2509 Cedar Creek Road, Ayr
Township of North Dumfries
Functional Servicing and Stormwater Management Report

January, 2025

Prepared for:

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1.0 INTRODUCTION

1.1 SITE LOCATION

The subject property is located at 2509 Cedar Creek Road in the Township of North Dumfries, Regional Municipality of Waterloo, Ontario as shown on Figure 1. The proposed Draft Plan includes the creation of a new private condo street, seven industrial zoned lots and stormwater management facility (SWMF). The study area for the project comprises approximately 18.03 hectares (ha), and is a mix of agricultural field, manicured lawns, scrubland, laneways, and buildings. The above described are illustrated in the proposed Draft Plan included in Appendix A.

1.2 BACKGROUND / OVERVIEW

The subject property is located within the Highway 401/97 Employment Area and currently zoned as Zone Z.11 (industrial) with a north and south pocket zoned as Zone Z.12 (open space). The subject property is bounded by industrial zoned lands to the west, Regional Road 97 (Cedar Creek Road) to the north, agriculturally zoned lands to the south and east. The closest noise sensitive land use (residence) is located approximately 235 m east of the proposed Site. The proposed development meets the Class I (light industry); however, it is within the area of influence for Class II and recommended minimum separation distance of 300 m from the closest existing residential land use for Class II (heavy industry). The industries in the proposed Site are expected to have MECP approval through the Environmental Compliance Approval (ECA).

1.3 PURPOSE OF THE REPORT

The purpose of this Functional Servicing and Stormwater Management Report (FSSWM Report) is to outline how the proposed development can be supplied with adequate services, including sanitary, domestic water, storm drainage, stormwater management (SWM), and utilities to the requirements of the various approval agencies. The servicing strategies presented in this Report are conceptual. Detailed engineering drawings (for construction) and a Final SWM Report will be submitted as part of the final engineering design process once the proposed subdivision has received Draft Plan Approval.

Stantec has conducted several onsite investigations to review the existing site conditions (see Existing Conditions Drawings, C-050 in Appendix B). Supplementary reports that should be read in conjunction with this report include:

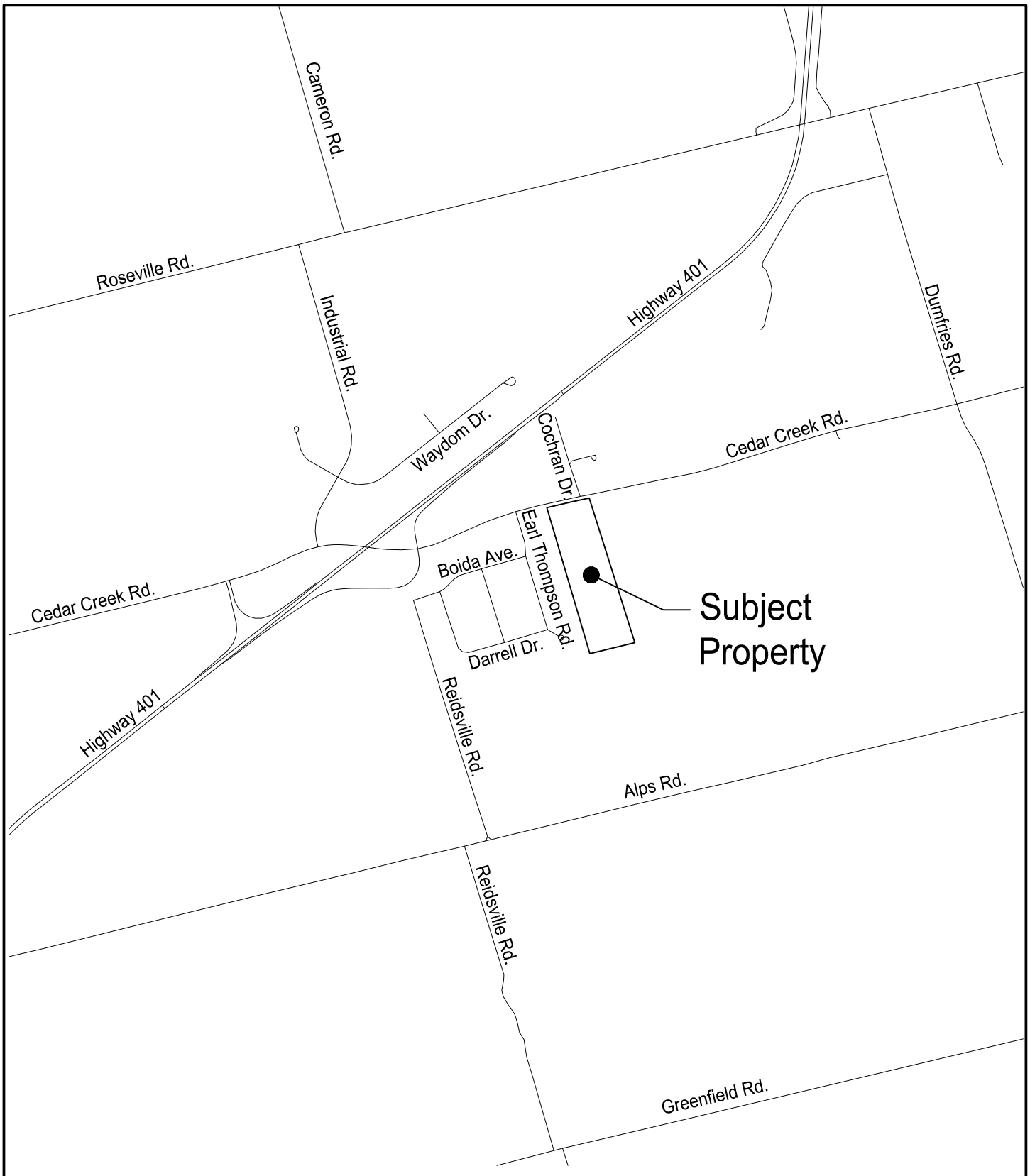
- Documentation and Commemoration Report—2509 Cedar Creek Road, Township of North Dumfries, prepared by Stantec Consulting dated February 2024
- Geotechnical Investigation – Preliminary Geotechnical Investigation for proposed Industrial Development, 2509 Cedar Creek Road, Ayr, ON, prepared by Stantec Consulting dated January 2024
- Hydrogeological Assessment, 2509 Cedar Creek Road, Township of North Dumfries, ON, prepared by Stantec Consulting dated May 2024
- Land Use Noise Compatibility Study for the proposed industrial development at 2509 Cedar Creek Road, Township of North Dumfries Ontario, prepared by Stantec Consulting dated January 2024
- Planning Justification Report, 2509 Cedar Creek Road, Ayr, Township of North Dumfries, ON, prepared by Stantec Consulting dated May 2024
- 2509 Cedar Creek Road, Ayr, ON Township of North Dumfries Scoped Environmental Impact Study, prepared by Stantec Consulting dated May 2024
- 2509 Cedar Creek Road Industrial Development, Chloride Impact Assessment, prepared by Stantec Consulting dated May 2024
- 2509 Cedar Creek Road - Traffic Impact Study, prepared by Stantec Consulting dated February 2024

1.4 ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The subject lands are located within the Regional Municipality of Waterloo (Region), Township of North Dumfries and within the administrative jurisdiction of the Grand River Conservation Authority (GRCA). The GRCA Regulation Limit associated with the Roseville Swamp Cedar Creek Provincially Significant Wetland Complex is on private property to the east and will be encroached upon by the SWM outlet channel. The subject lands lie within the Cedar Creek Sub Watershed of the Grand River Watershed.

Plans and Policies relating to natural heritage that will be considered are detailed in the Scoped Environmental Impact Study (EIS).

All of the works required for the Cedar Creek lands are described in the subsequent sections of this Report. The plans, included in this Report, show the location of the proposed septic field, wells and SWMF, as well as grading, and utilities. The intent of this Report and, the supplementary Reports, is to ensure that the commenting agencies and the public are made aware of the servicing strategies for the proposed development.



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Title
SITE LOCATION PLAN

Revision | Date

Reference Sheet | Figure No.
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2.0 OVERALL GRADING

2.1 EXISTING LAND USE AND SITE TOPOGRAPHY

Most of the subject lands is currently vacant and used for agricultural purposes with remnants of a residential dwelling, associated driveways and ancillary structures along the northwest portion of the Site. Generally, the site slopes down in a southerly direction with an overall grade change of approximately +/-13 m.

The topography of the subject lands slopes from west to east with a number of localized high and low points throughout the Site, elevations ranging from approximately 316.5 m along the northeast property line along Cedar Creek Road to approximately 301.0 m at the southern edge of the Site. There are localized hills and valleys within the Site with slopes ranging from 0.8% to 5%. There are two major existing drainage patterns within the Site; the first and largest catchment conveying external drainage from lands north of Cedar Creek Road via an existing culvert towards the Site and external lands directly west of the Site via the south Cedar Creek roadside ditch. These external areas enter the Site along the north edge of the property, crossing the lands and drains to a low area along the eastern property line to the neighboring lands (2407 Cedar Creek Road). The second includes external drainage from the Existing Municipal Infiltration based SWMF directly west of the subject lands that spill during large rain events to the remaining lands, south of the above noted catchment, that drain via sheet flow uncontrolled offsite through the southern property line of the Site to Con 10 PT Lots 28 & 29 Alps Road.

The shallow soil conditions at the Site typically comprised 0.8 m to 1.4 m of surficial silty sand topsoil overlying predominantly sand as well as sand and gravel/ gravel deposits. Localized, silt and/ or clay deposits were observed. Cobbles and boulders were noted withing the sand and gravelly deposits.

2.2 SITE AND ROAD PROFILE DESIGN CONSTRAINTS

Constraints in designing the road profiles and lot grading are as follows:

- Match existing grades, where possible, to minimize grading and cut/fill quantities and minimize changes to the surface hydrology and hydrogeology of the area.
- Match existing road elevations, with consideration given to forecasted road redevelopments (i.e., Cedar Creek Road).
- Satisfy the Town of North Dumfries's requirements for minimum and maximum road grades.
- Where possible, provide a major overland flow route.

- Respect existing environmental feature configurations, elevations that are to be retained, and prescribed wetland buffer limits.
- Provide a spill point and conveyance for the Existing Municipal Infiltration based SWMF west of the subject lands.
- Provide a drainage conveyance for external lands north and west of the subject lands.

2.3 PROPOSED ROAD PROFILES AND OVERAL SITE GRADING

A preliminary road profile has been established for Street A, based on the proposed street alignment, to satisfy the constraints outlined in the previous section 2.2 - Design Constraints and Procedures (see Preliminary Road Profile Drawing C-200 included in Appendix B). The road profile is relatively smooth with grades ranging from a minimum of 0.5% to a maximum of 5.0%. The design strategy for the Street A grades was to match existing elevations at Cedar Creek Road and to maintain an overland flow drainage route to the proposed SWMF, while attempting to match the existing topography. The proposed centerline road elevations are illustrated on the enclosed Preliminary Road Profile C-200 referenced above and the Preliminary Servicing and Grading Plan C-400 to C-402 also included in Appendix B.

The proposed Street A road cross section for the private road within the subject development is shown on Figure 2. The cross section has been designed to be superelevated draining to the east and include for roadside ditches that have been sized to accommodate the conveyance for the various storm events. The east road ditch is proposed to collect the drainage from the proposed road and lots fronting onto the road such to convey the drainage to the proposed SWMF. The proposed ditch along the west side of the proposed road has been sized to provide conveyance for the major flows expected to spill from the existing Infiltration based SWMF west of the development such to drain south, by-pass the proposed SWMF and directed to the outlet channel that crosses the neighboring property known as 2407 Cedar Creek Road to the existing wetland located at Con. 10 PT Lot 27 on Cedar Creek Road.

The proposed lot grading within the Site will range between a minimum of 2.5% and a maximum of 6%, including 3:1 transition slope to accommodate the various grade changes within the proposed development (i.e., adjacent to the proposed SWMF) and at various perimeter locations surrounding the Site. The lot grading is designed to split drainage such to minimize raising the Site. The lot grading is designed to be split drainage with the front of the lot draining to the east road ditch and the rear draining to a rear lot ditch. Both the east ditch and rear lot ditch convey lot drainage to the proposed SWMF for treatment prior to discharging to the outlet channel. Profiles of the east road ditch, rear lot ditch and outlet channel are illustrated in the Preliminary Road Profiles referenced above and the proposed grading is illustrated on the Concept Grading Plans also noted above and included in Appendix B.

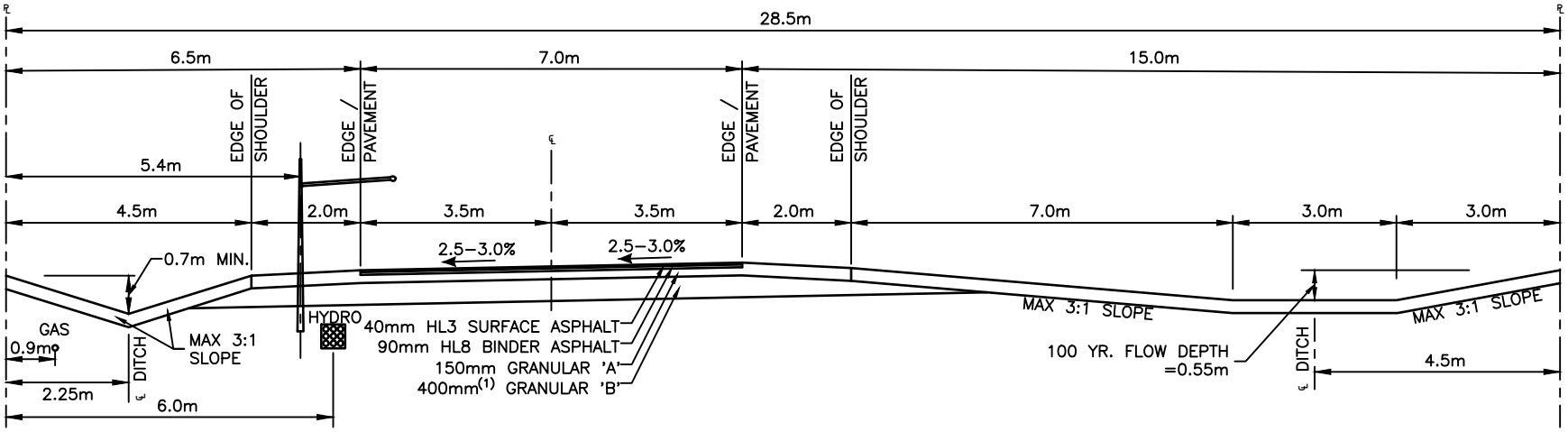


Overall Grading

The SWM Block is proposed at the southern edge of the Site. The SWM outlet is proposed to discharge to an outlet channel that will be established with an easement in favour of the proposed development, that will traverse the southern and eastern portions of the adjacent lands known as 2407 Cedar Creek Road, to the existing wetland located at Con. 10 PT Lot 27 on Cedar Creek Road and eventually discharging to the southern edge of the Roseville Swamp Cedar Creek Provincially Significant Wetland Complex on the west side of the CP rail line.

Preliminary earthwork calculations have been performed based on the preliminary road profiles and lot grades. The calculations indicate that there is an earth fill shortage with a surplus of existing topsoil. Surplus topsoil is to be reused onsite as fill where feasible, to minimize the fill shortage and import requirement. Please refer to Conceptual Cut/Fill Plan and earth quantities on Drawing No. C-900 also included in Appendix B.

At detailed design, profiles and grading will be refined to minimize the required earth fill shortage.



NOTE(1) – THICKER SUBBASE WILL BE REQUIRED WHERE SUBGRADE CONSISTS OF SILT.

MINIMUM DEPTH OF COVER (UNLESS OTHERWISE SPECIFIED)	
GAS MAIN	0.60m
HYDRO	0.90m
TELEPHONE	0.75m
CABLE T.V.	0.75m

3.0% FOR ROADS < 1.0% GRADE
2.5% FOR ROADS > 1.0% GRADE

TYPICAL ROAD CROSS–SECTION "STREET_A"

NTS

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Title
CROSS-SECTION

Revision | Date

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3.0 SITE SERVICING

3.1 SANITARY AND WATER SERVICING

Individual onsite sewage systems utilizing conventional septic system and tertiary treatment with subsurface discharge of treated effluent will provide sanitary servicing for each lot in the development. The individual onsite sewage systems will be located entirely within each property boundary. It is intended that these services would be privately owned and operated.

The conventional septic system consists of a two-compartment septic system, followed by a septic bed, fed either by gravity (where site topography allows it) or with an effluent pump. The gravity system, being the most economical where soils in place consist of sand, being the case at most of the proposed lots, will require the largest septic field footprint. The tertiary system is an advanced treatment system with a modified septic tank, used as a digester, followed by a biofilter tank, a recirculation pump, and an effluent pump feeding a modified septic field. As the treatment process normally occurring within the septic field, with a tertiary system, this treatment would be completed within these aforementioned tanks and respective septic field footprint could be reduced by one third compared to the conventional system.

This would allow us to increase the number of employees at a given lot, for the same septic field footprint.

Additional details regarding the water and sewage system feasibility are outlined in a Study included in Appendix C.

The Provincial Policy Statement (2005) Section 1.6.4.4 does allow for individual onsite services as follows:

Individual onsite sewage services and individual onsite water services shall be used for a new development of five or less lots or private residences where municipal sewage services and municipal water services or private communal sewage services and private communal water services are not provided and where site conditions are suitable for the long-term provision of such services. Despite this, individual onsite sewage services and individual onsite water services may be used to service more than five lots or private residences in rural areas provided these services are solely for those uses permitted by Policy 1.1.4.1(a) and site conditions are suitable for the long-term provision of such services. In rural areas located in municipalities: a) permitted uses and activities shall relate to the management or use of resources, resource-based recreational activities, limited residential development and other rural land uses. Based on the above, the proposed development complies with the Provincial Policy Statement.

3.2 STORM SERVICING

No traditional storm sewers are proposed for the subject development as the majority of the proposed lots and road will drain to the proposed roadside ditches or rear yard ditch that conveys site drainage to the proposed SWMF. This drainage pattern is further described in Section 4.0 below. A By-Pass Storm Sewer is proposed such to convey external drainage from the north and west of the Site to the adjacent lands mimicking the existing drainage conditions. Further details regarding this By-Pass Storm Sewer described below in Section 4.0 and demonstrated on the engineering plans included in Appendix B.

4.0 PRELIMINARY STORMWATER MANAGEMENT

The Preliminary Stormwater Management (PSWM) Design has been completed in support of the Draft Plan for the proposed 2509 Cedar Creek Rd Industrial Development, North Dumfries, Ontario. This section discusses the PSWM strategy for the Site that has been developed in order to mitigate potential impacts of the proposed development on adjacent water features.

4.1 STUDY APPROACH

A SWM strategy for the Site has been developed in order to mitigate against potential offsite water quality and quantity impacts associated with the development of the subject lands.

The SWM design involved the following study components:

- Complete a hydrologic study to determine the existing site conditions (pre-development conditions) with respect to topography, soils information, and existing land uses.
- Prepare an existing (pre-development) and proposed (post-development) condition hydrologic model using SWMHYMO to determine runoff volumes and peak flow rates to downstream areas.
- Complete the preliminary design of the SWMF to provide sufficient water quality and water quantity control to achieve target rates to downstream receivers.
- Summarize the Study through preliminary design and recommendations.

4.2 BACKGROUND

The following reports and primary guidance documents were referenced in the completion of the proposed SWM design:

- *Preliminary Geotechnical Investigation for Proposed Industrial Development, 2509 Cedar Creek Road, Ayr, Ontario*, Stantec Consulting Ltd., January 16, 2024.
- *City of Kitchener Development Manual*, City of Kitchener, 2021.
- *Erosion and Sediment Control Guide for Urban Construction*, Toronto and Region Conservation Authority, 2019.
- *Low Impact Development Stormwater Management Planning and Design Guide (LID Manual),* Credit Valley Conservation Authority and Toronto and Region Conservation Authority, 2010.
- *Stormwater Management Planning and Design (SWMPD) Manual*, Ministry of the Environment, Conservation and Parks (MECP), March 2003.

4.3 STORMWATER MANAGEMENT DESIGN CRITERIA

The SWM criteria for the subject lands were established through the above-mentioned documentation and pre-consultation with the GRCA, the Township of North Dumfries, and the Region of Waterloo. The SWM criteria are as follows:

- **Water Quality** – Provide sufficient permanent pool and extended detention volume to meet the MECP *Enhanced* (80% Total Suspended Solids [TSS] Removal) criteria and promote the at-source removal of potential contaminants.
- **Water Quantity** – Provide sufficient water quantity control to maintain proposed peak flow rates to existing levels for all storms up to and including the 100-year storm event.
- **Infiltration and Water Balance** – Promote infiltration measures where possible and provide best efforts to match existing Infiltration rates.
- **Erosion Control** – Provide sufficient extended detention for the 25 mm storm event with a minimum 24-hour drawdown period.
- **Erosion and Sediment Control** – Provide appropriate erosion and sediment control during construction/area grading to protect adjacent properties from potential siltation.

4.4 EXISTING CONDITIONS

4.4.1 Topography and Surface Drainage

As noted in the *Preliminary Geotechnical Investigation Report* (Stantec, 2024), the Site generally slopes down toward the south with an overall grade change of approximately 13 m. Based on topographic information, the ground surface is highest in the north of the subject site near elevation 314 m above mean sea level (AMSL) and slopes down toward the south border of the property near elevation 301 m AMSL. There is a high point in the northeast of the Site, with an elevation of approximately 316 m AMSL.

The Site is generally split by a drainage divide running east to west near the centre of the property. The drainage divide creates two predominant drainage zones (flows to the east and flows to the south), with flows from both directions draining overland to neighboring properties, and ultimately discharging to Cedar Creek. Additionally, several external catchment areas drain onto and are conveyed through the Site. These include a small agricultural area to the east of the site draining overland onto the site and a large mostly industrial area to the north that is conveyed to the Site through an existing culvert under Cedar Creek Road. These external areas are conveyed through the Site, eventually discharging east to the neighboring property. Additional industrial catchment areas to the west of the Site, including the outflow from an existing SWM feature, enter the Site from the west and discharge east or south.

Existing conditions drainage information is presented on Figure 3 and Figure 3.1, which present the Pre-Development Drainage Area Plans.

4.4.2 Geotechnical Information

As identified in the *Preliminary Geotechnical Investigation Report* (Stantec, 2024), the subsurface soils for the Site are predominantly sand overlain by a silty sand topsoil. Some sand and gravel / gravel deposits and occasional silt and/or clay deposits were also found in some locations. Cobbles and bounders were also noted within the sand and gravel deposits. Bedrock was not encountered at the boreholes advanced for this Site.

Based on results from the *Preliminary Geotechnical Investigation*, groundwater levels in the north third of the Site ranged between 2.8 m below ground surface (BGS) to 10.3m BGS (elevations ranging from 304.6 m to 305.3 m AMSL) in spring 2022 and were approximately 0.5 – 1 m lower in fall 2022 (Stantec, 2024). The monitoring wells in the south two-thirds of the Site were dry during testing, so the depth of the water table in this region is unknown; however, well depths in this area ranged from 5.02 m BGS to 6.03 m BGS (296.77 m AMSL to 305.89 m AMSL), suggesting that the water table is located further BGS than this in these areas. There is a potential for localized perched groundwater at shallower depths following heavy rain or snow melt in the spring (Stantec, 2024).

Thus, the predominant soil conditions (sand with trace silt and gravel) will generally be suitable for at-source infiltration of precipitation. In areas with higher silt content, lower infiltration rates should be expected.



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Notes

1:4000 0 40 120 200m

MAJOR OVERLAND FLOW ROUTE

Legend

103 / A=4.52 — EXISTING SUBCATCHMENT ID AREA (ha)

DRAINAGE BOUNDARY

320.0 — EXISTING CONTOURS

320.0 — LiDAR CONTOURS (2018 DATA)

GRCA FLOODPLAIN

GRCA REGULATION LIMIT

GRCA WATERBODY

GRCA WATERCOURSE

GRCA WETLAND

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PRE-DEVELOPMENT DRAINAGE PLAN

Revision
1

Date
2025.01.09

Reference Sheet

Figure No.
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EXTERNAL TOPO INFORMATION OBTAINED VIA ONTARIO GEOHUB. DATA SOURCE: ONTARIO DIGITAL TERRAIN MODEL (LiDAR–DERIVED) FROM THE MINISTRY OF NATURAL RESOURCES AND FORESTRY (CVGD 2013).

Notes

1:6000 0 60 180 300m

MAJOR OVERLAND FLOW ROUTE

Legend

103 / A=4.52 EXISTING SUBCATCHMENT ID AREA (ha)

DRAINAGE BOUNDARY

320.0 EXISTING CONTOURS

320.0 LiDAR CONTOURS (2018 DATA)

Legend

GRCA FLOODPLAIN

GRCA REGULATION LIMIT

GRCA WATERBODY

GRCA WATERCOURSE

GRCA WETLAND

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EXTERNAL PRE-DEVELOPMENT DRAINAGE PLAN

Revision
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Date
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Reference Sheet

Figure No.
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5.0 STORMWATER MANAGEMENT DESIGN

5.1 HYDROLOGIC MODELING

A hydrologic model was prepared using SWMHYMO to simulate drainage conditions for the subject development under existing and proposed development conditions. The model was employed to predict flows and design SWM systems to ensure the criteria are achieved.

In the absence of IDF parameters for Township of North Dumfries, City of Kitchener's IDF parameters were used. Model results were obtained for the existing and proposed conditions for the following events:

- The 25 mm, 4-hour Chicago Storm derived using the parameters as provided in Table 1
- The 2-, 5-, 10-, 25-, 50-, and 100-year, 3-hour Chicago distributions derived using the parameters provided in Table 1
- The 48-hour Regional Rainfall Event (i.e., Hurricane Hazel)

Table 1: Rainfall Events - City of Kitchener IDF Parameters

Return Period	IDF Parameters			
	A	B	C	Depth (mm)
25 mm, 4-hr	509	6	0.7989	25.0
2-year, 3-hr	743	6	0.7989	34.3
5-year, 3-hr	1593	11	0.8789	47.3
10-year, 3-hr	2221	12	0.9080	56.3
25-year, 3-hr	3158	15	0.9355	68.3
50-year, 3-hr	3886	16	0.9495	77.2
100-year, 3-hr	4688	17	0.9624	87.1
Hurricane Hazel	-	-	-	285

5.2 EXISTING CONDITIONS HYDROLOGIC MODEL

An existing conditions hydrologic model was prepared to simulate existing conditions for the Site. Input and output files for the SWMHYMO model are provided in Appendix D. Soil Conservation Service (SCS) Curve Numbers (CN) and catchment parameters were calculated for each existing catchment based on land use and soil type and are provided in Appendix D. Delineation of existing drainage catchments is provided on Figure 3 and Figure 3.1 which present the Pre-Development Drainage Area Plans, and are summarized below:

- Catchment 100: 55.94 ha of industrial property northwest of the Site and part of Highway 401, draining south through a culvert under Cedar Creek Road into the Site and flowing south/east through the Site.
- Catchment 101: 14.55 ha of external catchment containing a portion of Cedar Creek Road, a portion of industrial property, and a grassed area near Highway 401 off-ramp, entering the Site in the north and draining overland to the south/east.
- Catchment 102: 12.64 ha of external industrial area west of the Site, draining to private external SWM feature overflowing into the subject Site, ultimately flowing east through the Site.
- Catchment 103: 4.52 ha of external industrial area west of the Site, draining east into the Site and ultimately flowing south.
- Catchment 104: 0.73 ha of external agricultural area northeast of the Site, draining west into the Site and ultimately flowing south/east through the Site.
- Catchment 105: 7.06 ha of agricultural area in the north portion of the Site including a small house and driveway, draining to agricultural land to the east and eventually to Cedar Creek.
- Catchment 106: 11.00 ha of agricultural area in the southern portion of the Site draining south and eventually to Cedar Creek.

5.3 PROPOSED CONDITIONS HYDROLOGIC MODEL

The proposed development incorporates seven industrial lots and a SWMF Block, along with one new road. The proposed SWMF will be located in the southern portion of the Site and discharge mostly via infiltration, with a constructed conveyance channel (called the outlet channel) provided to convey high flows to Cedar Creek in the east.

The SWMF is proposed to provide water quality and quantity control for the entire 2509 Cedar Creek Road development. The drainage from the external agricultural lands to the west of the Site is to be routed around the perimeter of the Site via a swale (called the west road ditch), which will connect to the outlet channel to Cedar Creek. The drainage from the external lands to the northwest of the Site will enter a storm sewer upon entry into the Site (called the By-Pass Storm Sewer) and be released east of the Site, where the existing flows drain.

Stormwater Management Design

Catchment parameters including impervious percentage, slope, and SCS Curve Numbers were calculated for each of the proposed catchments based on land use and soil type and are provided in Appendix D. All input and output files are provided in Appendix D. The delineation of the proposed drainage catchments is provided on Figure 4, Post-Development Drainage Area Plan, and is summarized as follows:

- Catchment 100: 55.94 ha of industrial property northwest of the Site and part of Highway 401, draining south through a culvert under Cedar Creek Road into the By-Pass Storm Sewer and discharging to the agricultural lands to the east.
- Catchment 101: 14.55 ha of external catchment containing a portion of Cedar Creek Road, a portion of industrial property, and a grassed area near Highway 401 off-ramp, entering the By-Pass Storm Sewer and discharging to the agricultural lands to the east.
- Catchment 102: 12.64 ha of external industrial area west of the Site, draining to private external SWM feature and overflowing into the west road ditch, where flow is conveyed around the SWMF to the outlet channel.
- Catchment 103: 4.52 ha of external industrial area west of the Site, draining east into the west road ditch, where flow is conveyed around the SWMF to the outlet channel.
- Catchment 104: 0.73 ha of external agricultural area northeast of the Site, draining west into the rear lot ditch, where flow is conveyed to the east inlet of the SWMF.
- Catchment 200: 0.14 ha in northwest corner of property comprising a small portion of the west road ditch, draining to the By-Pass Storm Sewer and discharging uncontrolled to the east.
- Catchment 201: 0.64 ha in the northwest corner of property containing a portion of the east road ditch and developed land, draining to the By-Pass Storm Sewer and discharging uncontrolled to the east.
- Catchment 202: 8.82 ha of developed area covering the east portion of the Site, draining to the rear lot ditch and entering the SWMF through the east forebay.
- Catchment 203: 0.55 ha catchment on the east side of the Site containing the By-Pass Storm Sewer outlet and plunge pool, draining offsite to the east.
- Catchment 204: 4.92 ha of developed area, draining to the west into the east road ditch, entering the SWMF through the west forebay.
- Catchment 205: 1.63 ha SWMF Block.
- Catchment 206: 0.76 ha grassed swale (west road ditch), located on the far west side of the property, directing flows around the SWMF to the outlet channel at the southeast corner of the property.

