957-002
Date Completed: September 3, 2020
Elevation: 276.0

Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	Well Installation	Remarks
	0		Topsoil: Dark brown silty sand, some gravel, with organics, moist	1A					
			Silty Sand: Brown silty sand, some gravel, trace clay, compact to dense, moist	1B	SS	80	31		
274	1			2	SS	30	38		
273	2			3	SS	80	25		
			Clayey Silt: Grey brown clayey silt, trace sand, firm to stiff, moist	4	SS	80	7		
272	3			5	SS	90	9		
271	4								
270	5		Till: Brown to grey brown silty sand, trace clay, trace gravel, very dense, moist	6	SS	80	50/ 125 mm		
269	6			7	SS	100	50/ 255 mm		
268	7								
267	8			8	SS	100	50/ 230 mm		Borehole open and dry upon completion.

Borehole terminated at 8.0 mbgs.



Logged By: BW **Input By:** BW

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Log of Borehole: BH104-20

Client:	2640085 Ontario Inc.	**Project Name:**	Geotech Investigation - 140 Lockhart Road	**Project No.:**	10957-002
Contractor:	Walker Drilling Ltd.	**Method:**	Hollow Stem Augers	**Date Completed:**	September 3, 2020
Location:	140 Lockhart Raod, Barrie	**UTM:**	17T, 605785m E, 4909107m N	**Elevation:**	277.1

SUBSURFACE PROFILE			SAMPLE							
Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
	0		Topsoil: Dark brown, silty sand, with organics, moist	1	SS	60	5				
275	1		Till: Weathered/disturbed	2A 2B	SS	80	36				
274	2		Till: Grey silty sand, some gravel, trace clay, very dense, moist	3	SS	70	50/ 255 mm				
				4	SS	60	50/ 75mm				
273	3			5	SS	80	50/ 230 mm				GSA SS5: Gravel 15% Sand 49% Silt 27% Clay 9%
272	4										
271	5		Borehole terminated at 4.6 mbgs due to auger refusal.	6	SS	0	50/ 50mm				Borehole open and dry upon completion.

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Log of Borehole: BH105-20

Client: 2640085 Ontario Inc.
Contractor: Walker Drilling Ltd.
Location: 140 Lockhart Raod, Barrie
Project Name: Geotech Investigation - 140 Lockhart Road
Method: Hollow Stem Augers
UTM: 17T: 605848m E, 4909259m N
Project No.: 10957-002
Date Completed: September 4, 2020
Elevation: 280.5

SUBSURFACE PROFILE			SAMPLE							
Elevation (m) / Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	% Moisture (25 50 75)	SPT (N) / DCPT (10 20 30 40)	Well Installation	Remarks
279 / 0		Topsoil: Dark brown silty sand, trace clay, with organics, very loose, moist	1	SS	60	4				
278 / 1		Till: Weathered/disturbed	2	SS	70	25				
277 / 2		Till: Grey brown silty sand, some gravel, trace clay, very dense, moist	3	SS	80	50/ 230 mm				GSA SS3: Gravel 18% Sand 46% Silt 27% Clay 9%
			4	SS	20	50/ 500 mm				
276 / 3		Borehole terminated at 3.1 mbgs due to auger refusal.	5	SS	10	50/ 100 mm				Borehole open and dry upon completion.
275 / 4										
274 / 5										
273 / 6										
272 / 7										
8										

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Log of Borehole: BH106-20

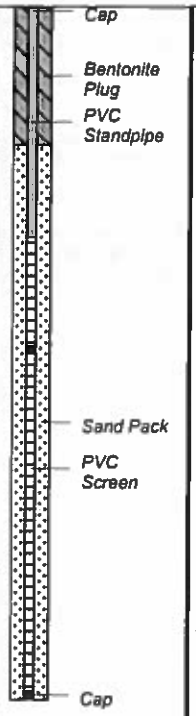
Client:	2640085 Ontario Inc.	**Project Name:**	Geotech Investigation - 140 Lockhart Road	**Project No.:**	10957-002
Contractor:	Walker Drilling Ltd.	**Method:**	Hollow Stem Augers	**Date Completed:**	September 4, 2020
Location:	140 Lockhart Raod, Barrie	**UTM:**	17T; 606069m E, 4909148m N	**Elevation:**	277.1

SUBSURFACE PROFILE

Elevation (m)	Depth	Lithology	Description
	0		Topsoil: Dark brown silty sand, with organics, loose, moist
275	1		Silty Sand: Brown silty sand, compact, moist
274	2		Clayey Silt: Grey clayey silt, trace sand, very stiff, moist to wet
273	3		Till: Grey brown silty sand, trace clay, trace gravel, compact, wet
272	4		
271	5		Borehole terminated at 5.0 mbgs
270	6		
269	7		
268	8		

SAMPLE

Number	Type	% Recovery	SPT (N) / DCPT
1	SS	90	6
2A	SS	90	7
2B			
3A	SS	30	16
3B			
4	SS	80	15
5	SS	100	11
6	SS	60	12



Remarks

Wet soils encountered at 2.3 mbgs.

3.7 m: Groundwater measurement on 22/09/2020

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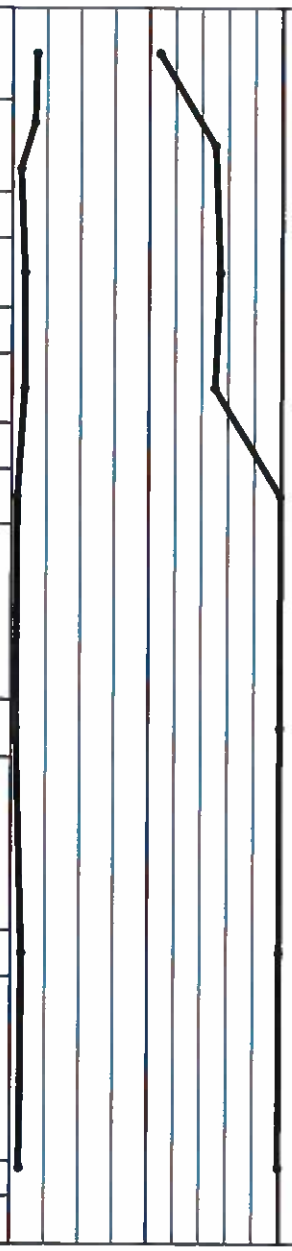
Log of Borehole: BH107-20

Client: 2640085 Ontario Inc.
Contractor: Walker Drilling Ltd.
Location: 140 Lockhart Raod, Barrie

Project Name: Geotech Investigation - 140 Lockhart Road
Method: Hollow Stem Augers
UTM: 17T: 605820m E, 4908951m N

Project No.: 10957-002
Date Completed: September 4, 2020
Elevation: 279.1

Elevation (m)	Depth	Lithology	Description	Number	Type	% Recovery	SPT (N) / DCPT	Well Installation	Remarks
	0		Topsoil: Dark brown silty sand, with organics, very loose, moist	1	SS	90	4		
				2A	SS	90	25		
277	1		Till: Weathered/disturbed	2B					
			Till: Grey brown silty sand, trace gravel, trace clay, very dense, moist	3	SS	100	27		
276	2								
				4	SS	10	25		
275	3								
				5	SS	30	50/ 205 mm		
274	4								
				6	SS	70	50/ 230 mm		
273	5								
272	6								
				7	SS	60	50/ 150 mm		GSA SS7: Gravel 3% Sand 61% Silt 31% Clay 5%
271	7								
				8	SS	20	50/ 100 mm		Borehole open and dry upon completion.
270	8		Borehole terminated at 7.7 mbgs.						