- Catchment 207: 0.14 ha south of the SWMF, draining offsite to the south.
- Catchment 208: 1.13 ha of constructed conveyance channel (outlet channel), directing flows to Cedar Creek in the northeast.

5.4 EXTERNAL SWM FEATURE ASSUMPTIONS

Limited background information was available for the private external SWM feature in Catchment 102, noted in Sections 5.2 and 5.3. It does appear to be an infiltration facility with no surface outlet prior to overflowing east into the subject site. In the absence of design information, conservative assumptions were made for the size and infiltration rate of the facility. Available LiDAR data was used to determine the approximate depth, footprint, and volume of the facility. To estimate the infiltration rate of the facility, the infiltration rates from the two closest on-site infiltration tests were averaged, and a factor of safety was applied. This factored infiltration rate was then multiplied by the estimated infiltration footprint to get the approximate infiltration rate out of the facility.



N

100
A=55.94

COCHRAN DRIVE

CEDAR CREEK ROAD

CEDAR CREEK ROAD

201
A=0.64

104
A=0.73

200
A=0.14

BY-PASS STORM SEWER

202
A=8.82

101
A=14.55

102
A=12.64

EAST ROAD DITCH

REAR LOT DITCH

WEST ROAD DITCH

BOIDA AVENUE

BOIDA AVENUE

203
A=0.55

REIDSVILLE ROAD

DARRELL DRIVE

HARMONY ROAD

EARL THOMPSON ROAD

103
A=4.52

204
A=4.92

STREET 'A'

206
A=1.22

DARRELL DRIVE

EARL THOMPSON PLACE

OUTLET CHANNEL

205
A=1.63

208
A=1.13

207
A=0.14

- FLOWS (ALL) ENTER BY-PASS STORM SEWER, THEN OUTLET TO PLUNGE POOL, DISCHARGING TO AGRICULTURAL LANDS TO THE EAST VIA SPREADER SWALE
- FLOWS (ALL) DRAIN DIRECTLY OFFSITE TO THE EAST, UNCONTROLLED
- FLOWS (ALL) CONVEYED THROUGH REAR LOT DITCH TO EAST INLET OF SWM FACILITY
- FLOWS (ALL) CONVEYED THROUGH EAST ROAD DITCH TO WEST INLET OF SWM FACILITY
- FLOWS (ALL) ENTER SWM FACILITY DIRECTLY
- FLOWS (ALL) CONVEYED THROUGH WEST ROAD DITCH, ROUTING FLOWS AROUND SWM FACILITY, THEN DISCHARGE TO OUTLET CHANNEL
- FLOWS (ALL) DRAIN DIRECTLY OFFSITE TO THE SOUTH, UNCONTROLLED
- FLOWS (ALL) ENTER OUTLET CHANNEL DIRECTLY

EXTERNAL TOPO INFORMATION OBTAINED VIA ONTARIO GEOHUB. DATA SOURCE: ONTARIO DIGITAL TERRAIN MODEL (LiDAR-DERIVED) FROM THE MINISTRY OF NATURAL RESOURCES AND FORESTRY (CGVD 2013).

Stantec

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Notes

1:4000 0 40 120 200m

DRAINAGE BOUNDARY

320.0 EXISTING CONTOURS

320.0 LiDAR CONTOURS (2018 DATA)

MAJOR OVERLAND FLOW ROUTE

Legend

103 A=4.52 EXISTING SUBCATCHMENT ID AREA (ha)

206 A=1.19 SUBCATCHMENT ID AREA (ha)

DIVERSION SWALE

GRCA FLOODPLAIN

GRCA REGULATION LIMIT

GRCA WATERBODY

GRCA WATERCOURSE

GRCA WETLAND

Client/Project

CEDAR CREEK ROAD HOLDINGS INC.

2509 CEDAR CREEK ROAD, AYR
TOWNSHIP OF NORTH DUMFRIES, ON

Project No.
161414214

Title

POST DEVELOPMENT DRAINAGE PLAN

Revision 1

Date 2025.01.09

Reference Sheet

Figure No. 4.0

V:\01614\active\161414214\design\drawing\civil\sheet_files\SWM\FIGURES\161414214-C-FIG 4.0_POST CONDS.dwg
1/9/2025 4:03:22 PM By: Matringh, Brian

5.5 PROPOSED SWM STRATEGY

The proposed SWM strategy for the 2509 Cedar Creek Road development incorporates minor and major system conveyance via grassed swales (east road ditch and rear lot ditch) to the proposed SWMF for water quality and quantity control. Infiltration has been incorporated on a lot-level basis where possible, as well as within the end of pipe SWMF. The SWM strategy has been developed in accordance with the objectives and criteria previously listed.

5.5.1 Stormwater Management Facility Design

Runoff from the majority of the proposed development drains into an infiltration facility complete with two forebays located in each inlet to the facility. The location of this proposed SWMF was selected for a variety of reasons including the following:

- This is an existing low point on the Site where water naturally drains overland offsite.
- This location is the most efficient use of land for the future development of the Site and minimizes the cut/fill impacts of development.

The proposed SWMF is designed to provide water quantity and quality control for 16.10 ha of land (including 0.73 ha of external agricultural land) as well as infiltration to simulate natural conditions of the Site and aid in groundwater recharge. As outlined in the preliminary criteria, the SWMF is required to provide 'enhanced' water quality treatment prior to discharging downstream.

The SWMF is designed to infiltrate all minor storms including the 5-year event, while major storm events greater than the 5-year storm will be attenuated in the infiltration cell, eventually discharging to Cedar Creek through the outlet channel at rates below existing conditions. The SWMF forebays will provide initial water quality treatment and isolation of sediment deposition for ease of cleanout as well as to minimize transport of fines from entering and clogging the infiltration cell. The berms of the SWMF forebays have been elevated above the infiltration cell bottom to prevent re-suspension of sediment. The infiltration cell will provide further water quality treatment through infiltration of most runoff events. Since the basin will be sized to infiltrate up to the 5-year storm event, it can be assumed it will also provide over 80% TSS removal prior to discharge downstream. Additionally, the MECP infiltration basin volume requirement for quality control based on an enhanced level of treatment is 608 m^3, whereas this facility contains over 6300 m^3 of infiltration volume.

In addition to the water quality benefit described above, the SWMF (including forebays and infiltration cell) will provide water quantity storage as well as enhance groundwater recharge. To provide a conservative estimate during the design of water quantity control infrastructure in the SWMF, any infiltration that will occur in the rooftop soak-away pits or conveyance swales (east road ditch and rear lot ditch) was ignored in the modelling, leading to more runoff entering the SWMF. The preliminary design of the SWMF has maximum ponding

elevations of 302.70 m above sea level (ASL) and 302.85 m ASL during the 100-year and Regional Storm Events, respectively. This leads to a depth of 0.20 m and 0.35 m above the maximum infiltration depth during the 100-year and Regional Storm Event, respectively. Thus, ponding height from the bottom of the infiltration cell is 1.20 m for the 100-year event and 1.35 m for the Regional Storm Event. Although the height of water in the SWMF exceeds the recommended maximum of 0.6 m for infiltration facilities for these storm events, the more frequent storm events (25 mm and 2-year) meet this recommendation and thus compaction that would limit the functionality of the infiltration basin is not expected. For further discussion on the ponding depths, see Section 5.7.1. The freeboard to the top of pond for 100-year storm event is 0.30 m. For all events greater than the 5-year (10-year, 25-year, 50-year, 100-year, and the Regional Storm), the flows are conveyed though the overflow weir and enter the outlet channel to Cedar Creek. The weir elevation has been set to provide sufficient infiltration volumes while ensuring infiltration drawdown times do not exceed 48 hours. The 1.4 m deep forebays have a sediment storage capacity of 127 m^3 and 187 m^3 for the west forebay and east forebay respectively, at a maximum depth of sediment at 0.5 m, providing an expected cleanout frequency of approximately once every 9 years for the west forebay and 7 years for the east forebay. The forebay length required to provide appropriate dispersion and settling length for the 5-year inlet flow is 24 m and 41 m and the length provided is approximately 44 m and 54 m, for the west forebay and east forebay respectively. Detailed design calculations are provided in Appendix D.

The SWMF is proposed to be drained by a single outflow weir once the infiltration volume is exceeded. Flows that pond to an elevation higher than the infiltration depth will discharge over the weir into the outlet channel to Cedar Creek. This will occur for events greater than the 5-year storm event. Details on the SWMF design and operating characteristics are summarized in Table 2 and Table 3 respectively, and the detailed stage-storage-discharge analysis for the proposed SWMF is provided in Appendix D. Additionally, a detailed drawing of the SWMF is included on Drawing No. C-410 (Appendix B).

Overall, the SWMF will provide an ‘enhanced’ level of water quality control through inlet forebays and the subsequent infiltration cell. The SWMF will enhance infiltration across the Site to maintain groundwater recharge while providing a total drawdown of <48 hours for all storm events. Design characteristics for the proposed SWMF are summarized in Table 2, with calculations provided in Appendix D.

Stormwater Management Design

Table 2: SWMF Design Characteristics

Parameter	Basin Characteristics
Total Contributing Area (quality and quantity)	16.10 ha
Total Percent Impervious to SWMF (includes external agricultural area – catchment 104)	78%
Forebay Parameters:	
West forebay	
Required Forebay Length/Provided Forebay Length	24 m / 44 m
Forebay Depth	1.4 m
Sediment Storage Volume Provided	127 m^3
Cleanout Frequency	9.5 years
East forebay	
Required Forebay Length/Provided Forebay Length	41 m / 54 m
Forebay Depth	1.4 m
Sediment Storage Volume Provided	187 m^3
Cleanout Frequency	7.2 years
Infiltration Cell Details:	
Infiltration Cell Top of Ponding Elevation	302.5 m
Infiltration Cell Bottom Elevation	301.5 m
Infiltration Depth	1 m
Infiltration Footprint	5,439 m^2
Maximum Drawdown (including surface drawdown)	43 hours
Total Depth of SWMF	1.5 m
Outlet Structure Details:	
Overflow Weir Crest Invert/ Length / Side Slopes (H:V)	302.50 m / 3 m / 10:1

The operating characteristics of the SWMF are summarized in Table 3**.** Detailed modelling files are found in Appendix D.

Table 3: SWMF Operating Characteristics

Storm Event	25 mm	2-year	5-year	10-year	25-year	50-year	100-year	Regional
Proposed Peak Flow Rate to SWMF (m^3/s)	1.734	2.693	3.621	4.499	5.225	5.953	6.892	2.235
Proposed Peak Flow Rate from the SWMF (m^3/s)	0.000	0.000	0.000	0.020	0.186	0.416	0.695	2.054
Maximum Storage Volume (including infiltration and active storage) (m^3)	2,379	3,610	5,286	6,466	7,339	7,900	8,513	10,182
Maximum Ponding elevation (m)	301.91	302.10	302.36	302.51	302.59	302.64	302.70	302.85
Infiltration Drawdown Time (hrs.)	15.1	22.9	33.5	40.3	40.3	40.3	40.3	40.3

Target peak flow rates to the east and south as well as peak flow rates for proposed conditions are summarized in Table 4 while detailed modelling files are included in Appendix D. Note that in the models, Catchment 104 is modelled as an “internal” catchment because the flows are being directed to the SWMF, even though it is not within the Site boundary. As observed in Table 4, water quantity targets from the Site have been met as the proposed peak flow rates from the Site to the east and south are at or below target levels. However, when considering the flows from external catchments that flow through the Site as well as internal catchments (collectively referred to as the “Study Area”), proposed flows to the east are slightly higher for larger storm events (≤2% increase for 25- to 100-year Storm Event). This is because flows from a large external catchment (Catchment 103) are being redirected around the Site to discharge to the east in the proposed conditions, whereas in existing conditions, the flows exit the Site to the agricultural lands to the south. However, these flows are all discharging to the same Cedar Creek system, with more of the flow now discharging further upstream, into the wetland area around Cedar Creek. Since flows from only a small area (Catchment 207) from the study area are being discharged south of the Site in the proposed conditions, the total flows to the Cedar Creek system will be much lower than existing conditions. Infiltration through the west road ditch and through the outlet channel to the east has also not been considered, so the actual increase in peak flow will be lower than what is shown in the model. Additionally, there is a larger external area east of the Site draining to the discharge point to the Cedar Creek system, which will further minimize the overall effect of the small increase from the Site flowing east.

Table 4: Existing and Proposed Flow Rates

Storm Event	Modelled Scenario	Outlet (contributing subcatchments, existing / proposed)			
		From Site Towards East *(104, 105 / 104, 200-206)*	**From Site Towards South *(106 / 207)***	**From Study Area Towards East *(all exc. 103 and 106 / all exc. 207)***	**From Study Area Towards South (103 and 106 / 207)**
25 mm	Existing Peak Flow Rate (PFR) (m^3/s)	0.072	0.078	1.162	0.435
	Post-Development Controlled PFR (m^3/s)	0.071	0.001	1.161	0.001
	Percent Change	*-1%*	*-99%*	*0%*	*-100%*
2-year	Existing PFR (m^3/s)	0.134	0.146	2.18	0.662
	Post-Development Controlled PFR (m^3/s)	0.109	0.003	2.169	0.003
	Percent Change	*-19%*	*-98%*	*-1%*	*-100%*
5-year	Existing PFR (m^3/s)	0.258	0.278	4.133	0.895
	Post-Development Controlled PFR (m^3/s)	0.155	0.005	4.105	0.005
	Percent Change	*-40%*	*-98%*	*-1%*	*-99%*
10-year	Existing PFR (m^3/s)	0.364	0.389	5.862	1.133
	Post-Development Controlled PFR (m^3/s)	0.202	0.007	5.815	0.007
	Percent Change	*-45%*	*-98%*	*-1%*	*-99%*
25-year	Existing PFR (m^3/s)	0.508	0.544	9.198	1.35
	Post-Development Controlled PFR (m^3/s)	0.242	0.01	9.212	0.01
	Percent Change	*-52%*	*-98%*	*0%*	*-99%*
50-year	Existing PFR (m^3/s)	0.631	0.673	11.506	1.554
	Post-Development Controlled PFR (m^3/s)	0.473	0.013	11.599	0.013
	Percent Change	*-25%*	*-98%*	*1%*	*-99%*
100-year	Existing PFR (m^3/s)	0.773	0.823	14.037	1.819
	Post-Development Controlled PFR (m^3/s)	0.772	0.016	14.324	0.016
	Percent Change	*0%*	*-98%*	*2%*	*-99%*
Regional	Existing PFR (m^3/s)	0.967	1.242	11.2	1.755
	Post-Development Controlled PFR (m^3/s)	2.279	0.015	13.108	0.015
	Percent Change	*136%*	*-99%*	*17%*	*-99%*

5.6 OTHER SWM FEATURES

There are four grassed swales (ditches) on the Site (west road ditch, east road ditch, rear lot ditch, and the outlet channel). These swales are designed to convey flow around the perimeter of the Site and to Cedar Creek. Grassed swales are known to provide infiltration and water quality benefits as the water travels over the pervious area; however, the amount of infiltration and sediment removal efficiency the swale can achieve is hard to predict, thus these additional benefits have not been accounted for, providing a conservative SWMF design. All grassed swales have been sized to convey the largest peak flows from the modelled events (100-year or Regional Storm Event). Details on the swale design can be found in Appendix D.

Additionally, a plunge pool and spreader swale has been provided following the outlet from the By-Pass Storm Sewer on the east border of the Site (Catchment 203). The 2,100 mm By-Pass Storm Sewer pipe has been sized to convey the 100-yr flows from the external catchments. The design sheet is provided in Appendix D. Flows from Catchment 100 will enter the sewer through a direct connection with the culvert crossing Cedar Creek Road. Overflows from Catchment 100 as well as flows from Catchments 101, 200, and 201 will enter the storm sewer via ditch inlet catchbasins (DICBs). Based on preliminary analysis assuming 50% blockage, it is likely that three 1.2 m x 0.6 m DICBs will be required to ensure the flows from the external areas can enter the storm sewer; however, the inlet structure will be refined in future design stages. This calculation can be found in Appendix D. The plunge pool will help dissipate the energy from the pipe and provide more infiltration potential while the spreader swale will help to release the flows over a greater surface area, reducing the erosion potential to the neighbouring external lands. Details of the plunge pool and spreader swale will be designed at a future design stage. The use of a perforated pipe system in the By-Pass Storm Sewer also will be investigated in future design stages to provide the potential for infiltration into the surrounding soils before daylighting into the plunge pool.

5.7 INFILTRATION CONSIDERATIONS

The geotechnical work performed by Stantec identifies a predominant soil of sands across the Site with smaller areas of gravel and silts. Based on the results of the *Preliminary Geotechnical Investigation* (Stantec, 2024), it can be concluded that the soils are generally suitable for infiltration. Additionally, infiltration testing conducted as a part of the hydrogeological study confirms this conclusion (Stantec, 2024). Locations with higher silt content have lower infiltration rates, as expected, whereas locations with higher amounts of non-cohesive sand and gravel (such as the south portion of the Site) have higher infiltration rates, presenting favorable conditions for onsite infiltration.

In general, the sandy soils onsite have coefficients of permeability of about 2.0×10^{-3} cm/sec. The infiltration rates for these soils are estimated to have an unfactored infiltration rate of approximately 100 mm/hr, which is representative of the soils in the location of the proposed infiltration facility. Applying a safety factor of 3.5 (LID Manual, 2010) leads to a preliminary infiltration rate of approximately 29 mm/hr. The suitability of existing soils should be assessed at the proposed elevation of any infiltration facility on a lot-by-lot basis following completion of site grading.

To promote infiltration, it is proposed that all rooftops throughout the development be directed to soak-away pits sized to retain runoff from the 25 mm event. Additionally, flows from the Site will be conveyed to the SWMF through swales, promoting infiltration, especially during smaller rainfall events.

5.7.1 End-Of-Pipe Infiltration

As mentioned previously, the proposed SWMF will be designed as an infiltration facility comprising of two dry forebays to provide initial water quality treatment and isolation of sediment at each inlet, followed by the main infiltration cell. The proposed SWMF provides additional retention volume to increase the groundwater recharge and decrease the excess runoff volume to the surrounding lands. The proposed system will be operational all year round. As this Site is outside of any Well Head Protection Areas (WHPAs), infiltration of winter runoff is assumed to not pose a significant risk to any drinking water sources. Additionally, infiltration of the winter runoff as opposed to directing this downstream via surface flow will help reduce the impact of salt on the aquatic vegetation; however, a Chloride Impact Assessment has been conducted and is provided under separate cover.

The infiltration cell functions by setting the SWMF outlet to the outlet channel to Cedar Creek above the base of the infiltration cell to provide a ‘dead’ ponding depth/volume that will then infiltrate through the amended soil and existing sandy soil layer. To determine this outlet elevation, the SWMF was modelled in SWMHYMO with infiltration as the only outflow value. The infiltration cell in the SWMF has a footprint of 5,439 m², which leads to an outflow rate of 0.044 m³/s using the factored infiltration rate of 29 mm/hr. Above the infiltration volumes or ‘dead’ storage volumes, water will be attenuated and released to the outlet channel to Cedar Creek via the outflow weir. This volume provides active storage to attenuate the large storm events.

The facility infiltrates all frequent storms (the 25 mm rainfall event alone represents approximately 80% of the annual precipitation volume), therefore, infiltration of this volume will make a significant contribution to the Site infiltration, leading to an overall infiltration surplus and aiding in groundwater recharge. A water balance analysis was completed as part of the Hydrogeological Investigation, documented under separate cover (Stantec, 2024). Further investigation/analysis will be necessary at the detailed design and site plan stages to confirm site water balance, infiltration rates, and depth to high groundwater levels at the base of the proposed infiltration facilities; however, it is assumed that as most of the Site is being infiltrated, the water balance targets will be maintained.

Although the height of water in the SWMF exceeds the recommended maximum of 0.6 m for infiltration facilities for larger storm events, the more frequent storm events (25 mm and 2-year) meet this recommendation. Water elevations in the infiltration basin will only be elevated above 0.6 m for a short duration following large (infrequent) storm events, providing less opportunity for compaction. Furthermore, borehole logs from the *Preliminary Geotechnical Investigation Report* (Stantec, 2024) in the vicinity of the proposed infiltration cell (BH/MW07-22) demonstrate that the sandy soils at the infiltration elevation may already be compacted, so further compaction that would decrease the infiltration rate is less likely.

To ensure that the facility continues to function as designed, the infiltration basin should be monitored after large storm events to determine whether there is standing water in the facility significantly longer than the designed drawdown times. According to the SWMPD manual, the basin should be maintained if there is greater than one-third of the design depth of water in the facility 48 hours after a storm (MECP, 2003). This maintenance may consist of tilling the soils, which will reduce the effects of compaction, restoring some of the infiltration capacity of the facility. A storm event large enough to exceed the 0.6 m ponding depth recommendation is likely to occur only once every 5 years. Tilling of the infiltration basin's floor is an expected maintenance activity for the facility, and due to the infrequency of the large storm events, is expected to align with the regular maintenance schedule for the SWMF. With these factors in mind, compaction that would limit the functionality of the infiltration basin is not expected, and if this is found to occur, can be improved upon with regular maintenance activities.

5.8 SWMF LINER

As discussed in the Preliminary Geotechnical Investigation Report (Stantec, 2024), the soils within the proposed SWMF Block include mainly sandy soils with the high groundwater level measured to be >5 m below the existing ground surface. Thus, due to the favorable soil conditions and resulting proposed infiltration measures, no liner is recommended for any portion of the SWMF. This will also allow the forebays to provide additional infiltration that has not been accounted for.

6.0 EROSION AND SEDIMENT CONTROL

The erosion and sediment control strategy has been developed and is to be implemented during the construction process, in order to minimize the potential for offsite discharge of sediment and the resultant negative environmental impacts. This Plan will focus on the protection of the downstream areas.

6.1 EROSION POTENTIAL

The *Toronto and Region Conservation Authority's Erosion and Sediment Control Guide for Urban Construction (2019)* was used to determine the erosion potential of the Site. The erosion potential is based on slope gradient, slope length, and soil texture and is then used to determine the appropriate erosion control methods, as follows:

- Site Slopes: Generally gentle (< 2%) to moderate (2-10%) – average slope is approximately 2%.
- Slope Lengths: Long (generally greater than 30 m).
- Erodibility Classification: High erodibility rate for silty sand and low erodibility rate for sandy soils.

Therefore, based on this classification the Site has moderate to high erosion potential, depending on the specific location within the Site.

6.2 PRELIMINARY EROSION AND SEDIMENTATION CONTROL PLAN

The following approach to erosion and sediment control onsite has been prepared to minimize the potential impacts associated with onsite erosion and/or offsite transport of sediment to downstream areas.

Prior to any grading or servicing works commencing onsite, erosion and sedimentation control measures shall be implemented as detailed on the Pre-grading, Erosion and Sedimentation Control Plans (prepared during detail design). The erosion and sedimentation controls will include the following items:

- Steep slopes (>3:1) shall have erosion blankets.
- Light and/or heavy-duty silt fencing will be erected on all site boundaries where there is potential for runoff to be discharged offsite, to protect adjacent downstream lands from migration of sediment in overland flow. The location of this fencing will be adjacent to the limit of grading. Silt fence attached to paige wire fencing will be installed periodically throughout the Site adjacent to sensitive areas. Silt fencing should be erected before grading begins to protect adjacent and downstream areas from migration of sediment in overland flow.
- Storm service outlets will be installed during servicing and roadworks construction to provide lot level dead and live storage where appropriate.

Erosion and Sediment Control

- Erosion control berms/swales will be located in appropriate (critical) areas to divert flows to temporary sediment basins.
- A construction entrance feature ("mud-mat") will be provided at all site entrances to minimize the offsite transport of sediment via construction vehicles.
- Runoff will be directed to a temporary sedimentation facility via swales to minimize untreated runoff discharged from the Site.
- The temporary sedimentation facility should not be sited in the location of the proposed permanent SWMF as it may inhibit the function of the final SWMF as an infiltration basin.
- Swales constructed onsite will have temporary rock check dams to help attenuate flows and encourage deposition of suspended sediment where appropriate.
- All disturbed areas where construction is not expected for 30 days shall be re-vegetated with 50 mm of topsoil and hydro-seeding according to OPSS 572.
- During construction, all catchbasins are to be sealed until roads are paved to prevent sediment deposition in the catchbasins' sumps and conveyance of silt to the SWMF.
- An Erosion Control Implementation Schedule will be included with the Detailed Erosion and Sedimentation Control Plan, prepared in conjunction with the pre-grading application and/or final engineering design.
- Following completion of construction and site stabilization, all erosion and sediment control measures and accumulated sediment are to be removed.

Infiltration facilities are particularly vulnerable to failure during the construction phase for two reasons. First, if the construction sequence is not followed correctly, construction sediment can clog the facility. In addition, heavy construction can result in compaction of the soil which can then reduce the soil's infiltration rate. For this reason, adequate erosion and sediment controls upstream of the infiltration facility and soak-away pits as well as a careful construction sequence will need to be implemented. This will be developed at detail design prior to construction.

The erosion control measures shall be maintained in good repair during the entire construction period and shall only be removed as contributing drainage areas are restored and stabilized. In addition, the condition of erosion control works, their overall performance, and any repairs, replacement, or modifications to the installed item shall be noted in the Monitoring Reports submitted to the GRCA and the Township. The Monitoring Reports should be submitted bi-monthly (quarterly during periods of inactivity or house construction) and should be based on inspection completed bi-weekly or after any significant rainfall events (>13 mm), whichever is more frequent.

Erosion and Sediment Control

6.3 MONITORING, MAINTENANCE AND MITIGATION

Monitoring and maintenance activities are an important part of a SWM Plan to ensure that the designed features continue to operate as intended. As this is a private facility, the condominium corporation will hold the responsibility for maintaining the facility. Thus, a Monitoring and Maintenance Program covering the SWMF and outlet channel will be established in consultation with the Region of Waterloo, Township of North Dumfries, and the Ministry of Environment, Conservation and Parks and incorporated into the Final Stormwater Management Plan at the detailed design stage.

7.0 UTILITIES

7.1 GRANDBRIDGE ENERGY

Grandbridge Energy stated that they have 3-phase power that runs along Cedar Creek Road. These services will be extended to service the subject lands, therefore, there are no constraints for providing hydro service to the proposed development.

7.2 BELL CANADA

Bell has an existing fibre ped on the opposite side of Earl Thompson with conduit crossing that goes down Earl Thompson. These services will be extended to service the subject lands, therefore, there are no constraints for providing Bell service to the proposed development.

7.3 ROGERS CABLE

Rogers has aerial fiber along Earl Thompson Road as well as having aerial fiber on the South side of HWY 97/Cedar Creek Road. Service for the subject lands would be provided off Earl Thompson Road; therefore, there are no constraints for providing Bell service to the proposed development.

7.4 ENBRIDGE

Enbridge has indicated that gas is currently located within the neighborhood. Once a demand for the future industrial lots is determined, a capacity review will need to be undertaken.

7.5 UTILITY SUMMARY

Internal hydro services, Bell, Rogers cable lines and gas mains for the development would be buried in a joint trench within the Subject Plan.

8.0 CONCLUSIONS AND RECOMMENDATIONS

8.1 CONCLUSIONS

Based on the finding of this Report, it is concluded that:

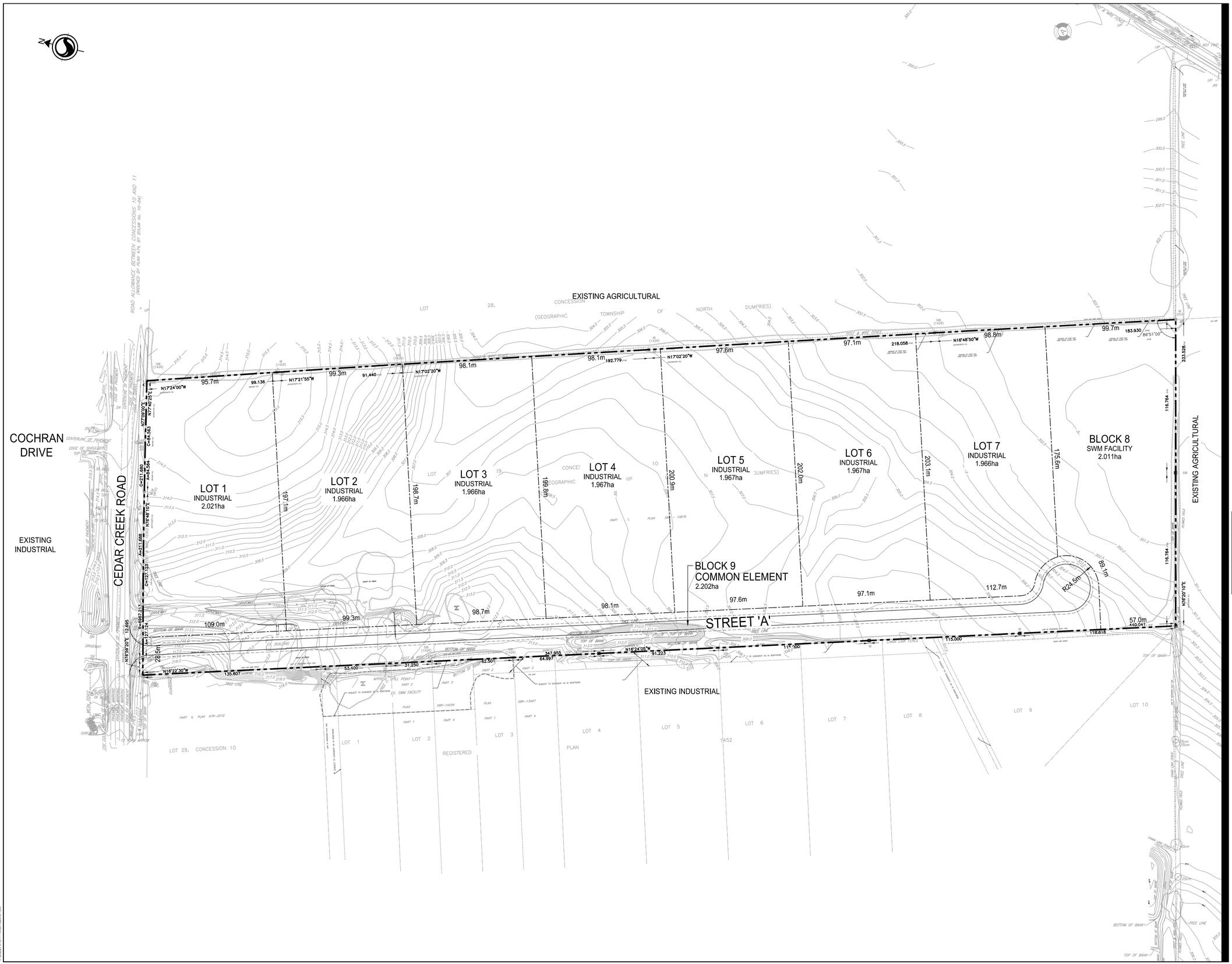
- The proposed 2509 Cedar Creek Road can be adequately serviced by municipal sewage, storm drainage, water services and utilities.
- The proposed SWM features provides water quantity and water quality control for the proposed 2509 Cedar Creek Road industrial development.
- The proposed SWMF provides sufficient storage to attenuate post-development discharge to maintain existing target flow rates.
- Along with the end-of-pipe infiltration facility, lot level soak-away pits should be incorporated to infiltrate the first 25 mm of clean roof runoff where possible to help promote at-source infiltration across the Site and aid in groundwater recharge.