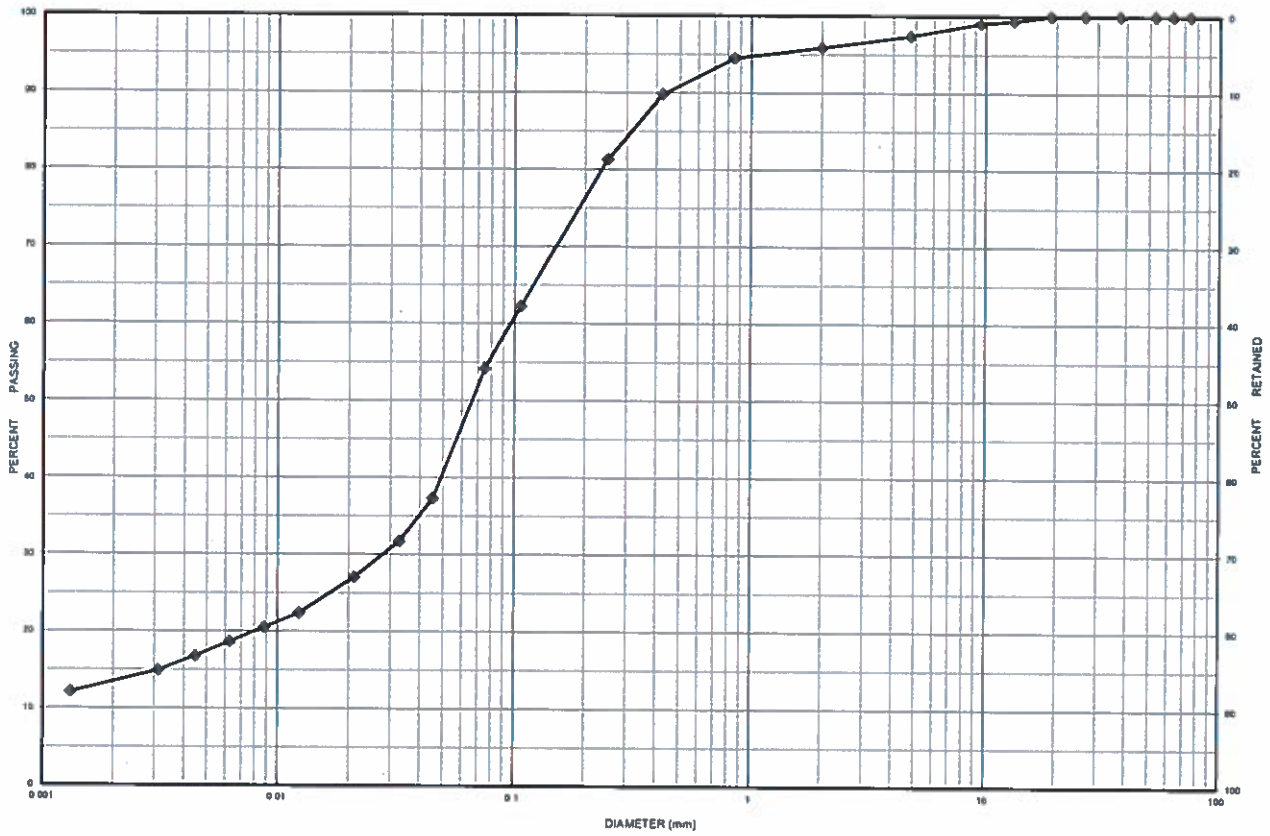
Logged By: BW **Input By:** BW

Appendix B
Physical Lab Results

Grain Size Distribution Chart

Project Number:	*10957-002*	**Client:**	*2640085 Ontario Inc. - Paul Racco*		
Project Name:	*140 Lockhart Road, Barrie*				
Sample Date:	*September 3 & 4, 2020*	**Sampled By:**	*Ben White - Cambium Inc.*		
Location:	*BH 101-20 SS 2*	**Depth:**	*0.6 m to 1.2 m*	**Lab Sample No:**	*S-20-0751*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 101-20	SS 2	0.6 m to 1.2 m	3	43	41	13	11.2

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Sand and Silt some Clay trace Gravel	ML	0.098	0.028	0.000	-	-

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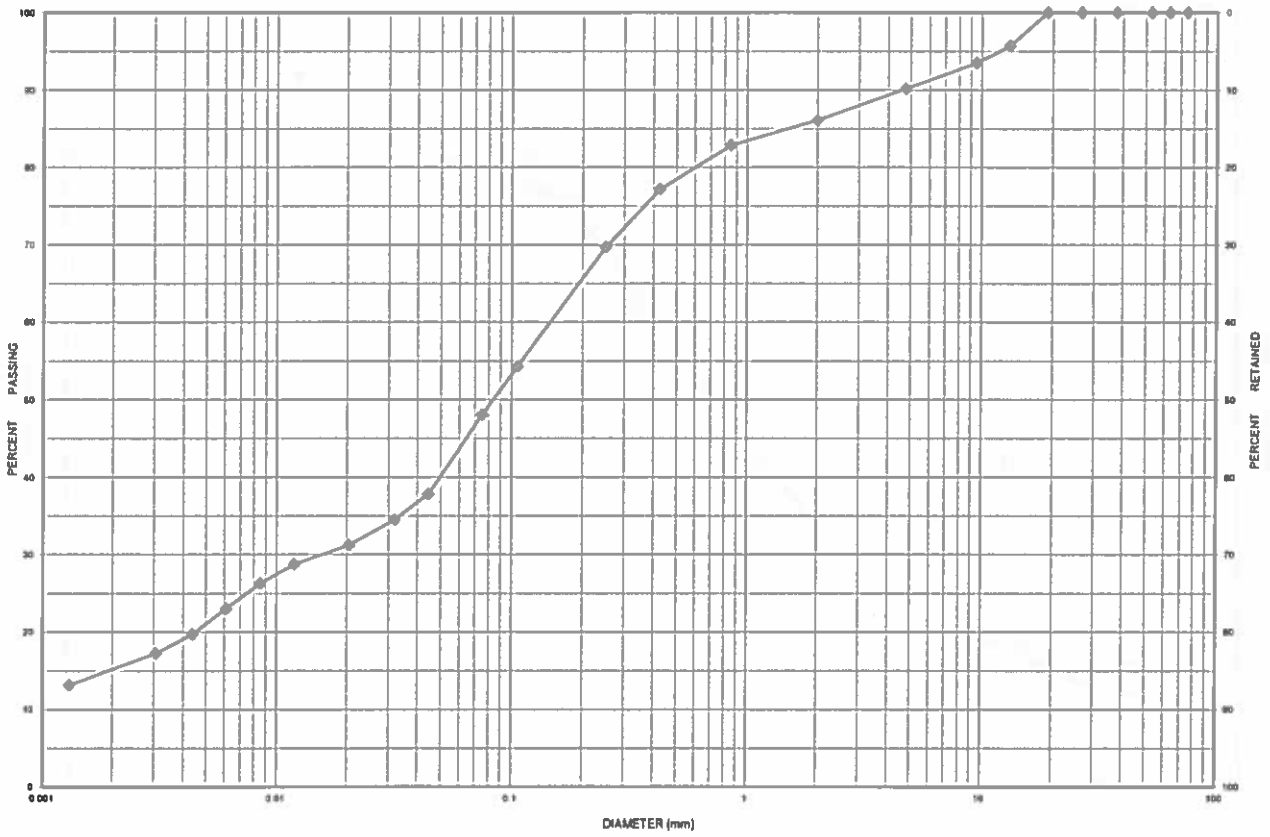
Grain Size Distribution Chart

Project Number:	*10957-002*	**Client:**	*2640085 Ontario Inc. - Paul Racco*		
Project Name:	*140 Lockhart Road, Barrie*				
Sample Date:	*September 3 & 4, 2020*	**Sampled By:**	*Ben White - Cambium Inc.*		
Location:	*BH 102-20 SS 3*	**Depth:**	*1.5 m to 2 m*	**Lab Sample No:**	*S-20-0750*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 102-20	SS 3	1.5 m to 2 m	10	42	33	15	8.7

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand some Clay some Gravel	SM	0.150	0.016	0.000	-	-