8.2 RECOMMENDATIONS

- This Report be circulated to the Municipalities and various approval agencies in support of Draft Plan of Subdivision Approval.
- Detailed grading and servicing design drawings be prepared, a Final Stormwater Management Report and Erosion Settlement Control Plan be completed once the Draft Plan of development for 2509 Cedar Creek Road has been approved to support construction.

APPENDIX A

Conceptual Draft Plan of Vacant Land Condominium DP-1



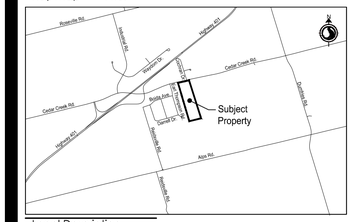
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Key Map NTS.



Legal Description

Part of Lot 29,
Concession 10,
Township of North Dumfries,
Regional Municipality of Waterloo

Information Required

Under Section 51(17) of the Planning Act,
R.S.O 1990 c.P 13 as Amended
a) - As Shown
b) - As Shown
c) - As Shown
d) - As Listed Below
e) - As Shown
f) - As Shown
g) - As Shown
h) - Municipal Water
i) - As Shown
j) - Municipal Sanitary and Storm Sewers
k) - None

Surveyor's Certificate

I hereby certify the boundaries of the subject lands and their relationship to the adjoining lands have been accurately and correctly shown.

Signed _____
O.L.S Name
Stantec Consulting Ltd.

Date _____

Owner's Certificate

I hereby authorize Stantec Consulting Ltd. to submit this Draft Plan of Subdivision on my behalf.

Signed _____
Owner Name
Company Name

Date _____

Land Use Schedule

Lots/Blocks	Land Use	Area (ha)
Lot 1	Industrial	2.021
Lot 2	Industrial	1.966
Lot 3	Industrial	1.966
Lot 4	Industrial	1.967
Lot 5	Industrial	1.967
Lot 6	Industrial	1.967
Lot 7	Industrial	1.966
Block 8	Stormwater Management Facility	2.011
Block 9	Street A	2.202
TOTAL		18.033ha

1st Submission for Draft Plan		TR	MD	2024.01.12
Revision		By	Appd	YYYY.MM.DD
File Name: 161414214_R-DP_CONDO	JJ	JJ	MD	2022.08.16
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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APPROVED: _____ DATE: _____

I hereby certify that the plan was prepared under the supervision of a registered professional planner, within the meaning of the Ontario Professional Planners Institute Act, 1994.

Client/Project
CEDAR CREEK ROAD HOLDINGS INC.

2509 CEDAR CREEK ROAD, AYR

TOWNSHIP OF NORTH DUMFRIES, ON

Title
CONCEPTUAL DRAFT PLAN OF VACANT LAND CONDOMINIUM

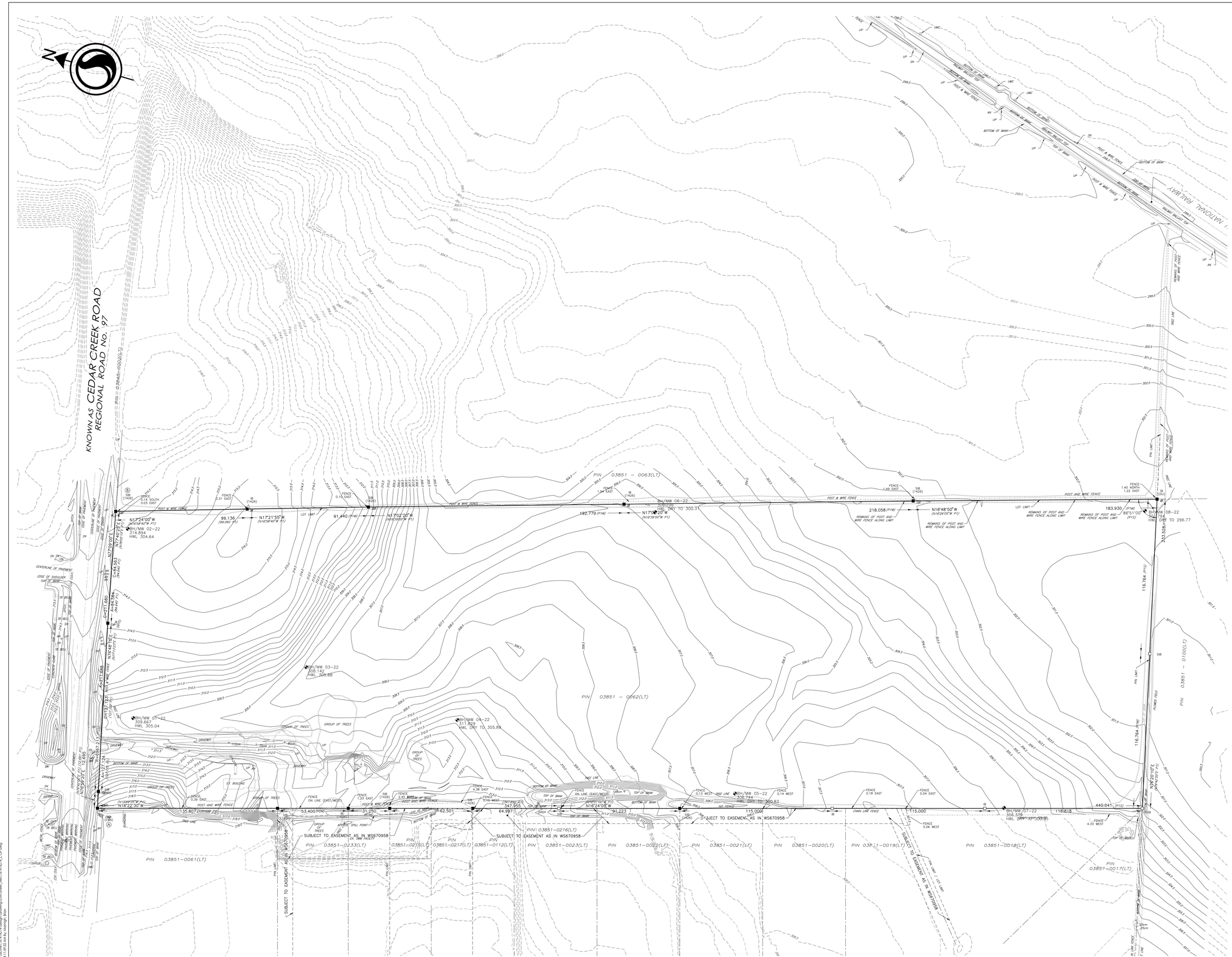
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Revision	Sheet	Drawing No.
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ORIGINAL SHEET - ARCH D

APPENDIX B

Existing Conditions Plan C-050
Preliminary Profiles Plan C-200, C-201 & C-202
Preliminary Servicing and Grading Plan C-400, C-401 & C-402
Prelim. Grading Plan Outlet Ditch Sta 0+000 To 0+320, C-403
Prelim. Grading Plan Outlet Ditch Sta 0+320 To End, C-404
Stormwater Management Facility Plan C-410
Preliminary Cut/Fill Plan C-900



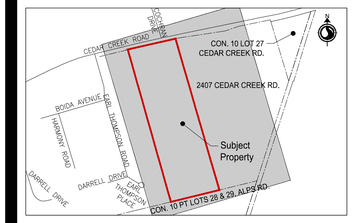
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Key Map NTS.



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Legend

PROPOSED		EXISTING
	PROPERTY LINE	
	EXISTING CONTOUR	305.0
	CONTOUR (MNRF LIDAR 2018)	305.0
	BOREHOLE/MONITORING WELL (WITH GROUND ELEVATION, AND HIGH WATER LEVEL)	BH/MW 02-22 314.894 HWL 304.64
	TREES	
	EASEMENT	
	UTILITY POLE	UP
	FENCE	
	EXISTING DRIPLINE	
	EXISTING DITCH	
	EXISTING STORM/CULVERT	
	EXISTING SIGN	SN
	EXISTING ANCHOR	AN
	EXISTING GAS MARKER	GMC
	STANDARD IRON BAR	SIB
	IRON BAR	IB

0. DRAFT PLAN FIRST SUBMISSION	BWM.	KRB	2024.01.18
Revision/Issue	By	Appd	YYYY.MM.DD
File Name: 161414214_C-DP	BWM. Dwn.	BWM. Dsgn.	KRB Chkd. 2024.01.18 YYYY.MM.DD

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2509 CEDAR CREEK ROAD, AYR

TOWNSHIP OF NORTH DUMFRIES, ON

Title
EXISTING CONDITIONS PLAN

Project No. 161414214

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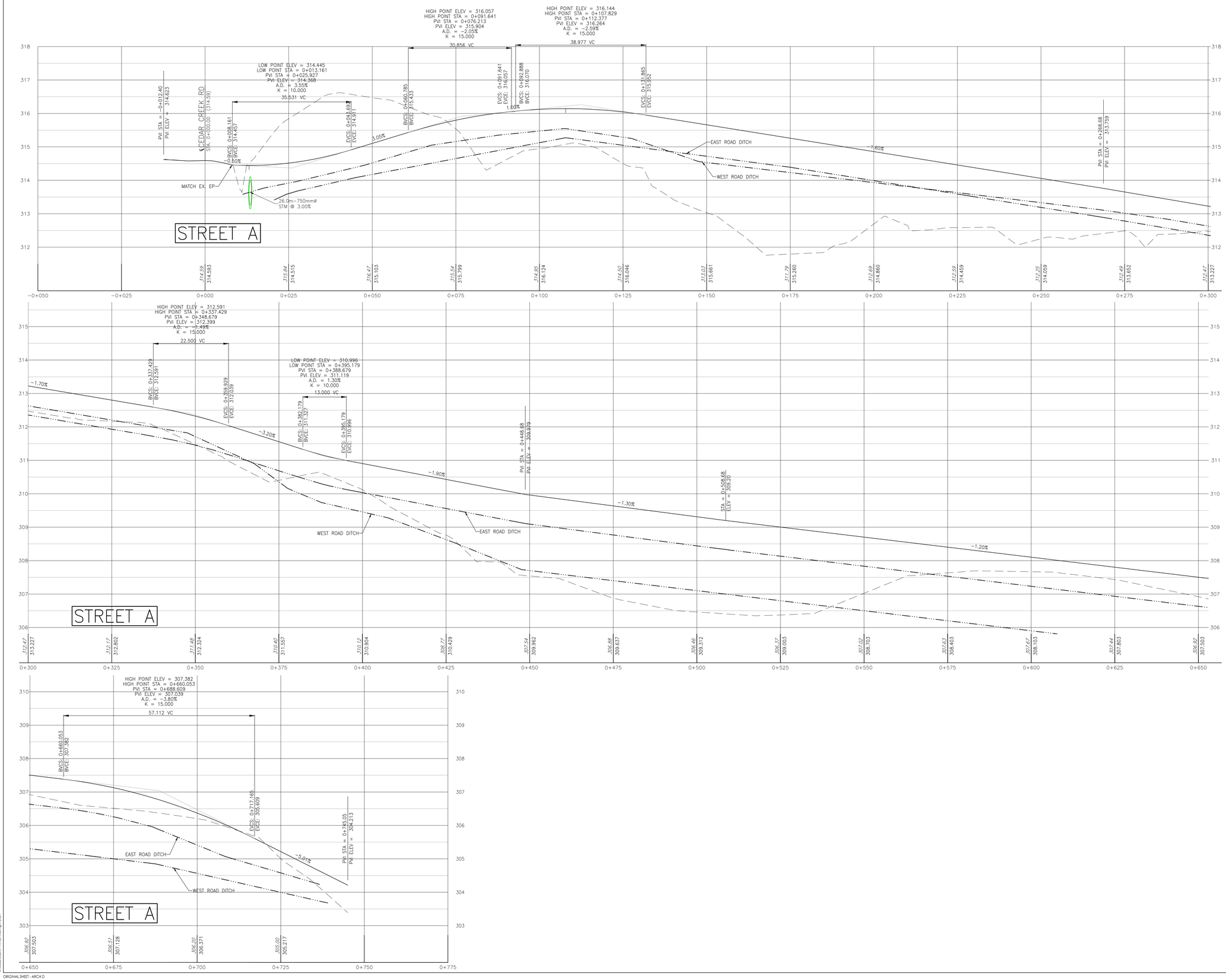
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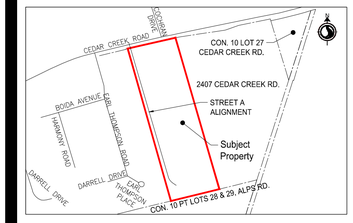
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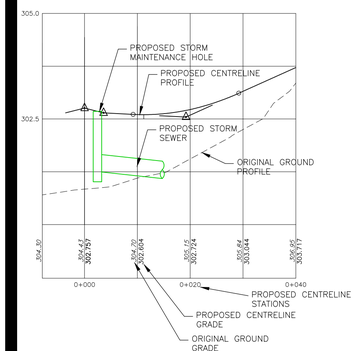
Key Map NTS.



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0.	DRAFT PLAN FIRST SUBMISSION	BWM	KRB	2024.01.18
Revision/Issue		By	Appd	YYYY.MM.DD
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TOWNSHIP OF NORTH DUMFRIES, ON

Title
PRELIMINARY PROFILES PLAN

Project No. 161414214

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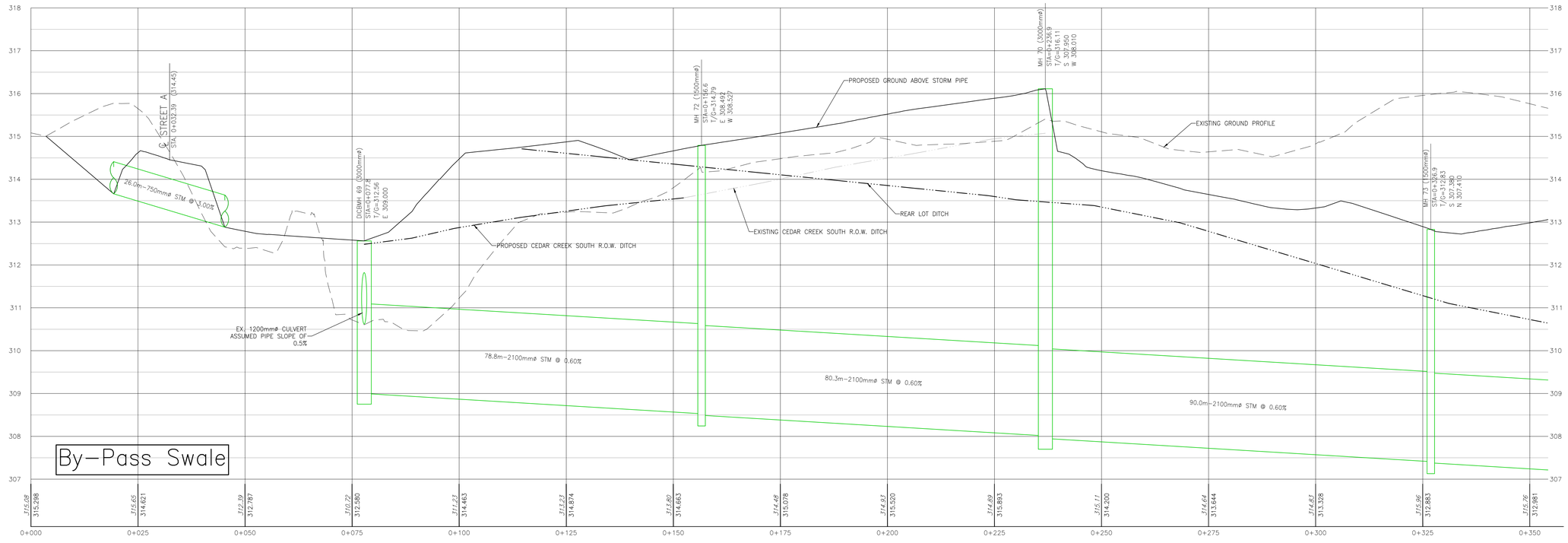
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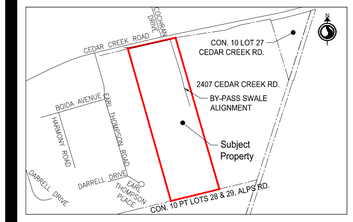
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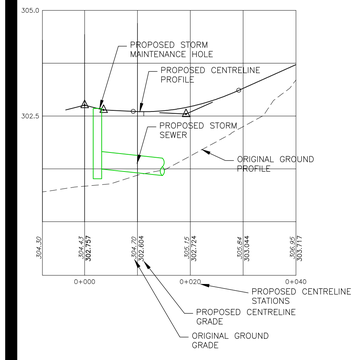
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Revision/Issue		By	Appd	YYYY.MM.DD
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TOWNSHIP OF NORTH DUMFRIES, ON

Title
PRELIMINARY PROFILES PLAN

Project No. 161414214

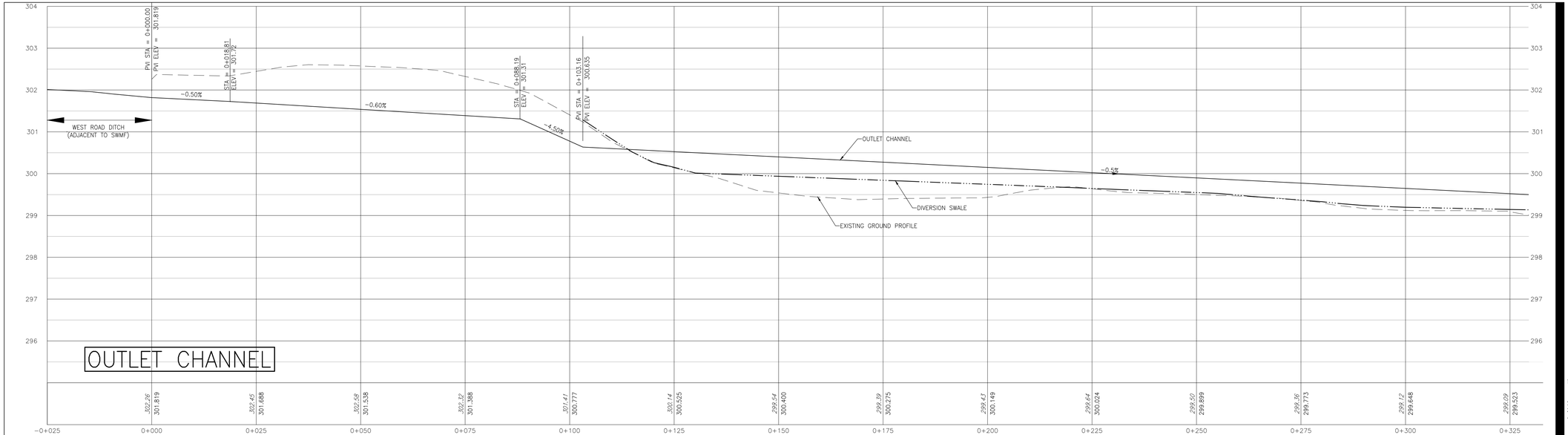
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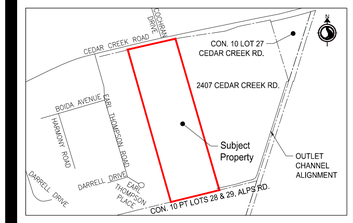
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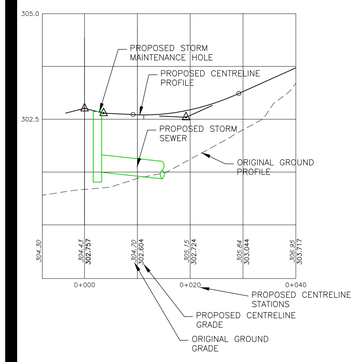
Key Map NTS.



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Revision/Issue		By	Appd	YYYY.MM.DD
File Name: 161414214_C-202ST-OUTLET-DITCH		BWM	BWM	KRB	2024.01.18
		Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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2509 CEDAR CREEK ROAD, AYR

TOWNSHIP OF NORTH DUMFRIES, ON

Title
PRELIMINARY PROFILES PLAN

Project No.
161414214

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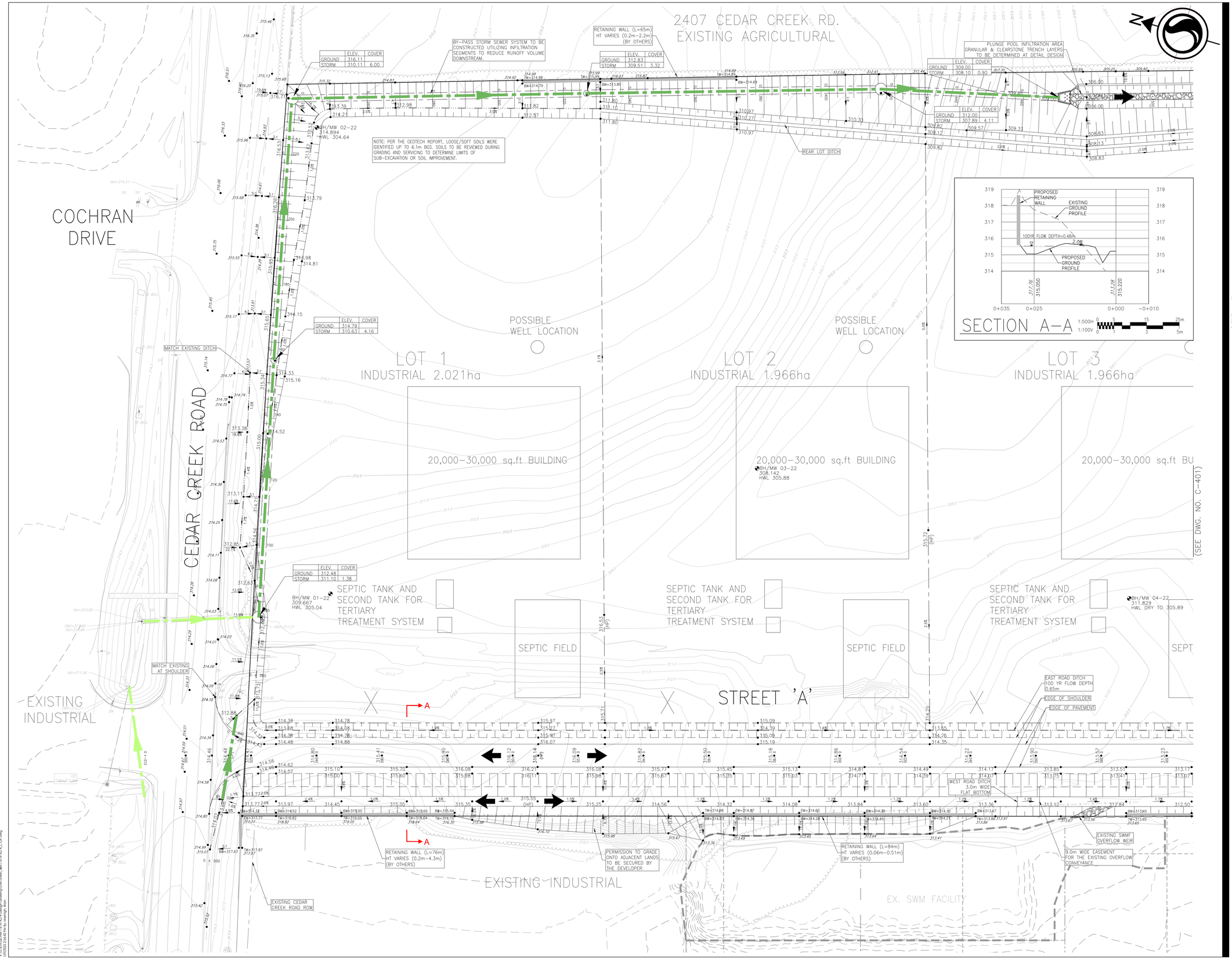
Revision 1

Sheet

Drawing No.
C-202

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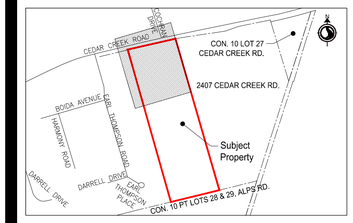
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Key Map NTS.



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Legend

- 352.82 EXISTING ELEVATION
- 352.92 PROPOSED ELEVATION
- 2.0% FLOW DIRECTION
- PROPOSED DRIVEWAY/ACCESS RAMP
- PROPOSED DRAINAGE SWALE/DITCH
- 349.00 EXISTING CONTOUR
- 349.00 M.N.R.F. CONTOUR (LIDAR 2018 DATA)
- RETAINING WALL
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)
- OVERLAND FLOW DIRECTION
- BH/MW 04-22 314.894 HWL 304.64 BORE HOLE
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- EXISTING SWM FACILITY BOUNDARY

GROUND ELEVATION

	ELEV.	COVER
GROUND	312.49	
STORM	308.83	3.66

COVER OVER SEWER (TO OBVERT)
SEWER OBVERT ELEVATION

No.	Revision/Issue	By	Appd	YYYY.MM.DD
1.	DRAFT PLAN SECOND SUBMISSION	BWM	KRB	2025.01.09
0.	DRAFT PLAN FIRST SUBMISSION	BWM	KRB	2024.01.18

File Name: 161414214_C-GP | Dwn. BWM | Dsgn. | Chkd. KRB | 2024.01.18 YYYY.MM.DD

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CEDAR CREEK ROAD HOLDINGS INC.

2509 CEDAR CREEK ROAD, AYR

TOWNSHIP OF NORTH DUMFRIES, ON

Title
PRELIMINARY SERVICING AND GRADING PLAN

Project No. 161414214
Scale 1:500 (0 5 15 25m)
Revision 1
Sheet
Drawing No. **C-400**

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07/02/2025 2:54:43 PM By: Mattingly, Brian

ORIGINAL SHEET - ARCH D

2407 CEDAR CREEK RD.
EXISTING AGRICULTURAL

SPREADER SWALE (L=108m)
0.5m DEPTH

PLUNGE POOL INFILTRATION AREA
GRANULAR 'A' & CLEARSTONE TRENCH LAYERS
TO BE DETERMINED AT DETAIL DESIGN

BH/MW 06-22
SOIL: TILL
HWL DRY TO 300.51

REAR LOT DITCH
100 YR FLOW DEPTH
0.68m

SECTION B-B
1:500H
1:100V

PROPOSED GROUND PROFILE
2.0%
100YR FLOW DEPTH=0.48m
EXISTING GROUND PROFILE
PROPOSED RETAINING WALL
0+025
0+000
0+010

POSSIBLE WELL LOCATION

LOT 4
INDUSTRIAL 1.967ha

LOT 5
INDUSTRIAL 1.967ha

LOT 6
INDUSTRIAL 1.967ha

LOT
INDUSTRIAL

20,000-30,000 sq.ft BUILDING

SEPTIC TANK AND SECOND TANK FOR TERTIARY TREATMENT SYSTEM

SEPTIC FIELD

(SEE DWG. NO. C-400)

(SEE DWG. NO. C-402)

STREET 'A'

STREET

EAST ROAD DITCH
100YR FLOW DEPTH
0.65m

EDGE OF SHOULDER

EDGE OF PAVEMENT

WEST ROAD DITCH
3.0m WIDE
FLAT BOTTOM

BH/MW 05-22
SOIL: TILL
HWL DRY TO 300.83

RETAINING WALL (L=67m)
HT VARIES (0.2m-1.92m)
(BY OTHERS)

EX. EXTERNAL DITCH TO DRAIN INTO WEST PROPOSED ROAD SIDE DITCH

9.0m WIDE EASEMENT FOR THE EXISTING OVERFLOW CONVEYANCE

RETAINING WALL (L=300m)
HT VARIES (0.2m-1.47m)
(BY OTHERS)

EX. EASEMENT

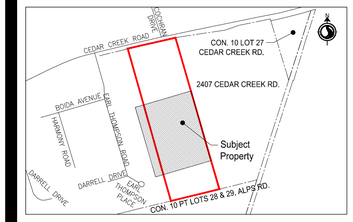
EXISTING INDUSTRIAL

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Key Map NTS.



Notes
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2. DRAFT PLAN PREPARED BY STANTEC CONSULTING LTD., DATED JANUARY 2024.
3. CALCULATED PLAN PREPARED BY STANTEC CONSULTING LTD., DATED JANUARY 2024.
4. TOPOGRAPHICAL SURVEY PREPARED BY STANTEC CONSULTING LTD., DATED APRIL 2022.
ADDITIONAL TOPOGRAPHICAL INFORMATION BY STANTEC CONSULTING LTD., DATED MAY 2022 AND JUNE 2022.

Legend
- 352.82 EXISTING ELEVATION
- 352.92 PROPOSED ELEVATION
- 2.0% FLOW DIRECTION
- PROPOSED DRIVEWAY/ACCESS RAMP
- PROPOSED DRAINAGE SWALE/DITCH
- 349.00 EXISTING CONTOUR
- 349.00 M.N.R.F. CONTOUR (LIDAR 2018 DATA)
- RETAINING WALL
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)
- OVERLAND FLOW DIRECTION
- BH/MW 05-22 (CONSTRUCTION YEAR - INSTALL YEAR) 314.894 HWL 304.64 BORE HOLE

1.	DRAFT PLAN SECOND SUBMISSION	BWM	KRB	2025.01.09
0.	DRAFT PLAN FIRST SUBMISSION	BWM	KRB	2024.01.18
Revision/Issue		By	Appd	YYYY.MM.DD

File Name: 161414214_C-GP	BWM	BWM	KRB	2024.01.18
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

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Client/Project
CEDAR CREEK ROAD HOLDINGS INC.