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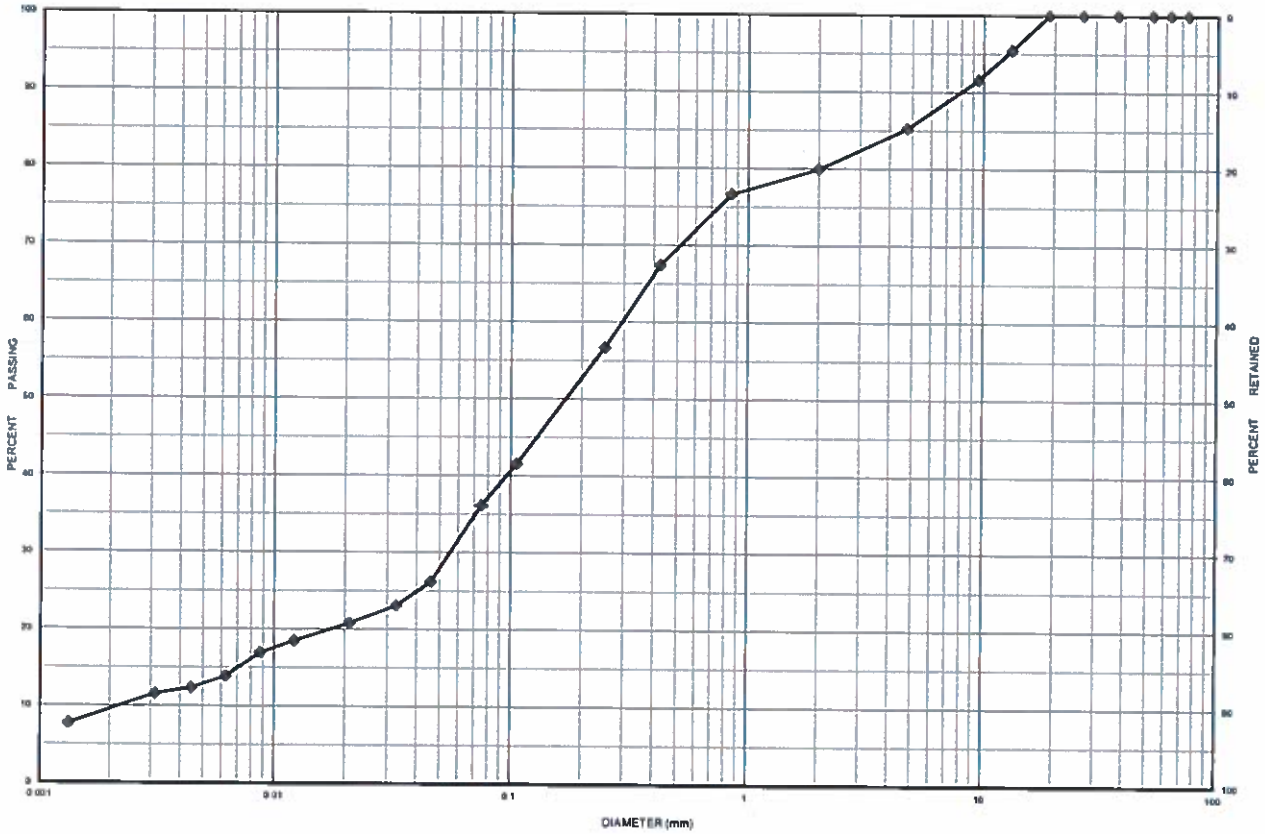
Grain Size Distribution Chart

Project Number:	*10957-002*	**Client:**	*2640085 Ontario Inc. - Paul Racco*		
Project Name:	*140 Lockhart Road, Barrie*				
Sample Date:	*September 3 & 4, 2020*	**Sampled By:**	*Ben White - Cambium Inc.*		
Location:	*BH 104-20 SS 5*	**Depth:**	*3 m to 3.5 m*	**Lab Sample No:**	*S-20-0747*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 104-20	SS 5	3 m to 3.5 m	15	49	27	9	5.0

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand some Gravel trace Clay	SM	0.2990	0.0550	0.0023	130.00	4.40