2509 CEDAR CREEK ROAD, AYR

TOWNSHIP OF NORTH DUMFRIES, ON

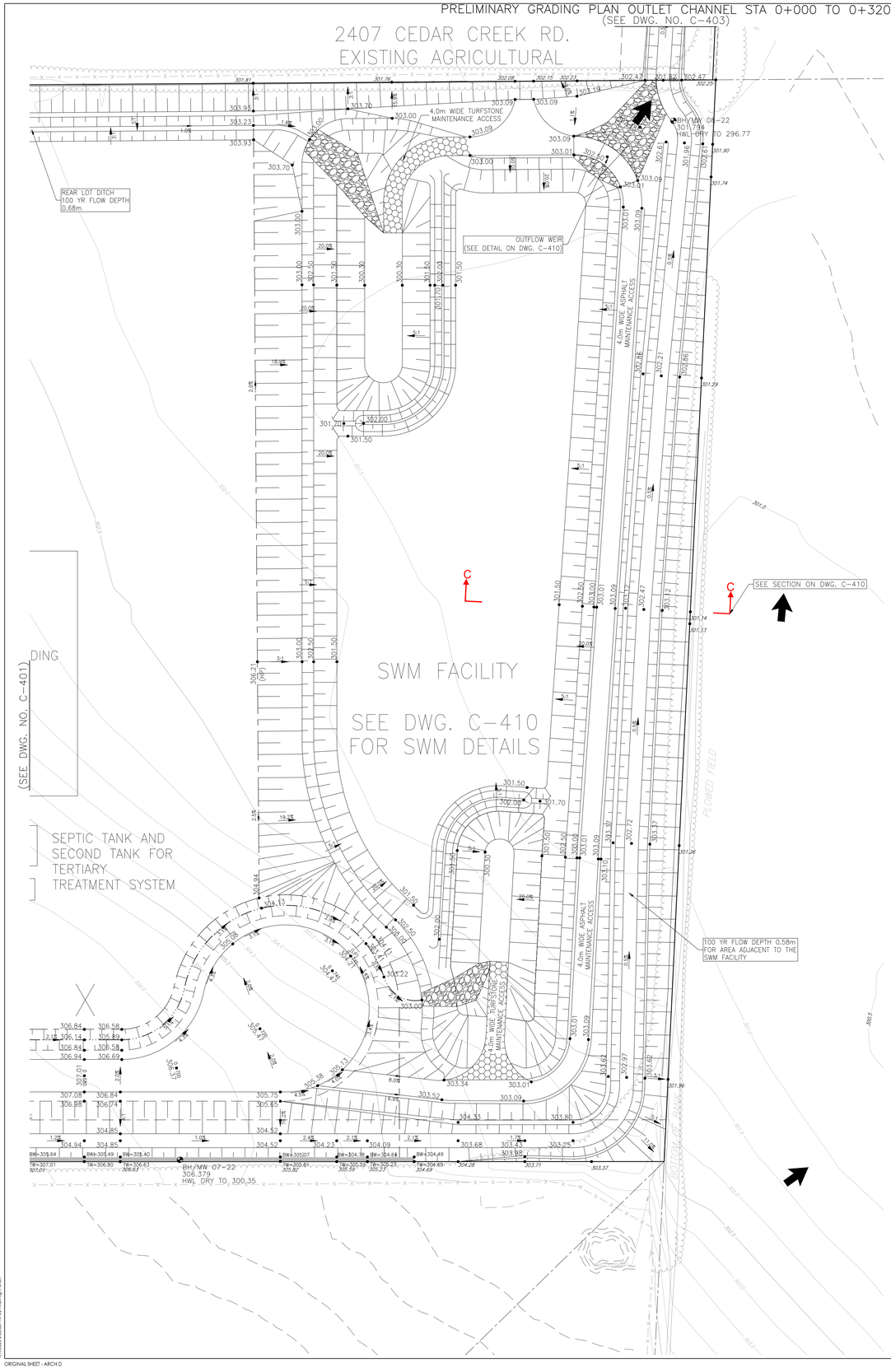
Title
PRELIMINARY SERVICING AND GRADING PLAN

Project No. 161414214
Scale 1:500 (0 5 15 25m)
Revision 1
Sheet
Drawing No. **C-401**

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1/17/2025 2:54:49 PM By: Mattingly, Brian

ORIGINAL SHEET - ARCH D

PRELIMINARY GRADING PLAN OUTLET CHANNEL STA 0+000 TO 0+320
(SEE DWG. NO. C-403)





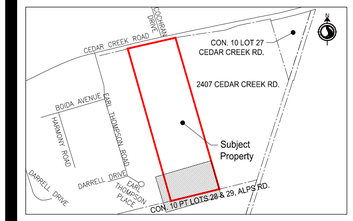
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Key Map NTS.



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Legend

- 352.82 EXISTING ELEVATION
- 352.92 PROPOSED ELEVATION
- 4.0% 2.0% FLOW DIRECTION
- PROPOSED DRIVEWAY/ACCESS RAMP
- PROPOSED DRAINAGE SWALE/DITCH
- 349.00 EXISTING CONTOUR
- 349.00 M.N.R.F. CONTOUR (LIDAR 2018 DATA)
- RETAINING WALL
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)
- OVERLAND FLOW DIRECTION
- BH/MW 07-22 (EXCAVATION 314.324 / INSTALL'D 314.324) HWL 304.64 BORE HOLE

1.	DRAFT PLAN SECOND SUBMISSION	BWM	KRB	2025.01.09
0.	DRAFT PLAN FIRST SUBMISSION	BWM	KRB	2024.01.18
Revision/Issue		By	Appd	YYYY.MM.DD
File Name: 161414214_C-GP		BWM Dwn.	BWM Dsgn.	KRB Chkd.	2024.01.18 YYYY.MM.DD

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Client/Project
CEDAR CREEK ROAD HOLDINGS INC.

2509 CEDAR CREEK ROAD, AYR

TOWNSHIP OF NORTH DUMFRIES, ON

Title
PRELIMINARY SERVICING AND GRADING PLAN

Project No. 161414214

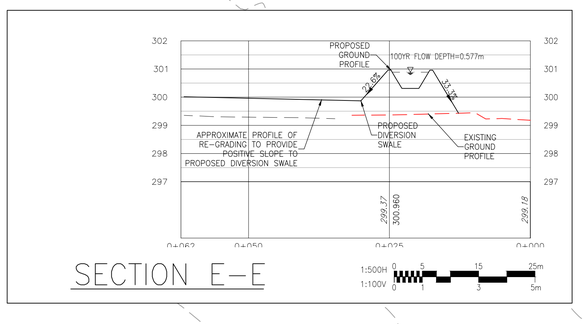
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Revision 1

Sheet

Drawing No. **C-402**

ORIGINAL SHEET - ARCH D



SECTION E-E

1:500H 0 5 15 25m
1:100V 0 1 3 5m

(SEE DWG. NO. C-404)

DIVERSION SWALE

2407 CEDAR CREEK RD.
EXISTING AGRICULTURAL

APPROXIMATE LOCATION OF RE-GRADING TO PROVIDE POSITIVE SLOPE TO PROPOSED DIVERSION SWALE

NOTE: SEE DWG. C-202 FOR OUTLET CHANNEL PROFILE

OUTLET CHANNEL 3.0m WIDE FLAT BOTTOM 100 YR FLOW DEPTH 0.58m

20.0m WIDE OUTLET CHANNEL EASEMENT

CON. 10 PT LOTS 28 & 29 ALPS ROAD
EXISTING AGRICULTURAL

(SEE DWG. NO. C-402)

PRELIMINARY GRADING AND SERVICING PLAN

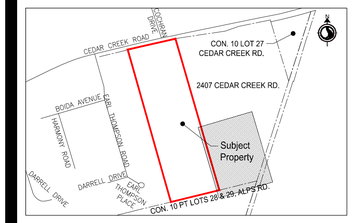
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Key Map NTS.



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Legend

- 352.82 EXISTING ELEVATION
- 352.92 PROPOSED ELEVATION
- 4.0% 2.0% FLOW DIRECTION
- PROPOSED DRIVEWAY/ACCESS RAMP
- PROPOSED DRAINAGE SWALE/DITCH
- 349.00 EXISTING CONTOUR
- 349.00 M.N.R.F. CONTOUR (LIDAR 2018 DATA)
- RETAINING WALL
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)
- OVERLAND FLOW DIRECTION
- GRCA REGULATION LIMIT

1. DRAFT PLAN SECOND SUBMISSION	BWM	KRB	2025.01.09
0. DRAFT PLAN FIRST SUBMISSION	BWM	KRB	2024.01.18
Revision/Issue	By	Appd	YYYY.MM.DD
File Name: 161414214_C-GP	BWM Dwn.	BWM Dsgn.	KRB Chkd. 2024.01.18 YYYY.MM.DD

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Client/Project

CEDAR CREEK ROAD HOLDINGS INC.

2509 CEDAR CREEK ROAD, AYR

TOWNSHIP OF NORTH DUMFRIES, ON

Title

PRELIMINARY GRADING PLAN
OUTLET DITCH STA 0+000 TO 0+320

Project No. 161414214

Scale 1:500 0 5 15 25m

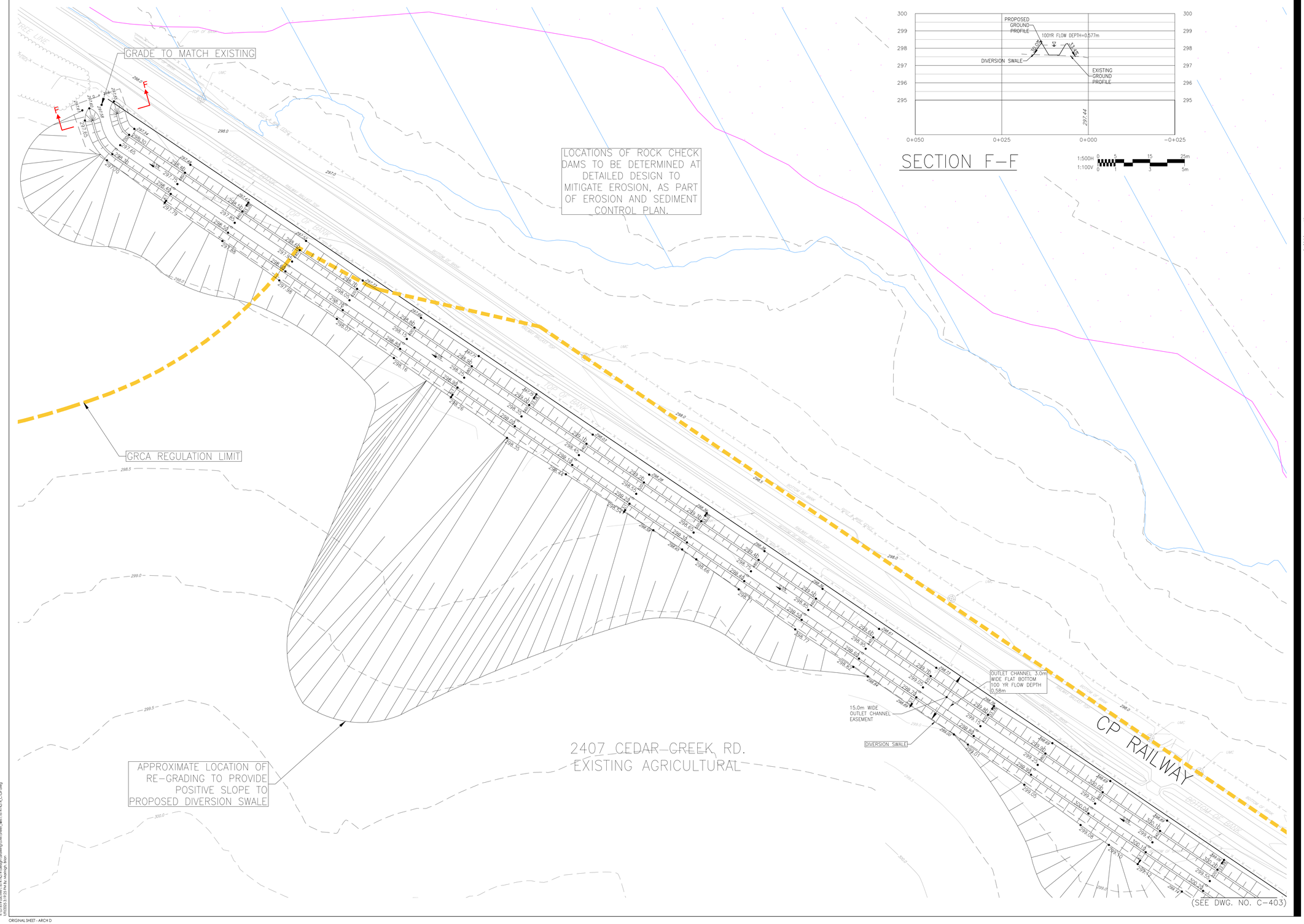
Revision 1

Sheet

Drawing No. **C-403**

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ORIGINAL SHEET - ARCH D



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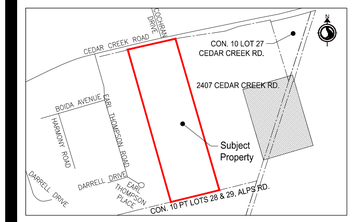
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Key Map NTS.



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Legend

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- 352.92 PROPOSED ELEVATION
- 2.0% 2.0% FLOW DIRECTION
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- 349.00 M.N.R.F. CONTOUR (LiDAR 2018 DATA)
- RETAINING WALL
- PROPOSED STORM MANHOLE
- PROPOSED STORM CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)
- OVERLAND FLOW DIRECTION
- GRCA FLOODPLAIN
- GRCA REGULATION LIMIT
- GRCA WATERBODY
- GRCA WATERCOURSE
- GRCA WETLAND

1. DRAFT PLAN SECOND SUBMISSION	BWM	KRB	2025.01.09
0. DRAFT PLAN FIRST SUBMISSION	BWM	KRB	2024.01.18
Revision/Issue	By	Appd	YYYY.MM.DD
File Name: 161414214_C-GP	BWM	KRB	2024.01.18
	Dwn.	Chkd.	YYYY.MM.DD

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CEDAR CREEK ROAD HOLDINGS INC.

2509 CEDAR CREEK ROAD, AYR

TOWNSHIP OF NORTH DUMFRIES, ON

Title

PRELIMINARY GRADING PLAN
OUTLET DITCH STA 0+320 TO END

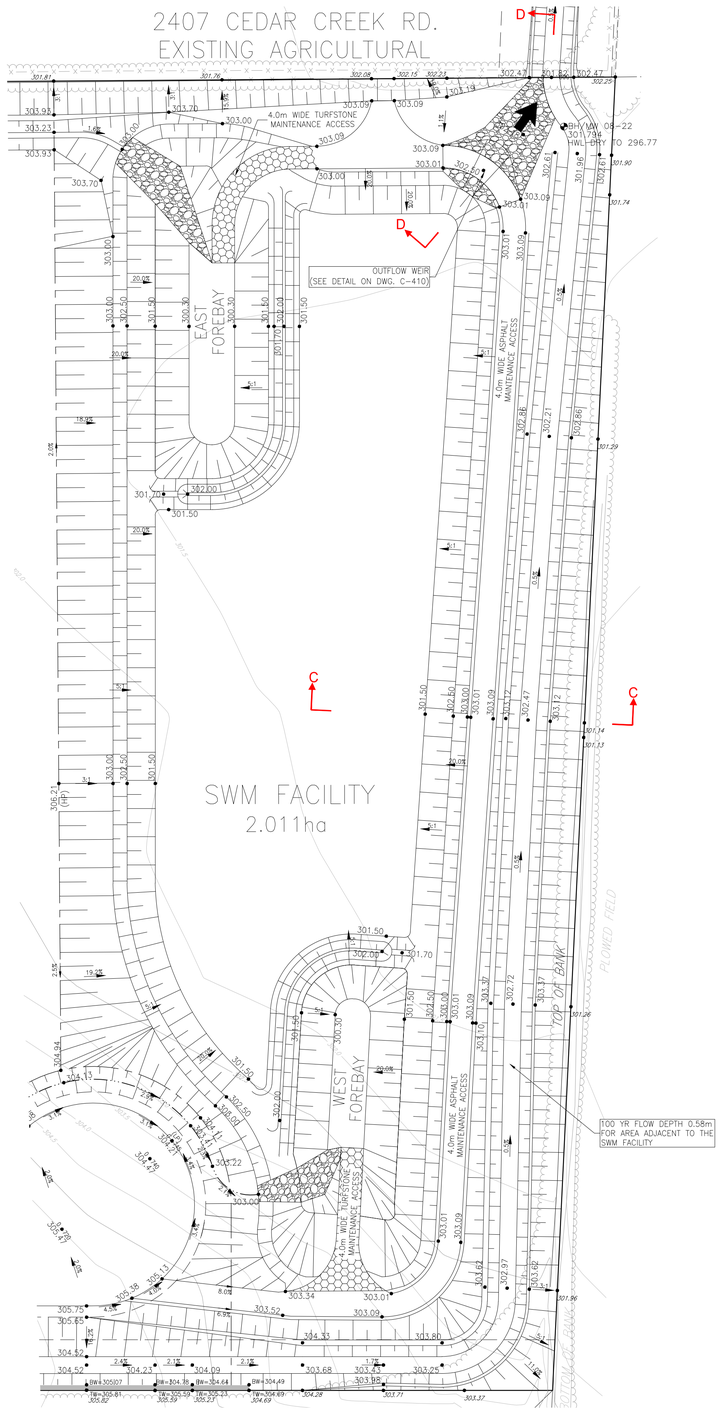
Project No. 161414214

Scale 1:500

Revision 1

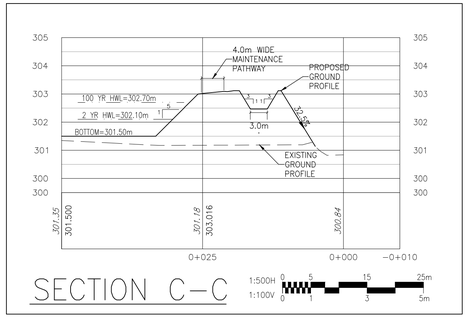
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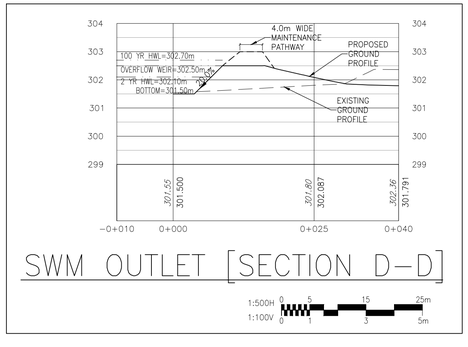
Drawing No. **C-404**

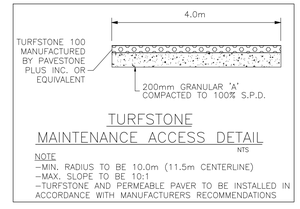


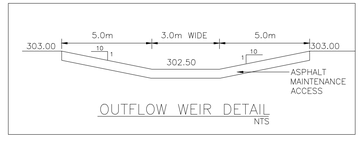
SWM POND STATISTICS

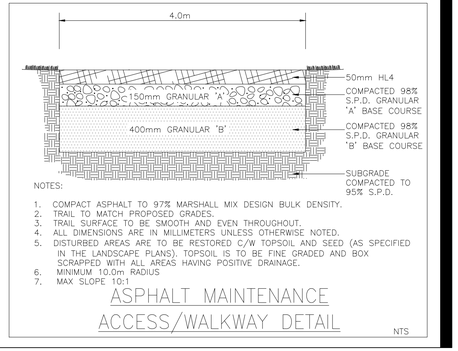
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POND BOTTOM (INFILTRATION CELL)	301.50
QUALITY EXTENDED DETENTION (25mm)	301.91
2 YEAR WATER LEVEL	302.10
5 YEAR WATER LEVEL	302.36
100 YEAR WATER LEVEL	302.70
REGIONAL WATER LEVEL	302.85











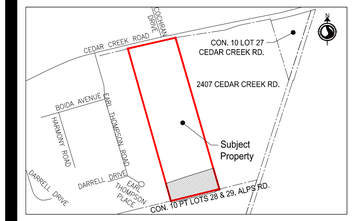
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Key Map NTS.



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Legend

- 352.82 EXISTING ELEVATION
- 352.92 PROPOSED ELEVATION
- 2.0% FLOW DIRECTION
- PROPOSED DRAINAGE SWALE (SEE DETAIL DWG C-500)
- 349.00 EXISTING CONTOUR
- RETAINING WALL
- PROPOSED SLOPE (3:1 UNLESS NOTED OTHERWISE)
- OVERLAND FLOW DIRECTION
- BH/MW 02-22 EXCAVATION 314.884 INITIAL 1644 HWL 304.64 BORE HOLE

1. DRAFT PLAN SECOND SUBMISSION	BWM	KRB	2025.01.09
0. DRAFT PLAN FIRST SUBMISSION	BWM	KRB	2024.01.18
Revision/Issue	By	Appd	YYYY.MM.DD
File Name: 161414214_C-GP	BWM Dwn.	BWM Dsgn.	KRB Chkd. 2024.01.18 YYYY.MM.DD

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Client/Project

CEDAR CREEK ROAD HOLDINGS INC.

2509 CEDAR CREEK ROAD, AYR

TOWNSHIP OF NORTH DUMFRIES, ON

Title

STORMWATER MANAGEMENT FACILITY PLAN & DETAILS

Project No. 161414214

Scale 1:500 (0 5 15 25m)

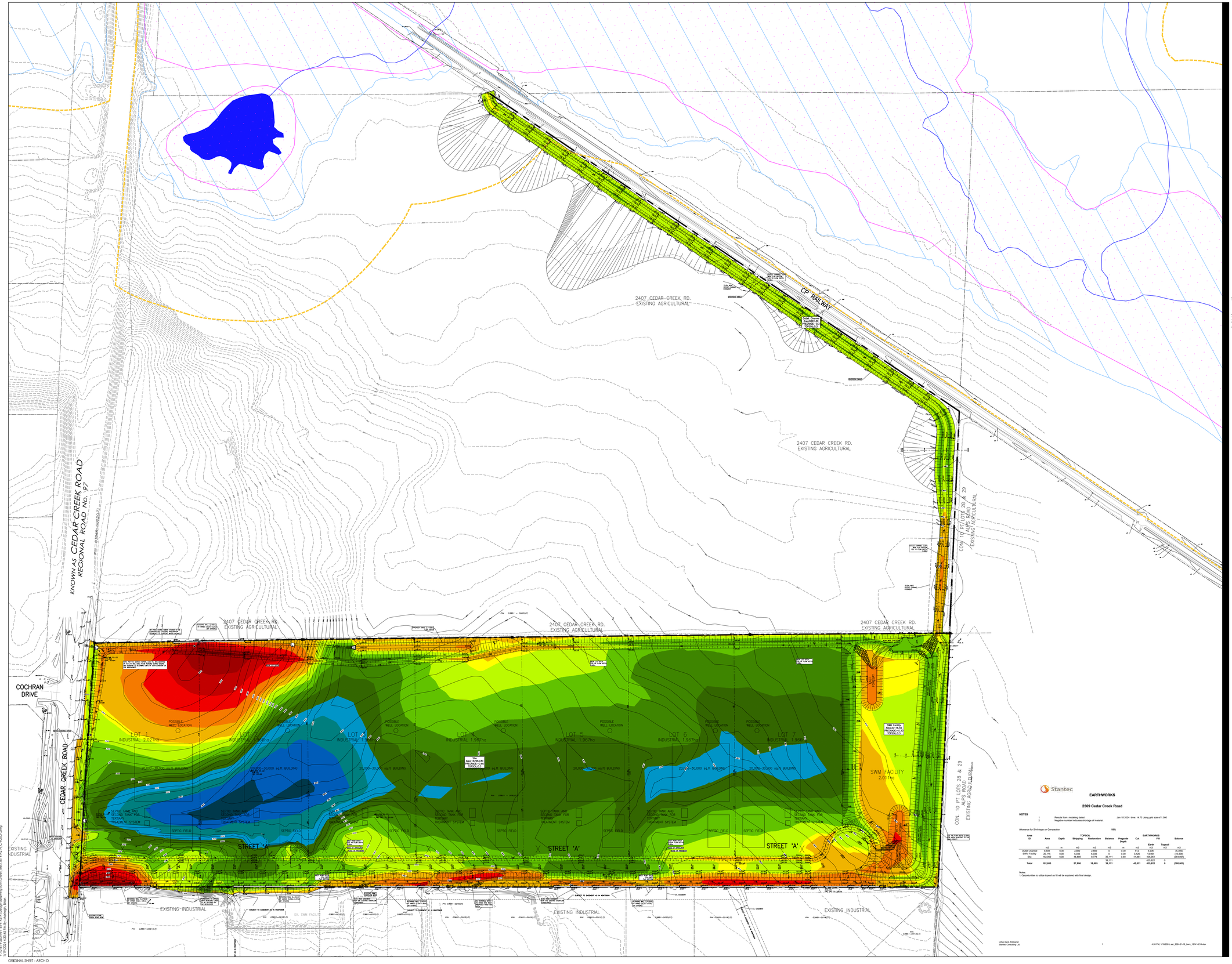
Revision 1

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Drawing No. **C-410**

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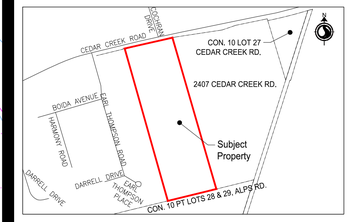
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Key Map NTS.



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Legend

Elevations Table

Number	Minimum Elevation	Maximum Elevation	Area	Color
1	-5.36	-5.00	114.21	
2	-5.00	-4.50	1376.10	
3	-4.50	-3.50	2445.48	
4	-3.50	-2.50	4304.21	
5	-2.00	-1.50	8026.59	
6	-1.50	-0.10	15150.41	
7	-0.10	0.10	7118.05	
8	0.10	1.00	32632.86	
9	1.00	2.00	35243.09	
10	2.00	3.00	34418.70	
11	3.00	4.00	31358.15	
12	4.00	5.00	10113.85	
13	5.00	6.00	1888.42	
14	6.00	7.00	6101.19	
15	7.00	7.32	1414.67	

Number	Description	By	Appd	YYYY.MM.DD
0.	DRAFT PLAN FIRST SUBMISSION	BWM	KRB	2024.01.18

Revision/Issue

File Name: 161414214_C-900CF	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD
	BWM	BWM	KRB	2024.01.18

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Client/Project
CEDAR CREEK ROAD HOLDINGS INC.

2509 CEDAR CREEK ROAD, AYR

TOWNSHIP OF NORTH DUMFRIES, ON

Title
PRELIMINARY CUT/FILL PLAN

Stantec

EARTHWORKS

2509 Cedar Creek Road

NOTES

1 Results from modelling dated Jan 18 2024 time: 14:73 Using grid size of 1.000
2 Negative number indicates shortage of material.

Allowance for Shrinkage on Compaction 10%

Area ID	Area	Depth	TOPSOIL Stripping	Restoration	Balance	Prograde Depth	Cut	EARTHWORKS Fill		Balance
								Earth	Topsoil	
	m2	m	m3	m3	m3	m	m3	m3	m3	m3
Outlet Channel	8,908	0.30	2,882	2,882	0	0.30	512	5,906		(5,395)
SWM Facility	20,115	0.30	6,035	6,035	0	0.30	3,423	13,494		(10,058)
Site	152,882	0.30	45,865	9,775	36,111	0.60	41,884	420,822		(364,087)
								420,822	0	
Total	182,885		57,306	18,693	36,111		45,821	420,822	0	(388,591)

Notes:
1. Opportunities to utilize topsoil as fill will be explored with final design.

Urban land, Kitchener
Stantec Consulting Ltd.

1

4:52 PM, 1/19/2024, sar_2024-01-19_bwm_161414214.stw

Project No.	Scale	0	15	45	75m
161414214	1:1500				

Revision 0 Sheet

Drawing No. **C-900**

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17/1/2024 4:52:43 PM By: Mannigh, Ryan

ORIGINAL SHEET - ARCH D

APPENDIX C

2509 Cedar Creek Road, Ayr ON - Water and Sewage System Feasibility Study Dated January 24, 2024

Stantec

Memo

To:	Kevin Brousseau, L.E.T., C.E.T. Principal, Practice Leader - Community Development Stantec Waterloo Office	From:	Jean Hébert, P. Eng. Stantec Ottawa Office
Project/File:	1614-14214	Date:	January 24, 2024

Reference: 2509 Cedar Creek Road, Ayr ON - Water and Sewage System Feasibility Study

Our review of the underground water conditions and land available at the seven proposed industrial lots at 2509 Cedar Creek Road concluded that the potential number of employees per site would vary from 24 to 84, depending on the soils characteristics at a given lot, and on the type of sewage treatment retained (conventional septic system or tertiary treatment system) by the landlord. In summary, the tertiary treatment system would allow an increase in serviced population (by about one half), compared to the conventional septic system, and would depend on the location of the commercial lot, as per the following chart.

Lot No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**
No of employees With conventional septic system	37	37	24	37	56	56	56
No of employees With tertiary treatment system	59	59	40	59	84	84	84

The above is developed on the assumption that the absorption area, including the septic field, and an infiltration gallery for the drinking water system process wastewater, are to be set within a 20 m by 30 m area.

To support higher number of employees at a given commercial lot, the landowner would have to allocate more room for the absorption area, which implies allocating less room for the building and/or the parking space.

Best regards,

STANTEC CONSULTING LTD.

Jean Hébert

P.Eng. (ON) PEO No. 90272949

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Senior Environmental Engineer
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APPENDIX C-1 – Septic System Assessment Methodology

The serviced population has been established based on daily design sewage flow rates and septic system design parameters as per the Ontario Building Code – Part 8 – Septic Systems, hereafter referred to as the OBC, as follows.