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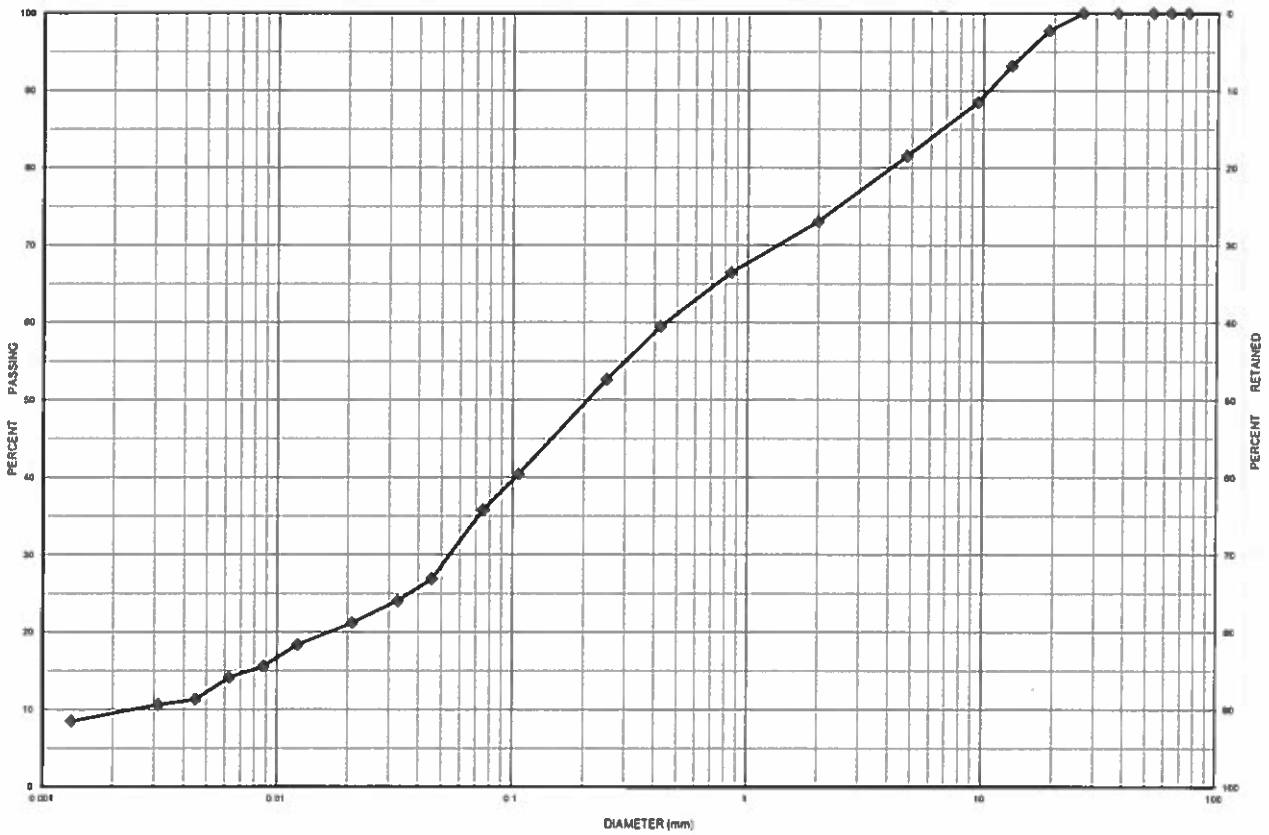
Grain Size Distribution Chart

Project Number:	*10957-002*	**Client:**	*2640085 Ontario Inc. - Paul Racco*		
Project Name:	*140 Lockhart Road, Barrie*				
Sample Date:	*September 3 & 4, 2020*	**Sampled By:**	*Ben White - Cambium Inc.*		
Location:	*BH 105-20 SS 3*	**Depth:**	*1.5 m to 2 m*	**Lab Sample No:**	*S-20-0749*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 105-20	SS 3	1.5 m to 2 m	18	46	27	9	4.6

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand some Gravel trace Clay	SM	0.4500	0.0550	0.0025	180.00	2.69