- Flow rate per employee per 8-hour shift = 75 L/d per employee
- Flow rate per toilet accessible to truckers = 950 L/d/toilet
- Office building: allocate one employee per 9.3 m^2 (100 sq. ft) = 75 L/d per employee

Soils characteristics have been assessed from well record datasheets for wells located north and west of the proposed commercial sites, available at https://www.ontario.ca/page/map-well-records

The time of percolation, i.e., the number of minutes for water to travel by one cm into the soils, has been deduced for each of the future lots, based on the type of soils at the nearby wells. That information will be updated prior to detailed design phase, using data from geotechnical and hydrogeological reports to be issued by Stantec.,

The theoretical time of percolation, as reported in the following table, extracted from Table 2-8 of the Sewerage System Standard Practice Manual (Version 2) prepared by the British Columbia Onsite Sewage Association, and from Supplementary Standard SB-6 (Percolation Time and Soil Descriptions) from the Government of Ontario's On-Site Sewage Systems Regulations, is deemed to be relatively conservative. On-site percolation tests would have to be conducted prior to detailed design phase, to validate those values, although the actual value could be slightly better (i.e., water may flow faster). Table 1 on next page presents the percolation time for different types of soils.

The OBC includes various options for private sewage disposal systems. The conventional septic system consists of a two-compartment septic system, followed by a septic bed, fed either by gravity (should site topography allows it) or with an effluent pump. The gravity system is the most economical where soils consist of sand, as it is the case at most of the industrial lots; however, requires the largest septic field footprint.

The tertiary system is an advanced treatment system with a modified septic tank, used as a digester, followed by a biofilter tank, a recirculation pump, and an effluent pump feeding a modified septic field. The treatment process normally occurs within the septic field; with a tertiary system the treatment process, would be accommodated in the modified septic tanks, with the final septic field footprint reduced up to one third in size. This would allow for an increase in the number of employees at a given industrial lot, for the same septic field footprint.

Septic field can be positioned as close as 3.0 m from the property limit, so the septic field could be set much closer to the property limit than shown on the typical arrangement sketch on Drawings C-400 to C-401.

Table C-1: Estimated Percolation Rate based on Soil Type

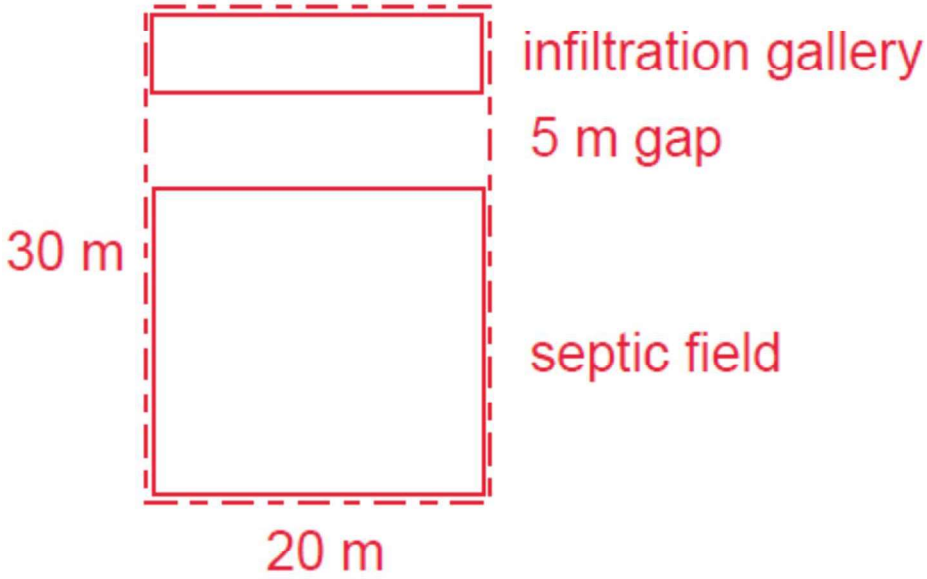
Soil Type	Percolation Rate (min/cm)
Sand	7
Silty Sand	14
Sandy Silt	28
Silt	28
Fine silt	28
Clayed sand	35
Clayey Silt	35
Silty Clay-Silt	35
Sandy Clay	35
Silty Clay	35
Clay	35

Office wastewater normally has ammonia concentration about 50% higher than typical residential wastewater, as it cannot rely on dishwasher, shower, and source of wastewater other than toilets and sinks to dilute sewage water. The septic field area is based on final ammonia disposal. For such reasons, the septic field area for an industrial building should be increased by 50%, compared to the result obtained while applying OBC design rules, which were developed for residential housing.

Process wastewater generated by various well water treatment equipment (iron filter, water softener, reverse osmosis) could be disposed of at an infiltration gallery, at a rate of 100 L/m^2/d. The nature of such process wastewater for this case is reviewed under Appendix C-2.

Horizontal gap (spacing) between infiltration gallery and septic field should be minimum 5 m, to avoid interference between both systems. Figure C-1 on next page shows how the infiltration gallery and the septic field could be set within a 20 m by 30 m absorption area:

Figure C-1 – Typical Absorption Area Setting



Any lot with combined flow rate (sewage flow and process wastewater flow) below 10,000 L/d is to be subject to approval by local authority, while any lot with higher daily flow rate would imply an application to the Ontario Ministry of the Environment, Conservation and Parks (MECP). This corresponds to 54 employees, at 75 L per 8-hour shift each, plus one trucker toilet at 950 L per day.

For reference, typical precast concrete septic tanks in Ontario are designed and fabricated for a one-meter burial depth, measured from the top of the slab to the highest ground surface elevation, above the tank and up to 5 meters measured horizontally from the tank exterior walls. Special order tanks designed for two-meter burial depth, measured above tank and up to seven meters from the tank wall, are available upon request, with an additional cost below $2,000 per tank. This safety parameter applies to ground surface usage, i.e., that no vehicle, and particularly no commercial truck, shall be allowed to drive over within the above-defined limits. The issue is that the vehicle load distributed by the soils would impact the tank walls, at the risk of exceeding the wall strength.

APPENDIX C-2 – Site Specific Conditions

Here are the site-specific conditions affecting the septic system capacity assessment.

Drawings C-400 to C-402 show the proposed building, septic tank and septic field setting at Lot no. 1 to Lot 7.

Most of the site is to be occupied by a parking lot, and office building approximately 1,858 to 2,787 m^2 range (20,000 to 30,000 ft^2).

A location allocated to support an absorption area of 20 m by 30 m would be required. This area would include a reverse osmosis concentrate disposal gallery (refer to discussion below) and the septic field (downstream either a conventional septic system tank or a tertiary treatment system group of tanks). The inclusion of an infiltration gallery will be required, on the following basis.

From **Table 2** - Summary of Groundwater Analytical Results - Hydrogeological Investigation in Support of Official Plan and Zoning Bylaw Amendments Site: 2509 Cedar Creek Road, Ayr ON, at the end of this Appendix C-2, well water in the local aquifer have chloride, hardness, sodium, iron and total dissolved solids considerably above aesthetic limit, which would require water to be treated with a water softener and a reverse osmosis filter, followed by calcium carbonate contact vessel to reduce filtered water corrosiveness. Depending on well water quality, an iron filter may be required. Such treatment process implies that, for every liter of drinking water produced, about 1.3 liter of process wastewater would be generated as follows: 1 L of concentrate from the reverse osmosis filter, continuously during water production, 0.15 L for iron filter backwash overnight, and 0.15 L brine regeneration volume overnight at the water softener. This process wastewater should be directed to an infiltration gallery, separated from the septic field, as there is practically no organic loading in that water. Such gallery would be part of the 20 m X 30 m absorption area, as shown on **Figure C-1** above.

Drawings C-400 to C-402 show the proposed absorption field (including the septic field, the infiltration gallery for process wastewater, and 5-m gap in between) located toward the front end of the industrial lot. Should gravity flow installation from the building sewer to the septic tank then to the absorption field be unachievable, a pump would be required to convey either raw sewage to the septic tank or septic tank effluent to the septic field.

An alternative to avoid installing such pump(s), the septic tank and the absorption field could be installed toward the back of the industrial sites, as ground surface generally slopes down, as shown on Drawings C-400 to C-402. This configuration implies to set the well at the front of the

lot, and to configure the parking lot around the septic tank and septic field, considering the later should be at least 15 meters from the top of the drainage ditch.

About the infiltration gallery:

The reverse osmosis concentrate is released on a continuous basis during water production process, while the iron filter backwash water and water softener brine are released at high flow rates, for a few minutes at a time. Those process wastewater would need an equalization tank and pumping system, to dose such water at a lower flow rate to the infiltration gallery. Concentrate and brine may be collected into the same basin, while iron fitter backwash water would be collected into a separate tank, working as a clarifier. After a few hours of settling, clarified water would be pumped to the infiltration gallery, at a reduced flow rate. Iron sludge at the bottom of the tank would be pumped out by a sewage vacuum truck on a year basis.

Absorption field and various tank locations, with required protection perimeters, would be reviewed at detailed design phase of each industrial lot, once final use, building size and the number of employees has been confirmed.

Table 2
Summary of Groundwater Analytical Results
Hydrogeological Investigation in Support of Official Plan and Zoning Bylaw Amendments Site: 2509 Cedar Creek Road, Ayr ON

Sample Location			111 Earl Thompson Road		121 Earl Thompson Road	2396 Cedar Creek Road		2407 Cedar Creek Road	
Sample Date			13-May-22	13-May-22	13-May-22	13-May-22	13-May-22	13-May-22	13-May-22
Sample ID			WG-161414214-20220513-SH3	WG-161414214-20220513-SH3 Lab-Dup	WG-161414214-20220513-SH2	WG-161414214-20220513-SH4	WG-161414214-20220513-SH4 Lab-Dup	WG-161414214-20220513-SH1	WG-161414214-20220513-SH1 Lab-Dup
Sampling Company			STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory			BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order			C2D0478	C2D0478	C2D0478	C2D0478	C2D0478	C2D0478	C2D0478
Laboratory Sample ID			SPU232	SPU232	SPU231	SPU233	SPU233	SPU230	SPU230
Sample Type	Units	ODWS		Lab Replicate			Lab Replicate		Lab Replicate
General Chemistry									
Alkalinity, Bicarbonate (as CaCO3)	mg/L	n/v	290	-	260	260	-	250	-
Alkalinity, Carbonate (as CaCO3)	mg/L	n/v	2.8	-	2.2	2.8	-	2.7	-
Alkalinity, Total (as CaCO3)	mg/L	30-500[E]	300	300	270	260	-	250	-
Ammonia (as N)	mg/L	n/v	<0.050	-	<0.050	<0.050	-	<0.050	<0.050
Anion Sum	me/L	n/v	21.7	-	54.1	8.24	-	7.81	-
Cation Sum	me/L	n/v	22.5	-	55.1	8.48	-	8.12	-
Chloride	mg/L	250[C]	**520[C]**	-	**1,700[C]**	54	-	40	-
Dissolved Organic Carbon (DOC)	mg/L	5[C]	0.71	-	0.56	0.47	-	<0.40	-
Electrical Conductivity, Lab	µmhos/cm	n/v	2,400	2,400	6,100	810	-	760	-
Hardness (as CaCO3)	mg/L	80-100[E]	**590[E]**	-	**870[E]**	**350[E]**	-	**360[E]**	-
Ion Balance	%	n/v	1.74	-	0.880	1.43	-	1.90	-
Langelier Index (at 20 C)	none	n/v	1.09	-	1.01	1.01	-	0.995	-
Langelier Index (at 4 C)	none	n/v	0.843	-	0.772	0.759	-	0.747	-
Nitrate (as N)	mg/L	10.0_d[B]	3.69	-	0.97	5.97	-	7.06	-
Nitrite (as N)	mg/L	1.0_d[B]	<0.010	-	<0.010	<0.010	-	<0.010	-
Orthophosphate (as P)	mg/L	n/v	0.012	-	<0.010	<0.010	-	<0.010	-
pH, lab	S.U.	6.5-8.5[E]	8.01	8.03	7.95	8.07	-	8.06	-
Saturation pH (at 20 C)	none	n/v	6.92	-	6.93	7.06	-	7.06	-
Saturation pH (at 4 C)	none	n/v	7.17	-	7.18	7.31	-	7.31	-
Sulfate	mg/L	500_h[C]	42	-	58	53	-	55	-
Total Dissolved Solids (Calculated)	mg/L	500[C]	**1,200[C]**	-	**3,100[C]**	460	-	440	-
Total Suspended Solids	mg/L	n/v	2	2	2	1	-	<1	-
Microbiological Analysis									
Escherichia coli (E.Coli)	cfu/100mL	0[A]	0	-	0	0	-	0	-
Total Coliform Background	cfu/100mL	n/v	0	-	0	17	-	0	-
Total Coliforms	cfu/100mL	0[A]	0	-	0	**1[A]**	-	0	-
Metals									
Aluminum	mg/L	0.1[E]	<0.0049	-	<0.0049	0.0077	0.0055	0.0093	-
Antimony	mg/L	0.006[B]	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	-
Arsenic	mg/L	0.01[B]	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	-
Barium	mg/L	1[B]	0.29	-	0.28	0.088	0.091	0.098	-
Beryllium	mg/L	n/v	<0.00040	-	<0.00040	<0.00040	<0.00040	<0.00040	-
Boron	mg/L	5[B]	0.014	-	0.014	0.012	0.012	0.011	-
Cadmium	mg/L	0.005[B]	<0.000090	-	<0.000090	<0.000090	<0.000090	<0.000090	-
Calcium	mg/L	n/v	150	-	230	96	97	98	-
Chromium	mg/L	0.05[B]	<0.0050	-	<0.0050	<0.0050	<0.0050	<0.0050	-
Cobalt	mg/L	n/v	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	-
Copper	mg/L	1[C]	0.013	-	0.013	<0.00090	<0.00090	0.0010	-
Iron	mg/L	0.3[C]	<0.10	-	0.11	**0.35[C]**	**0.35[C]**	<0.10	-
Lead	mg/L	0.01[B]	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	-
Lithium	mg/L	n/v	0.0070	-	0.013	<0.0050	<0.0050	<0.0050	-
Magnesium	mg/L	n/v	50	-	74	26	26	29	-
Manganese	mg/L	0.05[C]	0.0037	-	0.0047	<0.0020	<0.0020	<0.0020	-
Molybdenum	mg/L	n/v	<0.00050	-	0.00056	<0.00050	<0.00050	<0.00050	-
Nickel	mg/L	n/v	<0.0010	-	<0.0010	<0.0010	<0.0010	<0.0010	-
Phosphorus	mg/L	n/v	<0.10	-	<0.10	<0.10	<0.10	<0.10	-
Potassium	mg/L	n/v	2.3	-	4.1	1.2	1.2	1.5	-
Selenium	mg/L	0.05[B]	<0.0020	-	<0.0020	<0.0020	<0.0020	<0.0020	-
Silicon	mg/L	n/v	6.2	-	6.6	5.9	5.9	6.5	-
Silver	mg/L	n/v	<0.000090	-	<0.000090	<0.000090	<0.000090	<0.000090	-
Sodium	mg/L	200_g[C] 20_g[D]	**250[CD]**	-	**860[CD]**	**34[D]**	**33[D]**	19	-
Strontium	mg/L	n/v	0.27	-	0.65	0.46	0.45	0.49	-
Thallium	mg/L	n/v	<0.000050	-	<0.000050	<0.000050	<0.000050	<0.000050	-

Notes:

ODWS	Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines (MOE, 2006), in support of O.Reg 169/03 (January 1, 2018)
A	Schedule 1 - Microbiological Standards (expressed as a maximum)
B	Schedule 2 - Chemical Standards (expressed as a maximum acceptable concentration)
C	ODWS Table 4 - Chemical/Physical Objectives and Guidelines, Aesthetic Objectives
D	ODWS Table 4 - Medical Officer of Health Reporting Limit
E	ODWS Table 4 - Chemical/Physical Objectives and Guidelines, Operational Guidelines
6.5[A]	Concentration exceeds the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.

Table 2
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Hydrogeological Investigation in Support of Official Plan and Zoning Bylaw Amendments Site: 2509 Cedar Creek Road, Ayr ON

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Sample ID			WG-161414214-20220513-SH3	WG-161414214-20220513-SH3 Lab-Dup	WG-161414214-20220513-SH2	WG-161414214-20220513-SH4	WG-161414214-20220513-SH4 Lab-Dup	WG-161414214-20220513-SH1	WG-161414214-20220513-SH1 Lab-Dup
Sampling Company			STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC	STANTEC
Laboratory			BV	BV	BV	BV	BV	BV	BV
Laboratory Work Order			C2D0478	C2D0478	C2D0478	C2D0478	C2D0478	C2D0478	C2D0478
Laboratory Sample ID			SPU232	SPU232	SPU231	SPU233	SPU233	SPU230	SPU230
Sample Type	Units	ODWS		Lab Replicate			Lab Replicate		Lab Replicate
Titanium	mg/L	n/v	<0.0050	-	<0.0050	<0.0050	<0.0050	<0.0050	-
Uranium	mg/L	0.02[B]	0.00066	-	0.00099	0.00042	0.00038	0.00051	-
Vanadium	mg/L	n/v	<0.00050	-	<0.00050	<0.00050	<0.00050	<0.00050	-
Zinc	mg/L	5[C]	0.018	-	0.019	0.027	0.027	0.015	-

[d] Where both nitrate and nitrite are present, the total of the two should not exceed 10 mg/L (as nitrogen).

[g,CD] The aesthetic objective for sodium in drinking water is 200 mg/L. The local Medical Officer of Health should be notified when the sodium concentrati exceeds 20 mg/L so that this information may be communicated to local physicians for their use with patients on sodium restricted diets.

[h] When sulfate levels exceed 500 mg/L, water may have a laxative effect on some people.

APPENDIX C-3 – Septic System Assessment

The maximum possible office floor space (30,000 sq. ft = 2,787 m^2) could support at maximum 300 employees, at 9.3 m^2 (100 sq. ft) office space per each employee (from the Ontario Building Code), for a total of 22,477 L/d. It is understood that a major portion of the building area is to be allocated for industrial activity, so the net area used as office space, and the corresponding number of employees, would be much lower than the above. Assuming that half of the building area is allocated for office space, the balance being for industrial usage, then the net serviceable population would be between 100 and 150 employees.

Large number of parking spots would be required for so many employees. For reference, one of the largest business centers in that neighborhood, Farrow at 106 Earl Thompson Road, has about 120 parking spaces. To review the ultimate parking space capacity per lot, we verify what each lot could service, considering the absorption field allocation of 600 m^2 = 20 m X 30 m as per typical sketch in Figure C-1, in terms of number of employees. Those are based on the following assumptions:

- Unit flow rate per employee per 8-hour shift is 75 liters (from Ontario Building Code)
- Unit flow rate for the trucker toilet is 950 liters per day (from Ontario Building Code).
- Total flow rate is twice the theoretical domestic sewage flow rate, to consider concentrate release by the reverse osmosis filter.
- A 50% safety factor has been applied.
- Tertiary treatment is provided, to maximize hydraulic loading, and serviced population, within the septic field.

Table C-2: Estimated Maximum Number of Employees per Industrial Lot, for a 20 m X 30 m Septic Field

Lot No.	Percolation Time (min/cm)	Max number of employees, for a 20 m X 30 m septic field	Corresponding daily flow rate, including Reverse Osmosis concentrate (L/d)
1	10	59	10750
2	10	59	10750
3	14	40	7900
4	10	59	10750
5	7	84	14500
6	7	84	14500
7	7	84	14500

Note: Lot no. 8 is dedicated to the stormwater management pond and will not have a septic system.

It is possible to reach higher number of employees, by maximizing the ground level area dedicated to parking space while still maintaining adequate buffer up to the property limit, the building, the septic system, and the stormwater ditches. The following table shows an estimate of the maximum number of employees at each lot, with the corresponding daily sewage flow rate.

Table C-3: Estimated Maximum Number of Employees per Industrial Lot, based on parking space capacity.

Lot No.	Maximum number of cars	Corresponding daily flow rate, including Reverse Osmosis concentrate (L/d)
1	159	25750
2	173	27850
3	159	25750
4	180	28900
5	180	28900
6	194	31000
7	187	29950

Those values are above the estimated capacity of the theoretical 20 m X 30 m septic field. Practically, each site could be developed to support such number of employees, provided the septic field area be increased accordingly at the front end of the lot.

Beyond these surface land occupancy issues, we shall consider the impact of converting most of the lot surface into impermeable surface (at the building, parking lot and driveway). This would reduce the net transfer of rainwater to the aquifer, with associated impact on the aquifer regeneration capacity.

APPENDIX D

SCS Curve Number Determination

SWMF Design Calculations

SWMHYMO Input and Output Files

Swale Sizing Calculations

2509 Cedar Creek Road (161414214)
NRCS (SCS) Curve Number Determination

TABLE OF CURVE NUMBERS (CN's)									
		Hydrologic Soil Type							Manning's
Land Use		A	AB	B	BC	C	CD	D	'n'
Meadow	"Good"	30	44	58	64.5	71	74.5	78	0.40
Woodlot	"Fair"	36	48	60	66.5	73	76	79	0.40
Gravel		76	80.5	85	87	89	90	91	0.30
Lawns	"Good"	39	50	61	67.5	74	77	80	0.25
Pasture/Range		58	61.5	65	70.5	76	78.5	81	0.17
Crop		66	70	74	78	82	84	86	0.13
Fallow (Bare)		77	82	86	89	91	93	94	0.05
Impervious		98	98	98	98	98	98	98	0.01

1. MTO Drainage Manual (1997), Design Chart 1.09-Soil/Land Use Curve Numbers
2. Chin (2000), Water-Resources Engineering, Table 6.13-Curve Numbers for Various Urban Land Uses

HYDROLOGIC SOIL TYPE (%)								
	Hydrologic Soil Type							
Catchment	A	AB	B	BC	C	CD	D	TOTAL
Existing Conditions								
105		100						100
106		100						100
103		100						100
102		100						100
100		100						100
104		100						100
/		100						100
101		100						100
Proposed Conditions								
200		100						100
201		100						100
202		100						100
203		100						100
204		100						100
205		100						100
206		100						100
208		100						100
207		100						100
102		100						100
103		100						100
100		100						100
104		100						100
101		100						100

LAND USE (%)									
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Impervious	Total
Existing Conditions									
105		8		8		78		6	100
106						100			100
103				20				80	100
102				20				80	100
100				20				80	100
104						100			100
101				40				60	100
Proposed Conditions									
200				100					100
201				10				90	100
202				10				90	100
203				100					100
204				10				90	100
205				85				15	100
206				100					100
208				100				0	100
207				100					100
102				20				80	100
103				20				80	100
100				20				80	100
104						100			100
101				40				60	100

CURVE NUMBER (CN)										
Catchment	Meadow	Woodlot	Gravel	Lawns	Pasture Range	Crop	Fallow (Bare)	Impervious	Weighted CN	Pervious CN
Existing Conditions										
105	0	4	0	4	0	55	0	6	68	66
106	0	0	0	0	0	70	0	0	70	70
103	0	0	0	10	0	0	0	78	88	50
102	0	0	0	10	0	0	0	78	88	50
100	0	0	0	10	0	0	0	78	88	50
104	0	0	0	0	0	70	0	0	70	70
101	0	0	0	20	0	0	0	59	79	50
Proposed Conditions										
200	0	0	0	50	0	0	0	0	50	50
201	0	0	0	5	0	0	0	88	93	50
202	0	0	0	5	0	0	0	88	93	50
203	0	0	0	50	0	0	0	0	50	50
204	0	0	0	5	0	0	0	88	93	50
205	0	0	0	43	0	0	0	15	57	50
206	0	0	0	50	0	0	0	0	50	50
208	0	0	0	50	0	0	0	0	50	50
207	0	0	0	50	0	0	0	0	50	50
102	0	0	0	10	0	0	0	78	88	50
103	0	0	0	10	0	0	0	78	88	50
100	0	0	0	10	0	0	0	78	88	50
104	0	0	0	0	0	70	0	0	70	70
101	0	0	0	20	0	0	0	59	79	50

** AMC II assumed
** Hydrological Soil Group taken from MTO Drainage Manual for each soil type

2509 Cedar Creek Road (161414214)
SWMHYMO Parameters

Existing Conditions

Area Description	Catchment ID	SWMHYMO Command	Area (ha)	CN	TIMP	XIMP	Start of path elevation	End of path elevation	Slope (%)	Length (m)	Pervious RC	Tc (hrs)	Tp (hrs)
Agricultural area in the north portion of the site with house and driveway, draining to agricultural land to the east and eventually to creek	105	DESIGN NASHYD	7.06	68	0.06		316.0	305.5	3.5%	300	0.22	0.55	0.33
Agricultural area in the south portion of the site draining to agricultural land to the south and eventually to creek	106	DESIGN NASHYD	11.00	70	0.00		314.0	301.0	2.2%	600	0.22	0.91	0.54
External catchment west of the site, containing a portion of existing industrial property, draining east into the site and ultimately flowing south	103	DESIGN STANDHYD	4.52	50	0.80	0.50	319.0	310.0	5.3%	170			
Large external catchment west of site, containing exisiting industrial property draining into private SWM feature and then onto site and ultimately flowing south	102	DESIGN STANDHYD	12.64	50	0.80	0.50	338.0	315.0	3.1%	750			
Large external catchment of industrial property and part of Hwy 401 north of the site, draining south into the site and flowing out to the east.	100	CALIB STANDHYD	55.94	50	0.80	0.20	338.0	311.5	1.5%	1750	Pervious Slope = 2%, Pervious Length = 30m	MNP: 0.25, MNI: 0.025	IAper: 5mm, IAimp: 2mm
External agricultural area to the north-east of site draining to site and subsequently to agricultural area to the east	104	DESIGN NASHYD	0.73	70	0.00		318.0	314.5	3.5%	100	0.22	0.32	0.19
External catchment containing some of Cedar Creek Road, some industrial property, and a grassed area near Hwy 401 off-ramp, entering site in the north and draining overland to the east.	101	CALIB STANDHYD	14.55	50	0.60	0.15	338.0	313.5	2.3%	1050	Pervious Slope = 2%, Pervious Length = 30m	MNP: 0.25, MNI: 0.025	IAper: 5mm, IAimp: 2mm

Proposed Conditions

Area Description	Catchment ID	SWMHYMO Command	Area (ha)	CN	TIMP	XIMP	Start of path elevation	End of path elevation	Slope (%)	Length (m)	Pervious RC	Tc (hrs)	Tp (hrs)
Small catchment in in northwest corner of property comprising a small portion of the West Road Ditch, draining to storm sewer and discharging uncontrolled to the east	200	DESIGN NASHHYD	0.14	50	0.00				1.5%	90	0.15	0.43	0.26
Small catchment in the northwest corner of property containing a portion of the East Road Ditch and developed land, draining to storm sewer and discharging uncontrolled to the east.	201	DESIGN STANDHYD	0.64	50	0.90	0.50			2.0%	75			
Large catchment of developed area covering the east portion of the site, draining to Rear Lot Ditch and entering the SWMF through the East Forebay	202	DESIGN STANDHYD	8.82	50	0.90	0.80			2.0%	115			
Small catchment on the east side of the site containing By Pass Storm Sewer outlet and plunge pool, draining offsite to the east	203	DESIGN NASHYD	0.55	50	0.00				2.0%	10	0.15	0.13	0.08
Large catchment of impervious area, draining to the west and into the East Road Ditch, entering the SWMF through the West Forebay.	204	DESIGN STANDHYD	4.92	50	0.90	0.80			2.0%	80			
SWM pond, located in south portion of the property	205	DESIGN NASHYD	1.63	57	0.15				2.0%	200	0.15	0.58	0.35
Grassed swale (West Road Ditch), located on the far west side of the property, directing flows around the SWMF and to the Outlet Channel at the southeast corner of the property.	206	DESIGN NASHYD	1.22	50	0.00				1.5%	900	0.15	1.35	0.81
Constructed conveyance channel (Outlet Channel), directing flows to Cedar Creek in the northeast	208	DESIGN NASHYD	1.13	50	0.00	0.00	302.00	296.50	0.01	725.00	0.22	1.41	0.85
Small catchment south of the SWMF, draining offsite to the south	207	DESIGN NASHYD	0.14	50	0.00				2.0%	7	0.15	0.11	0.07
Large external industrial area west of site, draining into private SWM feature and then entering swale, routing flows around SWMF to conveyance channel to Cedar Creek.	102	DESIGN STANDHYD	12.64	50	0.80	0.50	338.00	315.00	3.1%	750			
External catchment west of the site, containing a portion of existing industrial property, draining east into the site and ultimately flowing south to swale around SWM pond	103	DESIGN STANDHYD	4.52	50	0.80	0.50	319.00	310.00	5.3%	170			
Large external catchment of industrial property and part of Hwy 401 north of the site, draining south into the site and flowing out to the east.	100	CALIB STANDHYD	55.94	50	0.80	0.20	338.00	311.50	1.5%	1750	Pervious Slope = 2%, Pervious Length = 30m	MNP: 0.25, MNI: 0.025	IAper: 5mm, IAimp: 2mm
external catchment at the northeast corner of the site, draining to the site and following rear-lot swale, entering SWMF at its northeast inlet.	104	DESIGN NASHYD	0.73	70	0.00		318.0	314.5	3.5%	100	0.22	0.32	0.19
External catchment containing some of Cedar Creek Road, existing industrial property, and a grassed area near Hwy 401 off-ramp, entering storm sewer on site and draining to the east.	101	CALIB STANDHYD	14.55	50	0.60	0.15	338.00	313.50	2.3%	1050	Pervious Slope = 2%, Pervious Length = 30m	MNP: 0.25, MNI: 0.025	IAper: 5mm, IAimp: 2mm
		Total to SWM Pond	16.10		78%								
		Total developed area to SWM pond											

Notes:

CN calculated for pervious areas only for DESIGN STANDHYD. CN is a weighted average for DESIGN NASHYD

TIMP ..... *Total percent impervious*

XIMP ..... *Percent impervious directly connected*

Time of Concentration calculated using the Airport Method ..... $Tc = [3.26 (1.1-C) L^{0.5}] / S^{0.33}$

Where: *C = Runoff Coefficient = 0.22 or 0.15 according to MTO Design chart 1.07 for 'cultivated' or 'lawn' on sandy soil*
L = Length of Overland Flow (m)
S = Slope (%)

Time to Peak (hr) ..... $Tp = 0.6Tc$

2509 Cedar Creek Road (161414214)
Stormwater Management Facility Design Calculations

	Rating Curve										Volume Estimation						
			Infiltration			Surface Discharge			Total Pond			Infiltration Basin					
	Elevation (m)		Infiltration (m^3/s)	Volume	Infiltration Drawdown (hrs)	Surface Discharge (m^3/s)	Active (m^3)	Surface Drawdown (hrs)	Total Storage (m^3)	Total Drawdown (hrs)	Elevation (m)	Area (m^2)	Total Volume (m^3)	Elevation (m)	Overflow Spillway (m^3/s)	Total Flow	Parameters
Maximum sedimentation depth	301.50		0.044								301.50	5439		301.50			High Flow Weir
	301.60	0.10	0.044	553	3.5				553	3.5	301.60	5636	553	301.60			Spillway Invert (m) / Top of Berm (m)
	301.70	0.20	0.044	1124	7.1				1,124	7.1	301.70	5838	1,124	301.70			302.50 / 303.00
	301.80	0.30	0.044	1718	10.9				1,941	10.9	301.80	6035	1,718	301.80			Spillway Length @ Invert (m) / Max. Flow Depth (m)
	301.90	0.40	0.044	2326	14.7				2,784	14.7	301.90	6233	2,326	301.90			3 / 0.50
	302.00	0.50	0.044	2954	18.7				3,665	18.7	302.00	6438	2,954	302.00			Side Slopes (ratio of H:V) / Topwidth
	302.10	0.60	0.044	3595	22.8				4,574	22.8	302.10	6579	3,595	302.10			10.00 / 13.00
	302.20	0.70	0.044	4245	26.9				5,503	26.9	302.20	6722	4,245	302.20			Weir Coefficient (Rectangle) / Weir Coeff. (Triangle)
	302.30	0.80	0.044	4906	31.1				6,451	31.1	302.30	6864	4,906	302.30			1.70 / 1.30
	302.40	0.90	0.044	5575	35.3				7,416	35.3	302.40	7007	5,575	302.40			Infiltration
	302.50	1.00	0.044	6364	40.3				8,575	40.3	302.50	7157	6,364	302.50			Infiltration Footprint (m^2)
	302.60	1.10				0.202	1,059	1.5	9,633	41.8	302.60	7306	7,087	302.60	0.202	0.202	5439
	302.70	1.20				0.689	2,141	2.1	10,716	42.5	302.70	7450	7,824	302.70	0.689	0.689	Factored Infiltration Rate (mm/hr)
	302.80	1.30				1.479	3,245	2.4	11,819	42.8	302.80	7593	8,571	302.80	1.479	1.479	29
	302.90	1.40				2.606	4,367	2.6	12,942	42.9	302.90	7735	9,329	302.90	2.606	2.606	Infiltration Rate (m^3/s)
Top of pond	303.00	1.50				4.101	5,560	2.7	14,135	43.0	303.00	7877	10,124	303.00	4.101	4.101	0.044

Notes:

Drawdown Time Calculations

Greater than 0.1 m above the permanent pool

$T=[v_2-v_1]/[(Q_2+Q_1)/2]/3600$

where

T=drawdown time in hours
v1=starting pond volume
v_2=ending pond volume
Q_2=starting flow
Q_1=ending flow

From 0.0 to 0.1 m above the permanent pool

$T=[v_2-v_1]/[(Q_2)]/3600$

where

T=drawdown time in hours
v1=starting pond volume
v_2=ending pond volume
Q_2=starting flow

Weir Equation Used: $Q = C_{wb}*L*H^{1.5} + C_{wt}*S*H^{2.5}$

where

L = bottom width of spillway
H = head above weir invert
S = side slopes (ratio of H:V)
C_{wt} = weir coefficient (triangular)
C_{wb} = weir coefficient (broad-crested)

2509 Cedar Creek Road (161414214)
External Stormwater Management Facility Design Calculations*

Rating Curve										Volume Estimation			Elevation (m)			Parameters	
		Infiltration			Surface Discharge			Total Pond			Infiltration Basin			Overflow Spillway (m³/s)	Total Flow		
Elevation (m)		Infiltration (m³/s)	Volume	Infiltration Drawdown (hrs)	Surface Discharge (m³/s)	Active (m³)	Surface Drawdown (hrs)	Total Storage (m³)	Total Drawdown (hrs)	Elevation (m)	Area (m²)	Total Volume (m³)					
312.00		0.018	438	6.9						312.00	1,750	438	312.00			High Flow Weir	
312.10	0.10	0.018	639	10.1				438	10.1	312.10	2,286	639	312.10			Spillway Invert (m)	Top of Berm (m)
312.20	0.20	0.018	861	13.7				639	13.7	312.20	2,142	861	312.20			313.20	314.00
312.30	0.30	0.018	1100	17.5				861	17.5	312.30	2,649	1,100	312.30			Spillway Length @ Invert (m)	Max. Flow Depth (m)
312.40	0.40	0.018	1340	21.3				1,100	21.3	312.40	2,142	1,340	312.40			10	0.80
312.50	0.50	0.018	1610	25.6				1,340	25.6	312.50	3,265	1,610	312.50			Side Slopes (ratio of H:V)	Topwidth
312.60	0.60	0.018	1884	29.9				1,610	29.9	312.60	2,219	1,884	312.60			3.00	14.80
312.70	0.70	0.018	2171	34.5				1,884	30.1	312.70	3,507	2,171	312.70			Weir Coefficient (Rectangle)	Weir Coeff. (Triangle)
312.80	0.80	0.018	2474	39.3				2,171	30.2	312.80	2,567	2,474	312.80			1.70	1.30
312.90	0.90	0.018	2778	44.1				2,474	30.2	312.90	3,507	2,778	312.90			Infiltration	
313.00	1.00	0.018	3094	49.1				2,778	30.3	313.00	2,811	3,094	313.00			Infiltration Footprint (m²)	
313.10	1.10	0.018	3427	54.4				3,094	30.3	313.10	3,844	3,427	313.10			1750	
313.20	1.20	0.018	3759	59.7				3,427	30.3	313.20	2,811	3,759	313.20			Factored Infiltration Rate (mm/hr)	
313.30	1.30				0.550	366	0.18	3,759	30.3	313.30	4,506	4,125	313.30	0.550	0.550	36	
313.40	1.40				1.590	756	0.29	4,125	30.3	313.40	3,289	4,515	313.40	1.590	1.590	Infiltration Rate (m³/s)	
313.50	1.50				2.986	1,145	0.33	4,515	29.9	313.50	4,506	4,905	313.50	2.986	2.986	0.018	
313.60	1.60				4.695	1,535	0.36			313.60	3,289	5,294	313.60	4.695	4.695		
313.70	1.70				6.700	1,959	0.38			313.70	5,184	5,718	313.70	6.700	6.700		
313.80	1.80				8.988	2,407	0.40			313.80	3,781	6,166	313.80	8.988	8.988		
313.90	1.90				11.555	2,855	0.41			313.90	5,184	6,615	313.90	11.555	11.555		
314.00	2.00				14.397	3,304	0.42			314.00	3,781	7,063	314.00	14.397	14.397		

Notes:

Drawdown Time Calculations Greater than 0.1 m above the permanent pool

$T=[v_2-v_1]/[(Q_2+Q_1)/2]/3600$

where

T=drawdown time in hours

v_2=starting pond volume

v_2=ending pond volume

Q_2=starting flow

Q_1=ending flow

From 0.0 to 0.1 m above the permanent pool

$T=[v_2-v_1]/[(Q_2)]/3600$

where

T=drawdown time in hours

v_2=starting pond volume

v_2=ending pond volume

Q_2=starting flow

Weir Equation Used: $Q = C_{wb}*L*H^{1.5} + C_{wt}*S*H^{2.5}$

where

L = bottom width of spillway

H = head above weir invert

S = side slopes (ratio of H:V)

C_{wt} = weir coefficient (triangular)

C_{wb} = weir coefficient (broad-crested)

Orifice Flow Calculations: Orifice flow equation

$Q = C \cdot A \cdot (2 \cdot g \cdot H)^{0.5}$

where

C = orifice coefficient

A = area of orifice

g = acceleration due to gravity

H = head above centre line of orifice

Note: used when water elevation is above 3/4 of the orifice diameter

Sharp crested semi-circular weir equation

Sharp crested semi-circular weir equation

$Q=C*D^{2.5}*(H/D)^{1.588}$

where

C = sharp crested semi-circular weir coefficient

D = diameter of orifice

H = head above orifice invert

Note: used when water elevation is below 3/4 of the orifice diameter

*External SWM Facility modelled according to assumptions made based on LiDAR data and the surrounding soil characteristics

2509 Cedar Creek Road (161414214)

Sediment Forebay Sizing Calculations

Using MOE - SWMPD Manual (2003)

East Forebay

Dispersion Length

Dist = 8Q/dv

= 41 m

y_s = total depth of sediment in forebay (m)	y_s =	0.5	
Q = inlet flow (m^3/s)	Q =	2.294	Note 1.
d = depth of perm pool in forebay above y_s (m)	d =	0.9	
v_f = desired vel in forebay (m/s)	v_f =	0.5	

West Forebay)

Dispersion Length

Dist = 8Q/dv

= 24 m

y_s = total depth of sediment in forebay (m)	y_s =	0.5	
Q = inlet flow (m^3/s)	Q =	1.323	Note 1.
d = depth of perm pool in forebay above y_s (m)	d =	0.9	
v_f = desired vel in forebay (m/s)	v_f =	0.5	

East Forebay

Cleanout Frequency

Table 5.3 MOEE SWMPP Guidelines

cleanout = Vol/(load*A_{sew}*effic)

= 7.2 years

A_{sew} = Contributing Sewer Area (ha)	A_{sew} =	9.55	
Imp = Percent Impervious (%)	Imp =	80%	
load = Sediment Loading (m^3/ha)	load =	3.4	
effic = Removal Efficiency (%) - Level 1	effic =	80%	
Targ = Cleanout Frequency Target (years)	Targ =	7	
Vol = Sediment volume (m^3)	Vol =	187	Note 2.

Therefore, **Cleanout Frequency Satisfied**

West Forebay

Cleanout Frequency

Table 5.3 MOEE SWMPP Guidelines

cleanout = Vol/(load*A_{sew}*effic)

= 9.5 years

A_{sew} = Contributing Sewer Area (ha)	A_{sew} =	4.92	
Imp = Percent Impervious (%)	Imp =	80%	
load = Sediment Loading (m^3/ha)	load =	3.4	
effic = Removal Efficiency (%) - Level 1	effic =	80%	
Targ = Cleanout Frequency Target (years)	Targ =	7	
Vol = Sediment volume (m^3)	Vol =	127	Note 2.

Therefore, **Cleanout Frequency Satisfied**

Notes

1. Peak inlet flows to SWM facility based on SWMHYMO modelling (5-year storm)
2. Volume of bottom 0.5 m depth, the maximum sediment accumulation depth

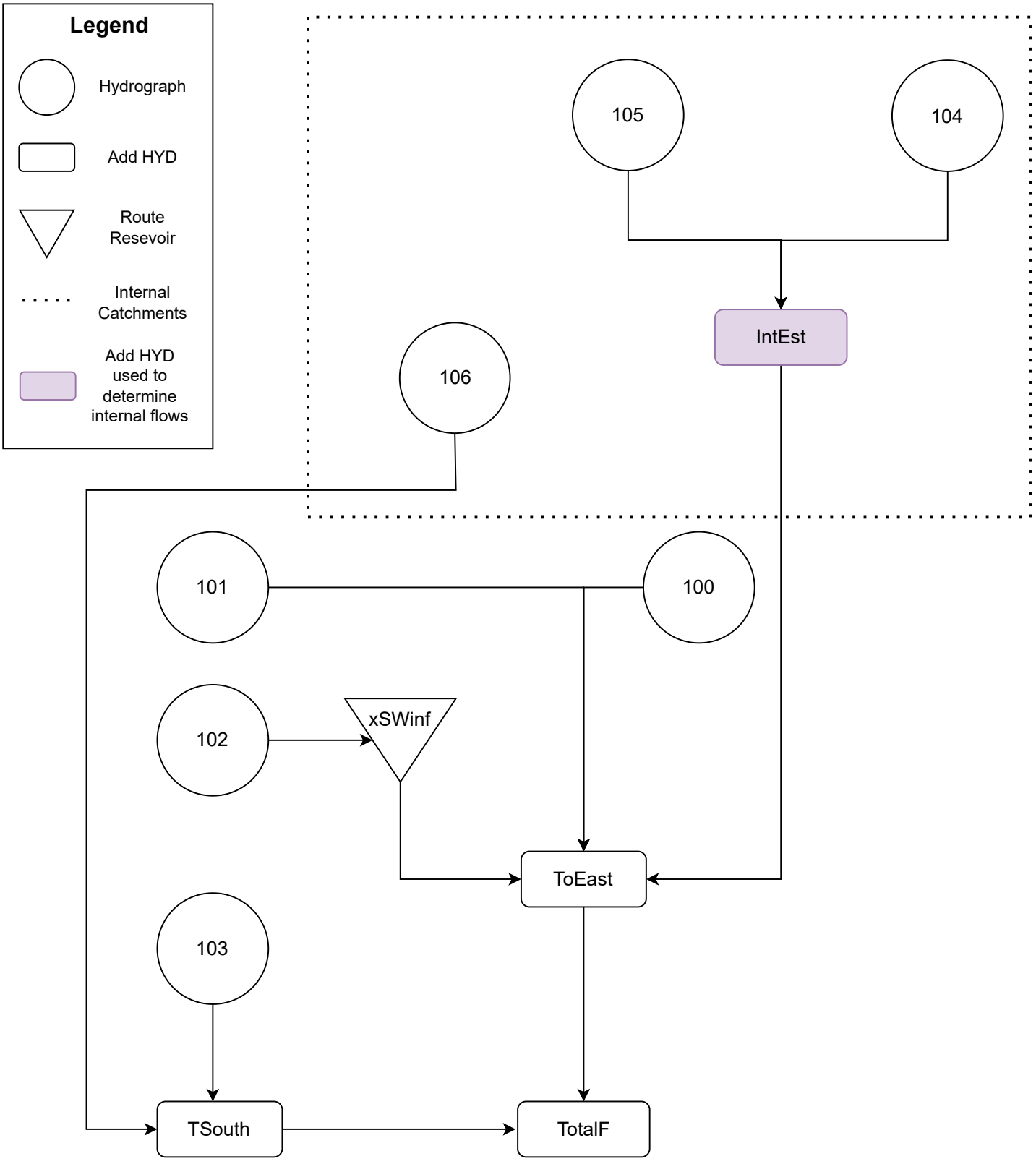
2509 Cedar Creek Road (161414214)

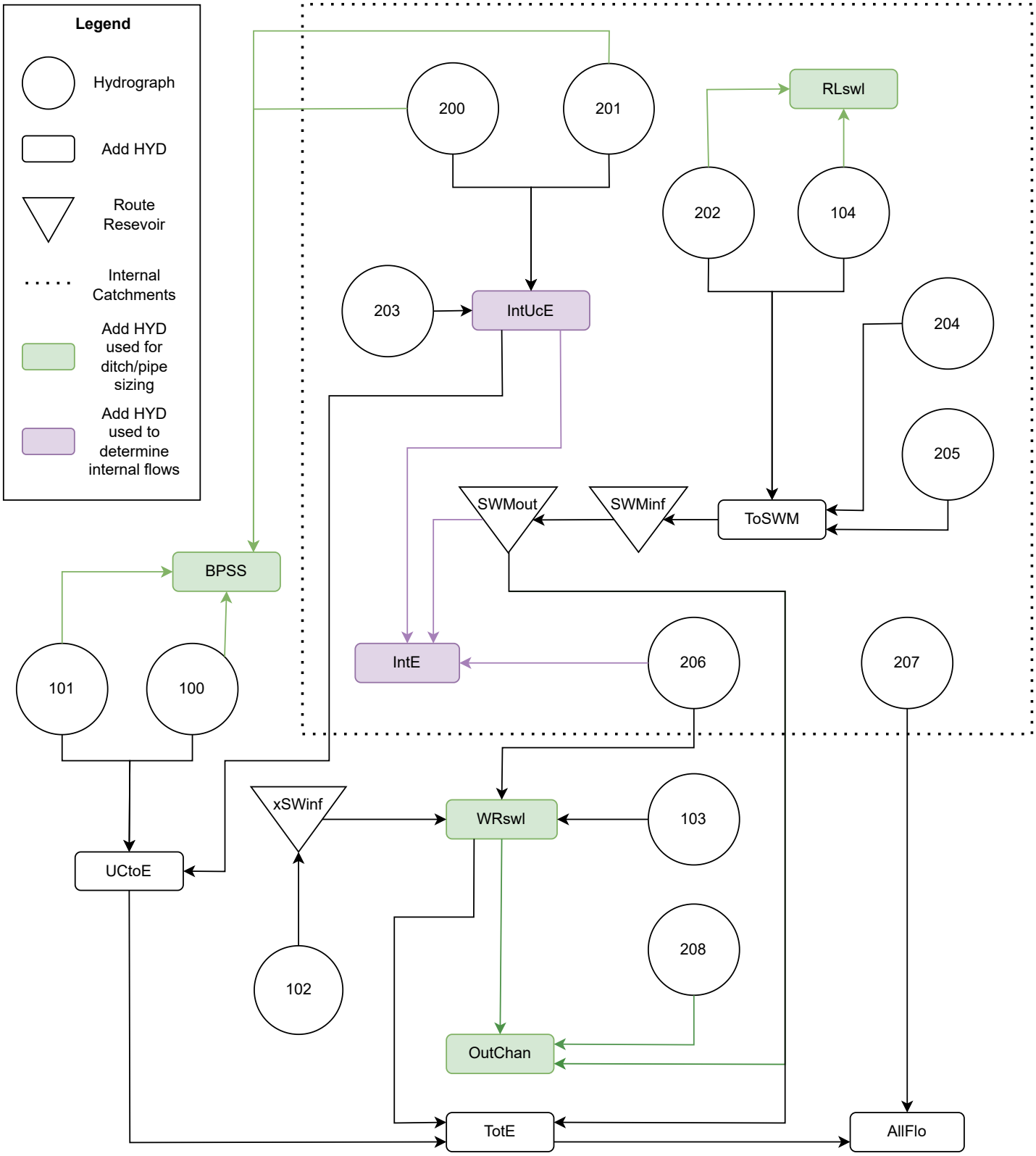
Stormwater Quality Volumetric Requirements (Future Conditions)

Drainage Area (ha)[2]	Total % Imp.	Level	Facility Type	Water Quality Unit Volume Requirements [1]	Water Quality Volume Requirements
				Total Unit Volume (m^3/ha)	Total MOE Volume
16.10	78%	Enhanced	Infiltration	38	608

[1] Water quality unit volume requirements based on Table 3.2, Stormwater Management Planning & Design Manual (MOE 2003)

[2] Drainage Area for Quality control represents total storm sewer drainage area to SWM Facility and includes the area of the SWM block itself and external area draining onto site


Legend
Hydrograph
Add HYD
Route Resevoir
Internal Catchments
Add HYD used to determine internal flows
105
104
IntEst
106
101
100
102
xSWinf
ToEast
103
TSouth
TotalF