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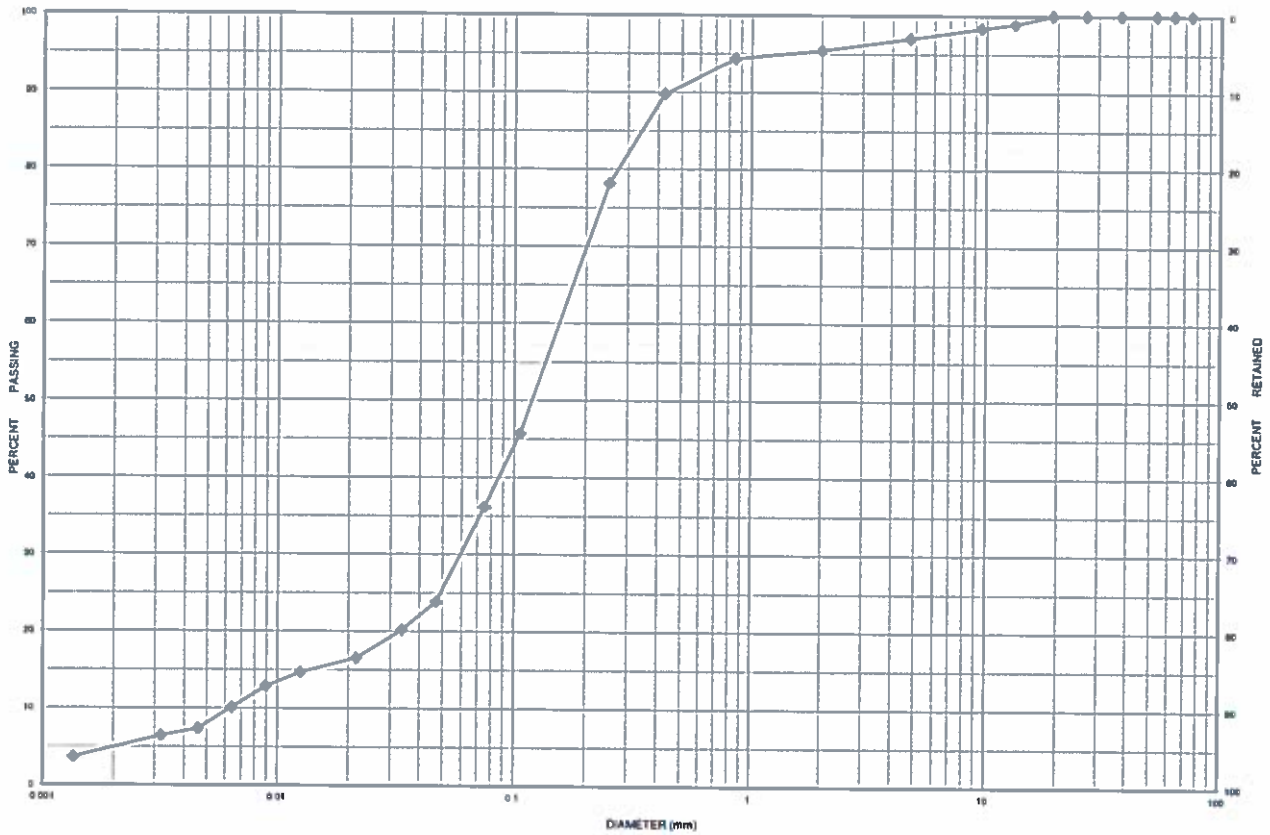
Grain Size Distribution Chart

Project Number:	*10957-002*	**Client:**	*2640085 Ontario Inc. - Paul Racco*		
Project Name:	*140 Lockhart Road, Barrie*				
Sample Date:	*September 3 & 4, 2020*	**Sampled By:**	*Ben White - Cambium Inc.*		
Location:	*BH 107-20 SS 7*	**Depth:**	*6.1 m to 6.6 m*	**Lab Sample No:**	*S-20-0748*

UNIFIED SOIL CLASSIFICATION SYSTEM					
CLAY & SILT (<0.075 mm)	SAND (<4.75 mm to 0.075 mm)			GRAVEL (>4.75 mm)	
	FINE	MEDIUM	COARSE	FINE	COARSE



MIT SOIL CLASSIFICATION SYSTEM								
CLAY	SILT	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	BOULDERS
		SAND			GRAVEL			

Borehole No.	Sample No.	Depth	Gravel	Sand	Silt	Clay	Moisture
BH 107-20	SS 7	6.1 m to 6.6 m	3	61	31	5	7.8

Description	Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
Silty Sand trace Clay trace Gravel	SM	0.1600	0.0600	0.0065	24.62	3.46

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