Legend
Hydrograph
Add HYD
Route Resevoir
Internal Catchments
Add HYD used for ditch/pipe sizing
Add HYD used to determine internal flows
200
201
RLswl
202
104
203
IntUcE
204
205
SWMout
SWMinf
ToSWM
BPSS
101
100
IntE
206
207
xSWinf
WRswl
103
UCtoE
208
102
OutChan
TotE
AllFlo

```
00001> 2     Metric units
00002> *#*****************************************************************************
00003> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project # : [161414214]
00004> *#  Date        : 11-18-2024
00005> *#  Modeller    : [Amy Kyle]
00006> *#  Company     : Stantec Consulting Ltd. (Waterloo)
00007> *#  License #   : 4730904
00008> *#
00009> *#  This hydrologic analysis prepared to provide pond sizing
00010> *#  for the 2509 Cedar Creek Road SWM Facility
00011> *#  The storm events modelled are:
00012> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
00013> *#  and the Regional Event
00014> *#*****************************************************************************
00015> START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
00016> *%                   ["Kit25mm.4hr"] <--storm filename, one per line for NSTORM
00017> *%-----------------|-------------------------------------------------------|
00018> READ STORM          STORM_FILENAME=["STORM.001"]
00019> *%-----------------|-------------------------------------------------------|
00020> *#=================================================================================
00021> *# Pre-Development Drainage Area (Internal Catchments)
00022> *#=================================================================================
00023> *#-----------------|-------------------------------------------------------|
00024> *#
00025> *#                    Existing internal area draining to the east
00026> *#
00027> *#-----------------|-------------------------------------------------------|
00028> DESIGN NASHYD       ID=[1], NHYD=["105"], DT=[1]min, AREA=[7.06](ha),
00029>                     DWF=[0](cms), CN/C=[68], TP=[0.33]hrs,
00030>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00031> *%-----------------|-------------------------------------------------------|
00032> *#
00033> *#    Small external area entering site from east and draining south / east
00034> *#
00035> *#-----------------|-------------------------------------------------------|
00036> DESIGN NASHYD       ID=[2], NHYD=["104"], DT=[1]min, AREA=[0.73](ha),
00037>                     DWF=[0](cms), CN/C=[70], TP=[0.19]hrs,
00038>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00039> *#-----------------|-------------------------------------------------------|
00040> *#
00041> *#                      Total existing area draining to the east
00042> *#
00043> *#-----------------|-------------------------------------------------------|
00044> ADD HYD             IDsum=[3], NHYD=["IntEst"], IDs to add=[1+2]
00045> *%-----------------|-------------------------------------------------------|
00046> *#
00047> *#                    Existing internal area draining to the south
00048> *#
00049> *#-----------------|-------------------------------------------------------|
00050> DESIGN NASHYD       ID=[4], NHYD=["106"], DT=[1]min, AREA=[11.00](ha),
00051>                     DWF=[0](cms), CN/C=[70], TP=[0.54]hrs,
00052>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00053> *%-----------------|-------------------------------------------------------|
00054> *#=================================================================================
00055> *# Total Pre-Development Drainage Area (Including Large External Catchments)
00056> *#=================================================================================
00057> *#-----------------|-------------------------------------------------------|
00058> *#
00059> *#  External industrial catchment and part of Hwy 401, draining south into the
00060> *#                      site and flowing south / east.
00061> *#
00062> *#-----------------|-------------------------------------------------------|
00063> CALIB STANDHYD      ID=[2], NHYD=["100"], DT=[1](min), AREA=[55.94](ha),
00064>                     XIMP=[0.20], TIMP=[0.80], DWF=[0](cms), LOSS=[2],
00065>                     SCS curve number CN=[50],
00066>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00067>                                          LGP=[30](m), MNP=[0.25], SCP=[0](min),
00068>                     Impervious surfaces: IAimp=[2](mm), SLPI=[1.5](%),
00069>                                          LGI=[1750](m), MNI=[0.025], SCI=[0](min
00070>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00071> *#*%----------------|-------------------------------------------------------
00072> *#
00073> *#  External catchment containing a portion of Cedar Creek Road, a portion of
00074> *#         industrial area, and a grassed area near Hwy 401 off-ramp,
00075> *#            draining south into site and flowing south / east.
00076> *#
00077> *#-----------------|-------------------------------------------------------|
00078> CALIB STANDHYD      ID=[6], NHYD=["101"], DT=[1](min), AREA=[14.55](ha),
00079>                     XIMP=[0.15], TIMP=[0.60], DWF=[0](cms), LOSS=[2],
00080>                     SCS curve number CN=[50],
00081>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00082>                                          LGP=[30](m), MNP=[0.25], SCP=[0](min),
00083>                     Impervious surfaces: IAimp=[2](mm), SLPI=[2.3](%),
00084>                                          LGI=[1050](m), MNI=[0.025], SCI=[0](min
00085>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00086> *%-----------------|-------------------------------------------------------|
00087> *#
00088> *# External catchment west of site, containing exisiting industrial
00089> *# property draining into private SWM feature and then onto site flowing east
00090> *#
00091> *#-----------------|-------------------------------------------------------|
00092> DESIGN STANDHYD     ID=[7], NHYD=["102"], DT=[1]min, AREA=[12.64](ha),
00093>                     XIMP=[0.50], TIMP=[0.80], DWF=[0](cms), LOSS=[2], CN=[50],
00094>                     SLOPE=[3.1](%), RAINFALL=[ , , , , ](mm/hr), END=-1
00095> *#-----------------|-------------------------------------------------------|
00096> *#
00097> *#                     Infiltration in External SWM Feature
00098> *#
00099> *#-----------------|-------------------------------------------------------|
00100> ROUTE RESERVOIR     IDout=[8],   NHYD=["xSWinf"],  IDin=[7],
00101>                     RDT=[1](min),
00102>                          TABLE of ( OUTFLOW-STORAGE ) values
00103>                                     (cms) - (ha-m)
00104>                                   [   0.0   ,  0.0 ]
00105>                                   [   0.018 ,  0.0438 ]
00106>                                   [   0.018 ,  0.3759 ]
00107>                                   [   -1  ,  -1  ]  (max twenty pts)
00108>                          IDovf=[9], NHYDovf=["OVF-xI"]
00109> *%-----------------|-------------------------------------------------------|
00110> *#
00111> *#                     Total existing area draining to the east
00112> *#
00113> *#-----------------|-------------------------------------------------------|
00114> ADD HYD             IDsum=[5], NHYD=["ToEast"], IDs to add=[2+3+6+9]
00115> *#-----------------|-------------------------------------------------------|
00116> *#
00117> *# External catchment west of the site, containing a portion of existing
00118> *# industrial property, draining east into the site and flowing south.
00119> *#
00120> *#-----------------|-------------------------------------------------------|
00121> DESIGN STANDHYD     ID=[1], NHYD=["103"], DT=[1]min, AREA=[4.52](ha),
00122>                     XIMP=[0.50], TIMP=[0.80], DWF=[0](cms), LOSS=[2], CN=[50],
00123>                     SLOPE=[5.3](%), RAINFALL=[ , , , , ](mm/hr), END=-1
00124> *#-----------------|-------------------------------------------------------|
00125> *#
00126> *#                           Total Flows to the south
00127> *#
00128> *#-----------------|-------------------------------------------------------|
00129> ADD HYD             IDsum=[2], NHYD=["TSouth"], IDs to add=[4+1]
00130> *%-----------------|-------------------------------------------------------|
00131> *#
00132> *#                 Total Flows from site (eventually to Cedar Creek)
00133> *#
00134> *#-----------------|-------------------------------------------------------|
00135> ADD HYD             IDsum=[3], NHYD=["TotalF"], IDs to add=[5+2]
00136> *%-----------------|-------------------------------------------------------|
00137> *%-----------------|-------------------------------------------------------|
00138> START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[2]
00139> *                   ["Kit2yr.3hr"] <--storm filename, one per line for NSTORM ti
00140> *%-----------------|-------------------------------------------------------|
00141> START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[5]
00142> *                   ["Kit5yr.3hr"] <--storm filename, one per line for NSTORM ti
00143> *%-----------------|-------------------------------------------------------|
00144> START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[10]
00145> *                   ["Kit10yr.3hr"] <--storm filename, one per line for NSTORM t
00146> *%-----------------|-------------------------------------------------------|
00147> START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[25]
00148> *                   ["Kit25yr.3hr"] <--storm filename, one per line for NSTORM t
00149> *%-----------------|-------------------------------------------------------|
00150> START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[50]
00151> *                   ["Kit50yr.3hr"] <--storm filename, one per line for NSTORM t
00152> *%-----------------|-------------------------------------------------------|
00153> START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[100
00154> *                   ["Kit100yr.3hr"] <--storm filename, one per line for NSTORM
00155> *%-----------------|-------------------------------------------------------|
00156> START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[500
00157> *                   ["hurhaz48.stm"] <--storm filename, one per line for NSTORM
00158> *%-----------------|-------------------------------------------------------|
00159> FINISH
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00001> 2     Metric units
00002> *#************************************************************************
00003> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project #: [161414214]
00004> *#  Date        : 11/13/2024
00005> *#  Modeller    : [Amy Kyle]
00006> *#  Company     : Stantec Consulting Ltd. (Waterloo)
00007> *#  License #   : 4730904
00008> *#
00009> *#  This hydrologic analysis prepared to provide pond sizing
00010> *#  for the 2509 Cedar Creek Road SWM Facility
00011> *#  The storm events modelled are:
00012> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
00013> *#  and the Regional Event
00014> *#************************************************************************
00015> START              TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[1]
00016> *%                  ["Kit25mm.4hr"] <--storm filename, one per line for NSTORM
00017> *%-----------------|-------------------------------------------------------|
00018> READ STORM          STORM_FILENAME=["STORM.001"]
00019> *#-----------------|-------------------------------------------------------|
00020> *#=======================================================================
00021> *# Proposed Drainage Conditions (Internal Areas)
00022> *#=======================================================================
00023> *#-----------------|-------------------------------------------------------|
00024> *#
00025> *#    Small portion of West Road Ditch draining offsite to the east through
00026> *#                          By-Pass Storm Sewer(BPSS)
00027> *#
00028> *#-----------------|-------------------------------------------------------|
00029> DESIGN NASHYD       ID=[1], NHYD=["200"], DT=[1]min, AREA=[0.14](ha),
00030>                     DWF=[0](cms), CN/C=[50], TP=[0.26]hrs,
00031>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00032> *#-----------------|-------------------------------------------------------|
00033> *#
00034> *#  Proposed developed catchment draining offsite to the east through BPSS
00035> *#
00036> *#-----------------|-------------------------------------------------------|
00037> DESIGN STANDHYD     ID=[2], NHYD=["201"], DT=[1]min, AREA=[0.64](ha),
00038>                     XIMP=[0.50], TIMP=[0.90], DWF=[0](cms), LOSS=[2], CN=[50],
00039>                     SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
00040> *#-----------------|-------------------------------------------------------|
00041> *#
00042> *# Proposed internal grassed area and plunge pool draining offsite to the east
00043> *#
00044> *#-----------------|-------------------------------------------------------|
00045> DESIGN NASHYD       ID=[3], NHYD=["203"], DT=[1]min, AREA=[0.55](ha),
00046>                     DWF=[0](cms), CN/C=[50], TP=[0.08]hrs,
00047>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00048> *#-----------------|-------------------------------------------------------|
00049> *#
00050> *#          Total internal area draining onto agricultural area to the east
00051> *#
00052> *#-----------------|-------------------------------------------------------|
00053> ADD HYD             IDsum=[5], NHYD=["IntUcE"], IDs to add=[1+2+3]
00054> *#-----------------|-------------------------------------------------------|
00055> *#
00056> *#             Proposed industrial lots draining to Rear Lot Ditch
00057> *#
00058> *#-----------------|-------------------------------------------------------|
00059> DESIGN STANDHYD     ID=[10], NHYD=["202"], DT=[1]min, AREA=[8.82](ha),
00060>                     XIMP=[0.80], TIMP=[0.90], DWF=[0](cms), LOSS=[2], CN=[50],
00061>                     SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
00062> *#-----------------|-------------------------------------------------------|
00063> *#
00064> *#    External agricultural area draining onsite and entering Rear Lot Ditch
00065> *#
00066> *#-----------------|-------------------------------------------------------|
00067> DESIGN NASHYD       ID=[7], NHYD=["104"], DT=[1]min, AREA=[0.73](ha),
00068>                     DWF=[0](cms), CN/C=[70], TP=[0.19]hrs,
00069>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00070> *#-----------------|-------------------------------------------------------|
00071> *#
00072> *#      Total area entering Rear Lot Ditch and entering SWMF at East inlet
00073> *#
00074> *#-----------------|-------------------------------------------------------|
00075> ADD HYD             IDsum=[8], NHYD=["RLswl"], IDs to add=[10+7]
00076> *#-----------------|-------------------------------------------------------|
00077> *#
00078> *#   Proposed industrial lots draining to East Road Ditch within catchment,
00079> *#                          and new internal roadway
00080> *#
00081> *#-----------------|-------------------------------------------------------|
00082> DESIGN STANDHYD     ID=[1], NHYD=["204"], DT=[1]min, AREA=[4.92](ha),
00083>                     XIMP=[0.80], TIMP=[0.90], DWF=[0](cms), LOSS=[2], CN=[50],
00084>                     SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
00085> *#-----------------|-------------------------------------------------------|
00086> *#
00087> *#              Proposed SWM facility catchment (infiltration basin)
00088> *#
00089> *#-----------------|-------------------------------------------------------|
00090> DESIGN NASHYD       ID=[9], NHYD=["205"], DT=[1]min, AREA=[1.63](ha),
00091>                     DWF=[0](cms), CN/C=[57], TP=[0.35]hrs,
00092>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00093> *#-----------------|-------------------------------------------------------|
00094> *#
00095> *#                         All flows entering SWM facility
00096> *#
00097> *#-----------------|-------------------------------------------------------|
00098> ADD HYD             IDsum=[6], NHYD=["ToSWM"], IDs to add=[7+9+10+1]
00099> *%-----------------|-------------------------------------------------------|
00100> *#
00101> *#                      Infiltration Portion of SWM facility
00102> *#
00103> *#-----------------|-------------------------------------------------------|
00104> ROUTE RESERVOIR     IDout=[7],   NHYD=["SWMinf"],  IDin=[6],
00105>                     RDT=[1](min),
00106>                           TABLE of ( OUTFLOW-STORAGE ) values
00107>                                     (cms) - (ha-m)
00108>                                  [   0.0   ,  0.0 ]
00109>                                  [   0.044 ,  0.0553 ]
00110>                                  [   0.044 ,  0.6364 ]
00111>                                  [   -1  ,  -1  ]  (max twenty pts)
00112>                           IDovf=[8], NHYDovf=["OVF-I"]
00113> *#-----------------|-------------------------------------------------------|
00114> *#
00115> *#                       Active Storage Portion of SWM facility
00116> *#
00117> *#-----------------|-------------------------------------------------------|
00118> ROUTE RESERVOIR     IDout=[1],   NHYD=["SWMout"],  IDin=[8],
00119>                     RDT=[1](min),
00120>                           TABLE of ( OUTFLOW-STORAGE ) values
00121>                                     (cms) - (ha-m)
00122>                                  [   0.0   ,  0.0 ]
00123>                                  [   0.202 ,  0.1059 ]
00124>                                  [   0.689 ,  0.2141 ]
00125>                                  [   1.479 ,  0.3245 ]
00126>                                  [   2.606 ,  0.4367 ]
00127>                                  [   4.101 ,  0.5560 ]
00128>                                  [   -1  ,  -1  ]  (max twenty pts)
00129>                           IDovf=[2], NHYDovf=["OVF"]
00130> *#-----------------|-------------------------------------------------------|
00131> *#
00132> *#    West Road Ditch, conveying external drainage from the west around the
00133> *#                    proposed SWM facility to Outlet Channel
00134> *#
00135> *#-----------------|-------------------------------------------------------|
00136> DESIGN NASHYD       ID=[2], NHYD=["206"], DT=[1]min, AREA=[1.22](ha),
00137>                     DWF=[0](cms), CN/C=[50], TP=[0.81]hrs,
00138>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00139> *#-----------------|-------------------------------------------------------|
00140> *#
00141> *#        Grassed area south of SWM facility draining offsite to the south
00142> *#
00143> *#-----------------|-------------------------------------------------------|
00144> DESIGN NASHYD       ID=[10], NHYD=["207"], DT=[1]min, AREA=[0.14](ha),
00145>                     DWF=[0](cms), CN/C=[50], TP=[0.07]hrs,
00146>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00147> *#-----------------|-------------------------------------------------------|
00148> *#
00149> *#                Total Flows to the east from internal catchments
00150> *#
00151> *#-----------------|-------------------------------------------------------|
00152> ADD HYD             IDsum=[7], NHYD=["IntE"], IDs to add=[5+1+2]
00153> *#-----------------|-------------------------------------------------------|
00154> *#=======================================================================
00155> *# Proposed Drainage Conditions (Including External Catchment Flows to Ditches)
00156> *#=======================================================================
00157> *#-----------------|-------------------------------------------------------|
00158> *#
00159> *# External industrial catchment and part of Hwy 401, draining south across
00160> *#                    Cedar Creek Road and entering BPSS
00161> *#
00162> *#-----------------|-------------------------------------------------------|
00163> CALIB STANDHYD      ID=[3], NHYD=["100"], DT=[1](min), AREA=[55.94](ha),
00164>                     XIMP=[0.20], TIMP=[0.80], DWF=[0](cms), LOSS=[2],
00165>                     SCS curve number CN=[50],
00166>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00167>                                          LGP=[30](m), MNP=[0.25], SCP=[0](min),
00168>                     Impervious surfaces: IAimp=[2](mm), SLPI=[1.5](%),
00169>                                          LGI=[1750](m), MNI=[0.025], SCI=[0](min
00170>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00171> *#-----------------|-------------------------------------------------------|
00172> *#
00173> *#  External catchment containing a portion of Cedar Creek Road, a portion
00174> *#  of industrial area, and a grassed area near Hwy 401 off-ramp, entering BPSS
00175> *#
00176> *#-----------------|-------------------------------------------------------|
00177> CALIB STANDHYD      ID=[7], NHYD=["101"], DT=[1](min), AREA=[14.55](ha),
00178>                     XIMP=[0.15], TIMP=[0.60], DWF=[0](cms), LOSS=[2],
00179>                     SCS curve number CN=[50],
00180>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
00181>                                          LGP=[30](m), MNP=[0.25], SCP=[0](min),
00182>                     Impervious surfaces: IAimp=[2](mm), SLPI=[2.3](%),
00183>                                          LGI=[1050](m), MNI=[0.025], SCI=[0](min
00184>                     RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
00185> *#-----------------|-------------------------------------------------------|
00186> *#
00187> *#     Total area draining offsite to east onto agricultural area to the east
00188> *#
00189> *#-----------------|-------------------------------------------------------|
00190> ADD HYD             IDsum=[9], NHYD=["UCtoE"], IDs to add=[5+3+7]
00191> *#-----------------|-------------------------------------------------------|
00192> *#
00193> *#   Large external catchment west of site containing industrial property,
00194> *#  draining into private SWM feature and then into West Road Ditch, routing
00195> *#                around SWM facility and entering Outlet Channel
00196> *#
00197> *#-----------------|-------------------------------------------------------|
00198> DESIGN STANDHYD     ID=[4], NHYD=["102"], DT=[1]min, AREA=[12.64](ha),
00199>                     XIMP=[0.50], TIMP=[0.80], DWF=[0](cms), LOSS=[2], CN=[50],
00200>                     SLOPE=[3.1](%), RAINFALL=[ , , , , ](mm/hr), END=-1
00201> *#-----------------|-------------------------------------------------------|
00202> *#
00203> *#                        Infiltration in External SWM Feature
00204> *#
00205> *#-----------------|-------------------------------------------------------|
00206> ROUTE RESERVOIR     IDout=[5],   NHYD=["xSWinf"],  IDin=[4],
00207>                     RDT=[1](min),
00208>                           TABLE of ( OUTFLOW-STORAGE ) values
00209>                                     (cms) - (ha-m)
00210>                                  [   0.0   ,  0.0 ]
00211>                                  [   0.018 ,  0.0438 ]
00212>                                  [   0.018 ,  0.3759 ]
00213>                                  [   -1  ,  -1  ]  (max twenty pts)
00214>                           IDovf=[6], NHYDovf=["OVF-xI"]
00215> *#-----------------|-------------------------------------------------------|
00216> *#
00217> *#    External catchment west of the site, containing a portion of existing
00218> *#   industrial property, draining east into West Road Ditch, routing around
00219> *#                      SWM facility and entering Outlet Channel
00220> *#
00221> *#-----------------|-------------------------------------------------------|
00222> DESIGN STANDHYD     ID=[7], NHYD=["103"], DT=[1]min, AREA=[4.52](ha),
00223>                     XIMP=[0.50], TIMP=[0.80], DWF=[0](cms), LOSS=[2], CN=[50],
00224>                     SLOPE=[5.3](%), RAINFALL=[ , , , , ](mm/hr), END=-1
00225> *#-----------------|-------------------------------------------------------|
00226> *#
00227> *#                        Total Flows through West Road Ditch
00228> *#
00229> *#-----------------|-------------------------------------------------------|
00230> ADD HYD             IDsum=[8], NHYD=["WRswl"], IDs to add=[6+7+2]
00231> *#-----------------|-------------------------------------------------------|
00232> DESIGN NASHYD       ID=[5], NHYD=["208"], DT=[1]min, AREA=[1.13](ha),
00233>                     DWF=[0](cms), CN/C=[50], TP=[0.85]hrs,
00234>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00235> *#-----------------|-------------------------------------------------------|
00236> *#
00237> *#                        Total Flows through Outlet Channel
00238> *#
00239> *#-----------------|-------------------------------------------------------|
00240> ADD HYD             IDsum=[3], NHYD=["OutChan"], IDs to add=[1+8+5]
00241> *#-----------------|-------------------------------------------------------|
00242> *#
00243> *#               Total Flows to the east (eventually to Cedar Creek)
00244> *#
00245> *#-----------------|-------------------------------------------------------|
00246> ADD HYD             IDsum=[4], NHYD=["TotE"], IDs to add=[1+8+9]
00247> *#-----------------|-------------------------------------------------------|
00248> *#
00249> *#                           Total Flows from the Site
00250> *#
00251> *#-----------------|-------------------------------------------------------|
00252> ADD HYD             IDsum=[6], NHYD=["AllFlo"], IDs to add=[4+10]
00253> *%-----------------|-------------------------------------------------------|
00254> *#
00255> *#   Catchments required for By-Pass Storm Sewer (BPSS) sizing - added again
00256> *#                              for ease of modelling
00257> *#
00258> *#-----------------|-------------------------------------------------------|
00259> DESIGN NASHYD       ID=[1], NHYD=["200"], DT=[1]min, AREA=[0.14](ha),
00260>                     DWF=[0](cms), CN/C=[50], TP=[0.26]hrs,
00261>                     RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
00262> *#-----------------|-------------------------------------------------------|
00263> DESIGN STANDHYD     ID=[2], NHYD=["201"], DT=[1]min, AREA=[0.64](ha),
00264>                     XIMP=[0.50], TIMP=[0.90], DWF=[0](cms), LOSS=[2], CN=[50],
00265>                     SLOPE=[2](%), RAINFALL=[ , , , , ](mm/hr), END=-1
00266> *#-----------------|-------------------------------------------------------|
00267> CALIB STANDHYD      ID=[3], NHYD=["100"], DT=[1](min), AREA=[55.94](ha),
00268>                     XIMP=[0.20], TIMP=[0.80], DWF=[0](cms), LOSS=[2],
00269>                     SCS curve number CN=[50],
00270>                     Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
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                                        LGP=[30](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[2](mm), SLPI=[1.5](%),
                                        LGI=[1750](m), MNI=[0.025], SCI=[0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*#------------------|------------------------------------------------------------|
CALIB STANDHYD      ID=[7], NHYD=["101"], DT=[1](min), AREA=[14.55](ha),
                    XIMP=[0.15], TIMP=[0.60], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[50],
                    Pervious   surfaces: IAper=[5](mm), SLPP=[2](%),
                                        LGP=[30](m), MNP=[0.25], SCP=[0](min),
                    Impervious surfaces: IAimp=[2](mm), SLPI=[2.3](%),
                                        LGI=[1050](m), MNI=[0.025], SCI=[0](min
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*#------------------|------------------------------------------------------------|
ADD HYD             IDsum=[6], NHYD=["BPSS"], IDs to add=[1+2+3+7]
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[2]
*                   ["Kit2yr.3hr"] <--storm filename, one per line for NSTORM ti
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[5]
*                   ["Kit5yr.3hr"] <--storm filename, one per line for NSTORM ti
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[10]
*                   ["Kit10yr.3hr"] <--storm filename, one per line for NSTORM t
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[25]
*                   ["Kit25yr.3hr"] <--storm filename, one per line for NSTORM t
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[50]
*                   ["Kit50yr.3hr"] <--storm filename, one per line for NSTORM t
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[100
*                   ["Kit100yr.3hr"] <--storm filename, one per line for NSTORM
*%------------------|------------------------------------------------------------|
START               TZERO=[0.0]hrs or date,  METOUT=[2],  NSTORM=[1],  NRUN=[500
*                   ["hurhaz48.stm"] <--storm filename, one per line for NSTORM
*%------------------|------------------------------------------------------------|
FINISH
```

```
00001> ================================================================================
00002>
00003>    SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO         999    999    =========
00004>    S      W W W  MM MM  H   H   Y Y   MM MM  O   O       9   9  9   9
00005>    SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##   9   9  9   9   Ver  4.05
00006>        S  W W W  M   M  H   H    Y    M   M  O   O        9999   9999   Sept 2011
00007>    SSSSS   W W   M   M  H   H    Y    M   M   OOO            9      9   =========
00008>                                                           9   9  9   9   # 4730904
00009>          StormWater Management HYdrologic Model            999    999    =========
00010>
00011> ********************************************************************************
00012> ***************************** SWMHYMO Ver/4.05 ***************************
00013> *********  A single event and continuous hydrologic simulation model  *********
00014> *********     based on the principles of HYMO and its successors      *********
00015> *********                  OTTHYMO-83 and OTTHYMO-89.                  *********
00016> ********************************************************************************
00017> ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
00018> *********                  Ottawa,  Ontario: (613) 836-3884           *********
00019> *********                  Gatineau, Quebec: (819) 243-6858           *********
00020> *********                  E-Mail: swmhymo@jfsa.com                   *********
00021> ********************************************************************************
00022>
00023> ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024> +++++++++ Licensed user: Stantec Consulting Ltd. (Kitchener)          +++++++++
00025> +++++++++                 Kitchener            SERIAL#:4730904       +++++++++
00026> ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028> ********************************************************************************
00029> *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *********
00030> *********           Maximum value for ID numbers  :     10            *********
00031> *********           Max. number of rainfall points: 105408            *********
00032> *********           Max. number of flow points    : 105408            *********
00033> ********************************************************************************
00034>
00035>
00036> **********************   D E T A I L E D   O U T P U T   **********************
00037> ********************************************************************************
00038> *         DATE: 2024-11-18     TIME: 11:13:32     RUN COUNTER: 000607         *
00039> ********************************************************************************
00040> * Input   filename: C:\SWMHYMO\CEDARC~1\11-18-~1\CCrPre.dat                    *
00041> * Output  filename: C:\SWMHYMO\CEDARC~1\11-18-~1\CCrPre.out                    *
00042> * Summary filename: C:\SWMHYMO\CEDARC~1\11-18-~1\CCrPre.sum                    *
00043> * User comments:                                                              *
00044> * 1:_____________________________________________________________________     *
00045> * 2:_____________________________________________________________________     *
00046> * 3:_____________________________________________________________________     *
00047> ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001--------------------------------------------------------------------------
00051> *#*******************************************************************************
00052> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project # : [161414214]
00053> *#  Date        : 11-18-2024
00054> *#  Modeller    : [Amy Kyle]
00055> *#  Company     : Stantec Consulting Ltd. (Waterloo)
00056> *#  License #   : 4730904
00057> *#
00058> *#  This hydrologic analysis prepared to provide pond sizing
00059> *#  for the 2509 Cedar Creek Road SWM Facility
00060> *#  The storm events modelled are:
00061> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
00062> *#  and the Regional Event
00063> *#*******************************************************************************
00064> --------------------
00065> | START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
00066> --------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
00067>     TZERO =   .00 hrs on       0
00068>     METOUT=   2 (output = METRIC)
00069>     NRUN  = 001
00070>     NSTORM=   1
00071>              #  1=Kit25mm.4hr
00072> --------------------------------------------------------------------------------
00073> 001:0002--------------------------------------------------------------------------
00074> --------------------
00075> | READ STORM       |    Filename: 25 mm, 4hr Chicago Storm - Kitchener IDF
00076> | Ptotal=  25.00 mm|    Comments: 25 mm, 4hr Chicago Storm - Kitchener IDF
00077> --------------------
00078>                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00079>                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00080>                 .08   1.465 |   1.08   4.024 |   2.08   5.764 |   3.08   2.074
00081>                 .17   1.540 |   1.17   4.814 |   2.17   4.969 |   3.17   1.977
00082>                 .25   1.625 |   1.25   6.025 |   2.25   4.374 |   3.25   1.889
00083>                 .33   1.720 |   1.33   8.114 |   2.33   3.913 |   3.33   1.810
00084>                 .42   1.829 |   1.42  12.526 |   2.42   3.545 |   3.42   1.737
00085>                 .50   1.955 |   1.50  27.198 |   2.50   3.245 |   3.50   1.671
00086>                 .58   2.101 |   1.58  74.855 |   2.58   2.994 |   3.58   1.610
00087>                 .67   2.274 |   1.67  31.410 |   2.67   2.782 |   3.67   1.553
00088>                 .75   2.482 |   1.75  16.819 |   2.75   2.601 |   3.75   1.501
00089>                 .83   2.736 |   1.83  11.357 |   2.83   2.443 |   3.83   1.453
00090>                 .92   3.055 |   1.92   8.563 |   2.92   2.305 |   3.92   1.408
00091>                1.00   3.468 |   2.00   6.882 |   3.00   2.183 |   4.00   1.366
00092>
00093> --------------------------------------------------------------------------------
00094> 001:0003--------------------------------------------------------------------------
00095> *#===============================================================================
00096> *# Pre-Development Drainage Area (Internal Catchments)
00097> *#===============================================================================
00098> *#-----------------|-------------------------------------------------------------|
00099> *#
00100> *#                    Existing internal area draining to the east
00101> *#
00102> *#-----------------|-------------------------------------------------------------|
00103> ---------------------
00104> | DESIGN NASHYD     |   Area    (ha)=    7.06   Curve Number   (CN)=68.00
00105> | 01:105    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00106> ----------------------  U.H. Tp(hrs)=    .330
00107>
00108>      Unit Hyd Qpeak  (cms)=     .817
00109>
00110>      PEAK FLOW       (cms)=     .064 (i)
00111>      TIME TO PEAK    (hrs)=    2.000
00112>      RUNOFF VOLUME    (mm)=    3.861
00113>      TOTAL RAINFALL   (mm)=   25.000
00114>      RUNOFF COEFFICIENT   =     .154
00115>
00116>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00117>
00118> --------------------------------------------------------------------------------
00119> 001:0004--------------------------------------------------------------------------
00120> *#
00121> *#    Small external area entering site from east and draining south / east
00122> *#
00123> *#-----------------|-------------------------------------------------------------|
00124> ---------------------
00125> | DESIGN NASHYD     |   Area    (ha)=     .73   Curve Number   (CN)=70.00
00126> | 02:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00127> ----------------------  U.H. Tp(hrs)=    .190
00128>
00129>      Unit Hyd Qpeak  (cms)=     .147
00130>
00131>      PEAK FLOW       (cms)=     .010 (i)
00132>      TIME TO PEAK    (hrs)=    1.817
00133>      RUNOFF VOLUME    (mm)=    4.172
00134>      TOTAL RAINFALL   (mm)=   25.000
00135>      RUNOFF COEFFICIENT   =     .167
00136>
00137>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00138>
00139> --------------------------------------------------------------------------------
00140> 001:0005--------------------------------------------------------------------------
00141> *#-----------------|-------------------------------------------------------------|
00142> *#
00143> *#                    Total existing area draining to the east
00144> *#
00145> *#-----------------|-------------------------------------------------------------|
00146> ------------------------
00147> | ADD HYD (IntEst    ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
00148> ------------------------  ID:              (ha)     (cms)   (hrs)   (mm)    (cms)
00149>                         ID1 01:105          7.06     .064    2.00   3.86    .000
00150>                        +ID2 02:104          .73      .010    1.82   4.17    .000
00151>                         ========================================================
00152>                         SUM 03:IntEst       7.79     .072    1.97   3.89    .000
00153>
00154>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00155>
00156> --------------------------------------------------------------------------------
00157> 001:0006--------------------------------------------------------------------------
00158> *#
00159> *#                    Existing internal area draining to the south
00160> *#
00161> *#-----------------|-------------------------------------------------------------|
00162> ---------------------
00163> | DESIGN NASHYD     |   Area    (ha)=   11.00   Curve Number   (CN)=70.00
00164> | 04:106    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00165> ----------------------  U.H. Tp(hrs)=    .540
00166>
00167>      Unit Hyd Qpeak  (cms)=     .778
00168>
00169>      PEAK FLOW       (cms)=     .078 (i)
00170>      TIME TO PEAK    (hrs)=    2.283
00171>      RUNOFF VOLUME    (mm)=    4.173
00172>      TOTAL RAINFALL   (mm)=   25.000
00173>      RUNOFF COEFFICIENT   =     .167
00174>
00175>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00176>
00177> --------------------------------------------------------------------------------
00178> 001:0007--------------------------------------------------------------------------
00179> *#===============================================================================
00180> *# Total Pre-Development Drainage Area (Including Large External Catchments)
00181> *#===============================================================================
00182> *#-----------------|-------------------------------------------------------------|
00183> *#
00184> *#  External industrial catchment and part of Hwy 401, draining south into the
00185> *#                      site and flowing south / east.
00186> *#
00187> *#-----------------|-------------------------------------------------------------|
00188> ---------------------
00189> | CALIB STANDHYD    |   Area    (ha)=   55.94
00190> | 02:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
00191> ----------------------
00192>                                IMPERVIOUS    PERVIOUS (i)
00193>      Surface Area     (ha)=       44.75         11.19
00194>      Dep. Storage     (mm)=        2.00          5.00
00195>      Average Slope     (%)=        1.50          2.00
00196>      Length            (m)=     1750.00         30.00
00197>      Mannings n            =        .025          .250
00198>
00199>      Max.eff.Inten.(mm/hr)=       28.37         24.81
00200>                    over (min)       31.00         41.00
00201>      Storage Coeff.  (min)=       30.88 (ii)    41.25 (ii)
00202>      Unit Hyd. Tpeak (min)=       31.00         41.00
00203>      Unit Hyd. peak  (cms)=         .04           .03
00204>                                                          *TOTALS*
00205>      PEAK FLOW       (cms)=         .56           .45          .935 (iii)
00206>      TIME TO PEAK    (hrs)=        2.07          2.32         2.217
00207>      RUNOFF VOLUME    (mm)=       23.00          6.46         9.772
00208>      TOTAL RAINFALL   (mm)=       25.00         25.00         25.000
00209>      RUNOFF COEFFICIENT   =         .92           .26           .391
00210>
00211>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00212>            CN* =  50.0    Ia = Dep. Storage  (Above)
00213>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00214>            THAN THE STORAGE COEFFICIENT.
00215>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00216>
00217> --------------------------------------------------------------------------------
00218> 001:0008--------------------------------------------------------------------------
00219> *#*%-----------------|-------------------------------------------------------------
00220> *#
00221> *#  External catchment containing a portion of Cedar Creek Road, a portion of
00222> *#          industrial area, and a grassed area near Hwy 401 off-ramp,
00223> *#             draining south into site and flowing south / east.
00224> *#
00225> *#-----------------|-------------------------------------------------------------|
00226> ---------------------
00227> | CALIB STANDHYD    |   Area    (ha)=   14.55
00228> | 06:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
00229> ----------------------
00230>                                IMPERVIOUS    PERVIOUS (i)
00231>      Surface Area     (ha)=        8.73          5.82
00232>      Dep. Storage     (mm)=        2.00          5.00
00233>      Average Slope     (%)=        2.30          2.00
00234>      Length            (m)=     1050.00         30.00
00235>      Mannings n            =        .025          .250
00236>
00237>      Max.eff.Inten.(mm/hr)=       41.23          8.25
00238>                    over (min)       17.00         33.00
00239>      Storage Coeff.  (min)=       17.21 (ii)    33.32 (ii)
00240>      Unit Hyd. Tpeak (min)=       17.00         33.00
00241>      Unit Hyd. peak  (cms)=         .07           .03
00242>                                                          *TOTALS*
00243>      PEAK FLOW       (cms)=         .16           .08          .197 (iii)
00244>      TIME TO PEAK    (hrs)=        1.83          2.20         1.867
00245>      RUNOFF VOLUME    (mm)=       23.00          3.61         6.516
00246>      TOTAL RAINFALL   (mm)=       25.00         25.00         25.000
00247>      RUNOFF COEFFICIENT   =         .92           .14           .261
00248>
00249>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00250>            CN* =  50.0    Ia = Dep. Storage  (Above)
00251>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00252>            THAN THE STORAGE COEFFICIENT.
00253>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00254>
00255> --------------------------------------------------------------------------------
00256> 001:0009--------------------------------------------------------------------------
00257> *#
00258> *# External catchment west of site, containing exisiting industrial
00259> *# property draining into private SWM feature and then onto site flowing east
00260> *#
00261> *#-----------------|-------------------------------------------------------------|
00262> ---------------------
00263> | DESIGN STANDHYD   |   Area    (ha)=   12.64
00264> | 07:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
00265> ----------------------
00266>                                IMPERVIOUS    PERVIOUS (i)
00267>      Surface Area     (ha)=       10.11          2.53
00268>      Dep. Storage     (mm)=         .80          1.50
00269>      Average Slope     (%)=        3.10          3.10
00270>      Length            (m)=     290.29         40.00
```

```
      Mannings n           =       .013         .250

      Max.eff.Inten.(mm/hr)=     74.85        19.51
                over (min)        4.00        16.00
      Storage Coeff.  (min)=     3.87 (ii)   15.77 (ii)
      Unit Hyd. Tpeak (min)=     4.00        16.00
      Unit Hyd. peak  (cms)=      .29          .07
                                                      *TOTALS*
      PEAK FLOW       (cms)=      .97          .08       1.002 (iii)
      TIME TO PEAK    (hrs)=     1.62         1.87       1.617
      RUNOFF VOLUME    (mm)=   24.20         4.72      14.463
      TOTAL RAINFALL   (mm)=   25.00        25.00      25.000
      RUNOFF COEFFICIENT   =      .97          .19        .579

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

001:0010--------------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------------|
*#
*#                       Infiltration in External SWM Feature
*#
*#-----------------|------------------------------------------------------------------|
 ---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>07:(102   )   |
| OUT<08:(xSWinf)   |    =========  OUTLFOW STORAGE TABLE  =========
 ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |    (cms)     (ha.m.)
                             .000  .0000E+00    |     .018  .3759E+00
                             .018  .4380E-01    |     .000  .0000E+00

      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
      -------------------         (ha)     (cms)     (hrs)       (mm)
      INFLOW >07: (102   )      12.64     1.002     1.617     14.463
      OUTFLOW<08: (xSWinf)      12.64      .018     1.583     14.463
     OVERFLOW<09: (OVF-xI)        .00      .000      .000       .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.797
                    TIME SHIFT OF PEAK FLOW         (min)=    -2.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.1636E+00

--------------------------------------------------------------------------------
001:0011--------------------------------------------------------------------------------
*#
*#                       Total existing area draining to the east
*#
*#-----------------|------------------------------------------------------------------|
 ---------------------
| ADD HYD (ToEast    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 ---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 02:100         55.94     .935    2.22   9.77    .000
                       +ID2 03:IntEst       7.79     .072    1.97   3.89    .000
                       +ID3 06:101         14.55     .197    1.87   6.52    .000
                       +ID4 09:OVF-xI        .00     .000     .00    .00    .000
                        ==========================================================
                        SUM 05:ToEast      78.28    1.162    2.17   8.58    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0012--------------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------------|
*#
*# External catchment west of the site, containing a portion of existing
*# industrial property, draining east into the site and flowing south.
*#
*#-----------------|------------------------------------------------------------------|
 ---------------------
| DESIGN STANDHYD    |   Area    (ha)=    4.52
| 01:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
 ---------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       3.62         .90
      Dep. Storage     (mm)=        .80        1.50
      Average Slope     (%)=       5.30        5.30
      Length            (m)=     173.59       40.00
      Mannings n           =       .013         .250

      Max.eff.Inten.(mm/hr)=     74.85        22.59
                over (min)        2.00        12.00
      Storage Coeff.  (min)=     2.42 (ii)   11.97 (ii)
      Unit Hyd. Tpeak (min)=     2.00        12.00
      Unit Hyd. peak  (cms)=      .49          .09
                                                      *TOTALS*
      PEAK FLOW       (cms)=      .42          .04       .430 (iii)
      TIME TO PEAK    (hrs)=     1.58         1.78       1.583
      RUNOFF VOLUME    (mm)=   24.20         4.73      14.463
      TOTAL RAINFALL   (mm)=   25.00        25.00      25.000
      RUNOFF COEFFICIENT   =      .97          .19        .579

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
001:0013--------------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------------|
*#
*#                             Total Flows to the south
*#
*#-----------------|------------------------------------------------------------------|
 ---------------------
| ADD HYD (TSouth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 ---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 04:106         11.00     .078    2.28   4.17    .000
                       +ID2 01:103          4.52     .430    1.58  14.46    .000
                        ==========================================================
                        SUM 02:TSouth      15.52     .435    1.58   7.17    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0014--------------------------------------------------------------------------------
*#
*#                Total Flows from site (eventually to Cedar Creek)
*#
*#-----------------|------------------------------------------------------------------|
 ---------------------
| ADD HYD (TotalF    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 ---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 05:ToEast      78.28    1.162    2.17   8.58    .000
                       +ID2 02:TSouth      15.52     .435    1.58   7.17    .000
                        ==========================================================
                        SUM 03:TotalF      93.80    1.288    2.15   8.35    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
001:0015--------------------------------------------------------------------------------
  ** END OF RUN :   1

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



--------------------
| START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
 --------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
    TZERO =   .00 hrs on       0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
                #  1=Kit2yr.3hr
--------------------------------------------------------------------------------
002:0002--------------------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project # : [161414214]
*#  Date        : 11-18-2024
*#  Modeller    : [Amy Kyle]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   : 4730904
*#
*#  This hydrologic analysis prepared to provide pond sizing
*#  for the 2509 Cedar Creek Road SWM Facility
*#  The storm events modelled are:
*#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
*#  and the Regional Event
*#**************************************************************************
--------------------------------------------------------------------------------
002:0002--------------------------------------------------------------------------------
 --------------------
| READ STORM       |    Filename: 2-yr, 3hr Chicago Storm - Kitchener IDF
| Ptotal=  34.27 mm|    Comments: 2-yr, 3hr Chicago Storm - Kitchener IDF
 --------------------
               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   2.837 |    .83  15.850 |   1.58   7.979 |   2.33   3.697
               .17   3.094 |    .92  36.885 |   1.67   7.027 |   2.42   3.501
               .25   3.409 |   1.00 109.401 |   1.75   6.286 |   2.50   3.326
               .33   3.803 |   1.08  47.437 |   1.83   5.694 |   2.58   3.169
               .42   4.314 |   1.17  26.381 |   1.92   5.211 |   2.67   3.028
               .50   5.002 |   1.25  18.051 |   2.00   4.807 |   2.75   2.899
               .58   5.982 |   1.33  13.687 |   2.08   4.466 |   2.83   2.783
               .67   7.493 |   1.42  11.030 |   2.17   4.173 |   2.92   2.676
               .75  10.127 |   1.50   9.251 |   2.25   3.920 |   3.00   2.578

--------------------------------------------------------------------------------
002:0003--------------------------------------------------------------------------------
*#==============================================================================
*# Pre-Development Drainage Area (Internal Catchments)
*#==============================================================================
*#-----------------|------------------------------------------------------------------|
*#
*#                       Existing internal area draining to the east
*#
*#-----------------|------------------------------------------------------------------|
 ---------------------
| DESIGN NASHYD      |   Area    (ha)=    7.06   Curve Number   (CN)=68.00
| 01:105    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .330

      Unit Hyd Qpeak  (cms)=     .817

      PEAK FLOW       (cms)=     .119 (i)
      TIME TO PEAK    (hrs)=    1.433
      RUNOFF VOLUME    (mm)=    7.052
      TOTAL RAINFALL   (mm)=   34.271
      RUNOFF COEFFICIENT   =     .206

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

--------------------------------------------------------------------------------
002:0004--------------------------------------------------------------------------------
*#
*#    Small external area entering site from east and draining south / east
*#
*#-----------------|------------------------------------------------------------------|
 ---------------------
| DESIGN NASHYD      |   Area    (ha)=     .73   Curve Number   (CN)=70.00
| 02:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .190

      Unit Hyd Qpeak  (cms)=     .147

      PEAK FLOW       (cms)=     .018 (i)
      TIME TO PEAK    (hrs)=    1.250
      RUNOFF VOLUME    (mm)=    7.583
      TOTAL RAINFALL   (mm)=   34.271
      RUNOFF COEFFICIENT   =     .221

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

--------------------------------------------------------------------------------
002:0005--------------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------------|
*#
*#                       Total existing area draining to the east
*#
*#-----------------|------------------------------------------------------------------|
 ---------------------
| ADD HYD (IntEst    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
 ---------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:105          7.06     .119    1.43   7.05    .000
                       +ID2 02:104           .73     .018    1.25   7.58    .000
                        ==========================================================
                        SUM 03:IntEst       7.79     .134    1.42   7.10    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0006--------------------------------------------------------------------------------
*#
*#                      Existing internal area draining to the south
*#
*#-----------------|------------------------------------------------------------------|
 ---------------------
| DESIGN NASHYD      |   Area    (ha)=   11.00   Curve Number   (CN)=70.00
| 04:106    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
 ---------------------   U.H. Tp(hrs)=    .540

      Unit Hyd Qpeak  (cms)=     .778

      PEAK FLOW       (cms)=     .146 (i)
      TIME TO PEAK    (hrs)=    1.733
      RUNOFF VOLUME    (mm)=    7.583
      TOTAL RAINFALL   (mm)=   34.271
```

```
00541>      RUNOFF COEFFICIENT   =     .221
00542>
00543>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00544>
00545> ---------------------------------------------------------------------------
00546> 002:0007-----------------------------------------------------------------------
00547> *#=========================================================================
00548> *# Total Pre-Development Drainage Area (Including Large External Catchments)
00549> *#=========================================================================
00550> *#-----------------|-------------------------------------------------------|
00551> *#
00552> *#  External industrial catchment and part of Hwy 401, draining south into the
00553> *#                    site and flowing south / east.
00554> *#
00555> *#-----------------|-------------------------------------------------------|
00556> ----------------------
00557> | CALIB STANDHYD     |   Area    (ha)=   55.94
00558> | 02:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
00559> ----------------------
00560>                              IMPERVIOUS    PERVIOUS (i)
00561>      Surface Area     (ha)=      44.75        11.19
00562>      Dep. Storage     (mm)=       2.00         5.00
00563>      Average Slope     (%)=       1.50         2.00
00564>      Length            (m)=    1750.00        30.00
00565>      Mannings n             =      .025         .250
00566>
00567>      Max.eff.Inten.(mm/hr)=      47.63        51.47
00568>                    over (min)       25.00        33.00
00569>      Storage Coeff.  (min)=      25.09 (ii)   32.84 (ii)
00570>      Unit Hyd. Tpeak (min)=      25.00        33.00
00571>      Unit Hyd. peak  (cms)=        .05          .03
00572>                                                        *TOTALS*
00573>      PEAK FLOW       (cms)=        .92          .92      1.734 (iii)
00574>      TIME TO PEAK    (hrs)=       1.40         1.62      1.517
00575>      RUNOFF VOLUME    (mm)=      32.27        11.30     15.492
00576>      TOTAL RAINFALL   (mm)=      34.27        34.27     34.271
00577>      RUNOFF COEFFICIENT   =        .94          .33       .452
00578>
00579>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00580>            CN* =  50.0    Ia = Dep. Storage  (Above)
00581>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00582>            THAN THE STORAGE COEFFICIENT.
00583>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00584>
00585> ---------------------------------------------------------------------------
00586> 002:0008-----------------------------------------------------------------------
00587> *#*%-----------------|-------------------------------------------------------|
00588> *#
00589> *#  External catchment containing a portion of Cedar Creek Road, a portion of
00590> *#          industrial area, and a grassed area near Hwy 401 off-ramp,
00591> *#             draining south into site and flowing south / east.
00592> *#
00593> *#-----------------|-------------------------------------------------------|
00594> ----------------------
00595> | CALIB STANDHYD     |   Area    (ha)=   14.55
00596> | 06:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
00597> ----------------------
00598>                              IMPERVIOUS    PERVIOUS (i)
00599>      Surface Area     (ha)=       8.73         5.82
00600>      Dep. Storage     (mm)=       2.00         5.00
00601>      Average Slope     (%)=       2.30         2.00
00602>      Length            (m)=    1050.00        30.00
00603>      Mannings n             =      .025         .250
00604>
00605>      Max.eff.Inten.(mm/hr)=      66.55        18.29
00606>                    over (min)       14.00        26.00
00607>      Storage Coeff.  (min)=      14.21 (ii)   25.93 (ii)
00608>      Unit Hyd. Tpeak (min)=      14.00        26.00
00609>      Unit Hyd. peak  (cms)=        .08          .04
00610>                                                        *TOTALS*
00611>      PEAK FLOW       (cms)=        .26          .17       .354 (iii)
00612>      TIME TO PEAK    (hrs)=       1.20         1.50      1.300
00613>      RUNOFF VOLUME    (mm)=      32.27         6.73     10.559
00614>      TOTAL RAINFALL   (mm)=      34.27        34.27     34.271
00615>      RUNOFF COEFFICIENT   =        .94          .20       .308
00616>
00617>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00618>            CN* =  50.0    Ia = Dep. Storage  (Above)
00619>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00620>            THAN THE STORAGE COEFFICIENT.
00621>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00622>
00623> ---------------------------------------------------------------------------
00624> 002:0009-----------------------------------------------------------------------
00625> *#
00626> *# External catchment west of site, containing exisiting industrial
00627> *# property draining into private SWM feature and then onto site flowing east
00628> *#
00629> *#-----------------|-------------------------------------------------------|
00630> ----------------------
00631> | DESIGN STANDHYD    |   Area    (ha)=   12.64
00632> | 07:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
00633> ----------------------
00634>                              IMPERVIOUS    PERVIOUS (i)
00635>      Surface Area     (ha)=      10.11         2.53
00636>      Dep. Storage     (mm)=       .80         1.50
00637>      Average Slope     (%)=       3.10         3.10
00638>      Length            (m)=     290.29        40.00
00639>      Mannings n             =      .013         .250
00640>
00641>      Max.eff.Inten.(mm/hr)=     109.40        40.60
00642>                    over (min)        3.00        12.00
00643>      Storage Coeff.  (min)=       3.33 (ii)   12.20 (ii)
00644>      Unit Hyd. Tpeak (min)=       3.00        12.00
00645>      Unit Hyd. peak  (cms)=        .35          .09
00646>                                                        *TOTALS*
00647>      PEAK FLOW       (cms)=       1.52          .17      1.577 (iii)
00648>      TIME TO PEAK    (hrs)=       1.02         1.22      1.017
00649>      RUNOFF VOLUME    (mm)=      33.47         8.38     20.926
00650>      TOTAL RAINFALL   (mm)=      34.27        34.27     34.271
00651>      RUNOFF COEFFICIENT   =        .98          .24       .611
00652>
00653>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00654>            CN* =  50.0    Ia = Dep. Storage  (Above)
00655>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00656>            THAN THE STORAGE COEFFICIENT.
00657>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00658>
00659> ---------------------------------------------------------------------------
00660> 002:0010-----------------------------------------------------------------------
00661> *#-----------------|-------------------------------------------------------|
00662> *#
00663> *#                      Infiltration in External SWM Feature
00664> *#
00665> *#-----------------|-------------------------------------------------------|
00666> ----------------------
00667> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00668> |  IN>07:(102   )    |
00669> | OUT<08:(xSWinf)    |    =========  OUTLFOW STORAGE TABLE  =========
00670> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00671>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
00672>                              .000  .0000E+00    |     .018  .3759E+00
00673>                              .018  .4380E-01    |     .000  .0000E+00
00674>
00675>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00676>      --------------------       (ha)      (cms)     (hrs)       (mm)
00677>      INFLOW >07: (102   )      12.64     1.577     1.017     20.926
00678>      OUTFLOW<08: (xSWinf)      12.64      .018      .967     20.926
00679>     OVERFLOW<09: (OVF-xI)        .00      .000      .000       .000
00680>
00681>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00682>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00683>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00684>
00685>
00686>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.141
00687>                     TIME SHIFT OF PEAK FLOW       (min)=    -3.00
00688>                     MAXIMUM  STORAGE   USED       (ha.m.)=.2478E+00
00689>
00690> ---------------------------------------------------------------------------
00691> 002:0011-----------------------------------------------------------------------
00692> *#
00693> *#                       Total existing area draining to the east
00694> *#
00695> *#-----------------|-------------------------------------------------------|
00696> ------------------------
00697> | ADD HYD (ToEast    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00698> ------------------------ (ha)     (cms)   (hrs)   (mm)    (cms)
00699>                         ID1 02:100          55.94    1.734   1.52  15.49    .000
00700>                       +ID2 03:IntEst         7.79     .134   1.42   7.10    .000
00701>                       +ID3 06:101           14.55     .354   1.30  10.56    .000
00702>                       +ID4 09:OVF-xI          .00     .000    .00    .00    .000
00703>                        ===========================================================
00704>                        SUM 05:ToEast        78.28    2.180   1.50  13.74    .000
00705>
00706>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00707>
00708> ---------------------------------------------------------------------------
00709> 002:0012-----------------------------------------------------------------------
00710> *#-----------------|-------------------------------------------------------|
00711> *#
00712> *# External catchment west of the site, containing a portion of existing
00713> *# industrial property, draining east into the site and flowing south.
00714> *#
00715> *#-----------------|-------------------------------------------------------|
00716> ----------------------
00717> | DESIGN STANDHYD    |   Area    (ha)=    4.52
00718> | 01:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
00719> ----------------------
00720>                              IMPERVIOUS    PERVIOUS (i)
00721>      Surface Area     (ha)=       3.62          .90
00722>      Dep. Storage     (mm)=        .80         1.50
00723>      Average Slope     (%)=       5.30         5.30
00724>      Length            (m)=     173.59        40.00
00725>      Mannings n             =      .013         .250
00726>
00727>      Max.eff.Inten.(mm/hr)=     109.40        45.49
00728>                    over (min)        2.00         9.00
00729>      Storage Coeff.  (min)=       2.08 (ii)    9.30 (ii)
00730>      Unit Hyd. Tpeak (min)=       2.00         9.00
00731>      Unit Hyd. peak  (cms)=        .54          .12
00732>                                                        *TOTALS*
00733>      PEAK FLOW       (cms)=        .63          .07       .655 (iii)
00734>      TIME TO PEAK    (hrs)=       1.00         1.17      1.000
00735>      RUNOFF VOLUME    (mm)=      33.47         8.38     20.926
00736>      TOTAL RAINFALL   (mm)=      34.27        34.27     34.271
00737>      RUNOFF COEFFICIENT   =        .98          .24       .611
00738>
00739>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00740>            CN* =  50.0    Ia = Dep. Storage  (Above)
00741>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00742>            THAN THE STORAGE COEFFICIENT.
00743>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00744>
00745> ---------------------------------------------------------------------------
00746> 002:0013-----------------------------------------------------------------------
00747> *#-----------------|-------------------------------------------------------|
00748> *#
00749> *#                            Total Flows to the south
00750> *#
00751> *#-----------------|-------------------------------------------------------|
00752> ------------------------
00753> | ADD HYD (TSouth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00754> ------------------------ (ha)     (cms)   (hrs)   (mm)    (cms)
00755>                         ID1 04:106          11.00     .146   1.73   7.58    .000
00756>                       +ID2 01:103           4.52     .655   1.00  20.93    .000
00757>                        ===========================================================
00758>                        SUM 02:TSouth        15.52     .662   1.00  11.47    .000
00759>
00760>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00761>
00762> ---------------------------------------------------------------------------
00763> 002:0014-----------------------------------------------------------------------
00764> *#
00765> *#                  Total Flows from site (eventually to Cedar Creek)
00766> *#
00767> *#-----------------|-------------------------------------------------------|
00768> ------------------------
00769> | ADD HYD (TotalF    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00770> ------------------------ (ha)     (cms)   (hrs)   (mm)    (cms)
00771>                         ID1 05:ToEast       78.28    2.180   1.50  13.74    .000
00772>                       +ID2 02:TSouth        15.52     .662   1.00  11.47    .000
00773>                        ===========================================================
00774>                        SUM 03:TotalF        93.80    2.406   1.50  13.36    .000
00775>
00776>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00777>
00778> ---------------------------------------------------------------------------
00779> 002:0015-----------------------------------------------------------------------
00780> ---------------------------------------------------------------------------
00781> 002:0002-----------------------------------------------------------------------
00782>   ** END OF RUN :   4
00783>
00784> ***************************************************************************
00785>
00786>
00787>
00788>
00789>
00790> --------------------
00791> | START              |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
00792> --------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
00793>     TZERO =   .00 hrs on       0
00794>     METOUT=   2 (output = METRIC)
00795>     NRUN  = 005
00796>     NSTORM=   1
00797>            #  1=Kit5yr.3hr
00798> ---------------------------------------------------------------------------
00799> 005:0002-----------------------------------------------------------------------
00800> *#**************************************************************************
00801> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project # : [161414214]
00802> *#  Date        : 11-18-2024
00803> *#  Modeller    : [Amy Kyle]
00804> *#  Company     : Stantec Consulting Ltd. (Waterloo)
00805> *#  License #   : 4730904
00806> *#
00807> *#  This hydrologic analysis prepared to provide pond sizing
00808> *#  for the 2509 Cedar Creek Road SWM Facility
00809> *#  The storm events modelled are:
00810> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
```

```
00811> *#  and the Regional Event
00812> *#*****************************************************************************
00813> ----------------------------------------------------------------------------
00814> 005:0002----------------------------------------------------------------------
00815> --------------------
00816> | READ STORM      |    Filename: 5-yr, 3hr Chicago Storm - Kitchener IDF
00817> | Ptotal=  47.26 mm|    Comments: 5-yr, 3hr Chicago Storm - Kitchener IDF
00818> --------------------
00819>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00820>               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00821>               .08   3.031 |    .83  24.598 |   1.58  11.053 |   2.33   4.231
00822>               .17   3.380 |    .92  57.395 |   1.67   9.458 |   2.42   3.949
00823>               .25   3.819 |   1.00 139.288 |   1.75   8.241 |   2.50   3.701
00824>               .33   4.385 |   1.08  72.741 |   1.83   7.286 |   2.58   3.483
00825>               .42   5.141 |   1.17  42.120 |   1.92   6.519 |   2.67   3.288
00826>               .50   6.195 |   1.25  28.378 |   2.00   5.892 |   2.75   3.114
00827>               .58   7.751 |   1.33  20.884 |   2.08   5.370 |   2.83   2.957
00828>               .67  10.239 |   1.42  16.280 |   2.17   4.930 |   2.92   2.815
00829>               .75  14.725 |   1.50  13.216 |   2.25   4.554 |   3.00   2.687
00830>
00831> ----------------------------------------------------------------------------
00832> 005:0003----------------------------------------------------------------------
00833> *#============================================================================
00834> *# Pre-Development Drainage Area (Internal Catchments)
00835> *#============================================================================
00836> *#-----------------|--------------------------------------------------------|
00837> *#
00838> *#                    Existing internal area draining to the east
00839> *#
00840> *#-----------------|--------------------------------------------------------|
00841> ---------------------
00842> | DESIGN NASHYD     |   Area    (ha)=    7.06   Curve Number    (CN)=68.00
00843> | 01:105    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00844> ---------------------  U.H. Tp(hrs)=    .330
00845>
00846>      Unit Hyd Qpeak  (cms)=     .817
00847>
00848>      PEAK FLOW       (cms)=     .230 (i)
00849>      TIME TO PEAK    (hrs)=    1.450
00850>      RUNOFF VOLUME    (mm)=   12.668
00851>      TOTAL RAINFALL   (mm)=   47.258
00852>      RUNOFF COEFFICIENT   =     .268
00853>
00854>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00855>
00856> ----------------------------------------------------------------------------
00857> 005:0004----------------------------------------------------------------------
00858> *#
00859> *#    Small external area entering site from east and draining south / east
00860> *#
00861> *#-----------------|--------------------------------------------------------|
00862> ---------------------
00863> | DESIGN NASHYD     |   Area    (ha)=     .73   Curve Number    (CN)=70.00
00864> | 02:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00865> ---------------------  U.H. Tp(hrs)=    .190
00866>
00867>      Unit Hyd Qpeak  (cms)=     .147
00868>
00869>      PEAK FLOW       (cms)=     .035 (i)
00870>      TIME TO PEAK    (hrs)=    1.250
00871>      RUNOFF VOLUME    (mm)=   13.542
00872>      TOTAL RAINFALL   (mm)=   47.258
00873>      RUNOFF COEFFICIENT   =     .287
00874>
00875>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00876>
00877> ----------------------------------------------------------------------------
00878> 005:0005----------------------------------------------------------------------
00879> *#-----------------|--------------------------------------------------------|
00880> *#
00881> *#                    Total existing area draining to the east
00882> *#
00883> *#-----------------|--------------------------------------------------------|
00884> ------------------------
00885> | ADD HYD (IntEst    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00886> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00887>                       ID1 01:105          7.06     .230    1.45  12.67    .000
00888>                      +ID2 02:104           .73     .035    1.25  13.54    .000
00889>                       ========================================================
00890>                       SUM 03:IntEst       7.79     .258    1.42  12.75    .000
00891>
00892>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00893>
00894> ----------------------------------------------------------------------------
00895> 005:0006----------------------------------------------------------------------
00896> *#
00897> *#                    Existing internal area draining to the south
00898> *#
00899> *#-----------------|--------------------------------------------------------|
00900> ---------------------
00901> | DESIGN NASHYD     |   Area    (ha)=   11.00   Curve Number    (CN)=70.00
00902> | 04:106    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00903> ---------------------  U.H. Tp(hrs)=    .540
00904>
00905>      Unit Hyd Qpeak  (cms)=     .778
00906>
00907>      PEAK FLOW       (cms)=     .278 (i)
00908>      TIME TO PEAK    (hrs)=    1.717
00909>      RUNOFF VOLUME    (mm)=   13.542
00910>      TOTAL RAINFALL   (mm)=   47.258
00911>      RUNOFF COEFFICIENT   =     .287
00912>
00913>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00914>
00915> ----------------------------------------------------------------------------
00916> 005:0007----------------------------------------------------------------------
00917> *#============================================================================
00918> *# Total Pre-Development Drainage Area (Including Large External Catchments)
00919> *#============================================================================
00920> *#-----------------|--------------------------------------------------------|
00921> *#
00922> *#  External industrial catchment and part of Hwy 401, draining south into the
00923> *#                      site and flowing south / east.
00924> *#
00925> *#-----------------|--------------------------------------------------------|
00926> ---------------------
00927> | CALIB STANDHYD    |   Area    (ha)=   55.94
00928> | 02:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
00929> ---------------------
00930>                              IMPERVIOUS    PERVIOUS (i)
00931>      Surface Area     (ha)=      44.75         11.19
00932>      Dep. Storage     (mm)=       2.00          5.00
00933>      Average Slope     (%)=       1.50          2.00
00934>      Length            (m)=    1750.00         30.00
00935>      Mannings n            =       .025          .250
00936>
00937>      Max.eff.Inten.(mm/hr)=      75.53        105.46
00938>                 over (min)       21.00         27.00
00939>      Storage Coeff.  (min)=      20.87 (ii)    26.68 (ii)
00940>      Unit Hyd. Tpeak (min)=      21.00         27.00
00941>      Unit Hyd. peak  (cms)=        .05           .04
00942>                                                          *TOTALS*
00943>      PEAK FLOW       (cms)=       1.47          1.93         3.252 (iii)
00944>      TIME TO PEAK    (hrs)=       1.33          1.50         1.433
00945>      RUNOFF VOLUME    (mm)=      45.25         19.33         24.515
00946>      TOTAL RAINFALL   (mm)=      47.26         47.26         47.258
00947>      RUNOFF COEFFICIENT   =        .96           .41           .519
00948>
00949>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00950>            CN* =  50.0    Ia = Dep. Storage  (Above)
00951>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00952>            THAN THE STORAGE COEFFICIENT.
00953>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00954>
00955> ----------------------------------------------------------------------------
00956> 005:0008----------------------------------------------------------------------
00957> *#*%-----------------|--------------------------------------------------------|
00958> *#
00959> *#  External catchment containing a portion of Cedar Creek Road, a portion of
00960> *#         industrial area, and a grassed area near Hwy 401 off-ramp,
00961> *#            draining south into site and flowing south / east.
00962> *#
00963> *#-----------------|--------------------------------------------------------|
00964> ---------------------
00965> | CALIB STANDHYD     |   Area    (ha)=   14.55
00966> | 06:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
00967> ---------------------
00968>                              IMPERVIOUS    PERVIOUS (i)
00969>      Surface Area     (ha)=       8.73          5.82
00970>      Dep. Storage     (mm)=       2.00          5.00
00971>      Average Slope     (%)=       2.30          2.00
00972>      Length            (m)=    1050.00         30.00
00973>      Mannings n            =       .025          .250
00974>
00975>      Max.eff.Inten.(mm/hr)=      97.91         39.83
00976>                 over (min)       12.00         21.00
00977>      Storage Coeff.  (min)=      12.18 (ii)    20.76 (ii)
00978>      Unit Hyd. Tpeak (min)=      12.00         21.00
00979>      Unit Hyd. peak  (cms)=        .09           .05
00980>                                                          *TOTALS*
00981>      PEAK FLOW       (cms)=        .39           .38          .675 (iii)
00982>      TIME TO PEAK    (hrs)=       1.18          1.42         1.317
00983>      RUNOFF VOLUME    (mm)=      45.26         12.26        17.212
00984>      TOTAL RAINFALL   (mm)=      47.26         47.26        47.258
00985>      RUNOFF COEFFICIENT   =        .96           .26          .364
00986>
00987>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00988>            CN* =  50.0    Ia = Dep. Storage  (Above)
00989>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00990>            THAN THE STORAGE COEFFICIENT.
00991>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00992>
00993> ----------------------------------------------------------------------------
00994> 005:0009----------------------------------------------------------------------
00995> *#
00996> *# External catchment west of site, containing exisiting industrial
00997> *# property draining into private SWM feature and then onto site flowing east
00998> *#
00999> *#-----------------|--------------------------------------------------------|
01000> ---------------------
01001> | DESIGN STANDHYD    |   Area    (ha)=   12.64
01002> | 07:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
01003> ---------------------
01004>                              IMPERVIOUS    PERVIOUS (i)
01005>      Surface Area     (ha)=      10.11          2.53
01006>      Dep. Storage     (mm)=        .80          1.50
01007>      Average Slope     (%)=       3.10          3.10
01008>      Length            (m)=     290.29         40.00
01009>      Mannings n            =       .013          .250
01010>
01011>      Max.eff.Inten.(mm/hr)=     139.29         78.90
01012>                 over (min)        3.00         10.00
01013>      Storage Coeff.  (min)=       3.02 (ii)     9.82 (ii)
01014>      Unit Hyd. Tpeak (min)=       3.00         10.00
01015>      Unit Hyd. peak  (cms)=        .37           .11
01016>                                                          *TOTALS*
01017>      PEAK FLOW       (cms)=       2.04           .35         2.179 (iii)
01018>      TIME TO PEAK    (hrs)=       1.02          1.20         1.017
01019>      RUNOFF VOLUME    (mm)=      46.46         14.68        30.571
01020>      TOTAL RAINFALL   (mm)=      47.26         47.26        47.258
01021>      RUNOFF COEFFICIENT   =        .98           .31          .647
01022>
01023>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01024>            CN* =  50.0    Ia = Dep. Storage  (Above)
01025>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01026>            THAN THE STORAGE COEFFICIENT.
01027>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01028>
01029> ----------------------------------------------------------------------------
01030> 005:0010----------------------------------------------------------------------
01031> *#-----------------|--------------------------------------------------------|
01032> *#
01033> *#                      Infiltration in External SWM Feature
01034> *#
01035> *#-----------------|--------------------------------------------------------|
01036> ---------------------
01037> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
01038> |  IN>07:(102    )  |
01039> | OUT<08:(xSWinf)   |    =========  OUTLFOW STORAGE TABLE  =========
01040> ---------------------   OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01041>                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
01042>                           .000  .0000E+00   |     .018  .3759E+00
01043>                           .018  .4380E-01   |     .000  .0000E+00
01044>
01045>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01046>      --------------------       (ha)     (cms)     (hrs)       (mm)
01047>      INFLOW >07: (102   )      12.64     2.179     1.017     30.571
01048>      OUTFLOW<08: (xSWinf)      12.64      .018      .917     30.570
01049>     OVERFLOW<09: (OVF-xI)        .00      .000      .000       .000
01050>
01051>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =         0
01052>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
01053>                    PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
01054>
01055>
01056>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=      .826
01057>                    TIME SHIFT OF PEAK FLOW          (min)=    -6.00
01058>                    MAXIMUM  STORAGE   USED       (ha.m.)=.3695E+00
01059>
01060> ----------------------------------------------------------------------------
01061> 005:0011----------------------------------------------------------------------
01062> *#
01063> *#                      Total existing area draining to the east
01064> *#
01065> *#-----------------|--------------------------------------------------------|
01066> ------------------------
01067> | ADD HYD (ToEast    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01068> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01069>                       ID1 02:100          55.94    3.252    1.43  24.52    .000
01070>                      +ID2 03:IntEst        7.79     .258    1.42  12.75    .000
01071>                      +ID3 06:101          14.55     .675    1.32  17.21    .000
01072>                      +ID4 09:OVF-xI         .00     .000     .00    .00    .000
01073>                       ========================================================
01074>                       SUM 05:ToEast       78.28    4.133    1.42  21.99    .000
01075>
01076>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01077>
01078> ----------------------------------------------------------------------------
01079> 005:0012----------------------------------------------------------------------
01080> *#-----------------|--------------------------------------------------------|
```

```
*#
*# External catchment west of the site, containing a portion of existing
*# industrial property, draining east into the site and flowing south.
*#
*#------------------|-------------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    4.52
| 01:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.62         .90
     Dep. Storage     (mm)=        .80        1.50
     Average Slope     (%)=       5.30        5.30
     Length            (m)=     173.59       40.00
     Mannings n             =      .013        .250

     Max.eff.Inten.(mm/hr)=     139.29       81.28
                 over (min)        2.00        8.00
     Storage Coeff.  (min)=       1.89 (ii)   7.61 (ii)
     Unit Hyd. Tpeak (min)=       2.00        8.00
     Unit Hyd. peak  (cms)=        .58         .15
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .82         .14          .881 (iii)
     TIME TO PEAK    (hrs)=       1.00        1.15         1.000
     RUNOFF VOLUME    (mm)=      46.46       14.68        30.571
     TOTAL RAINFALL   (mm)=      47.26       47.26        47.258
     RUNOFF COEFFICIENT   =        .98         .31          .647

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
005:0013----------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#
*#                              Total Flows to the south
*#
*#------------------|-------------------------------------------------------------|
----------------------
| ADD HYD (TSouth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 04:106          11.00     .278    1.72  13.54    .000
                     +ID2 01:103           4.52     .881    1.00  30.57    .000
                      ============================================================
                      SUM 02:TSouth       15.52     .895    1.00  18.50    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0014----------------------------------------------------------------------
*#
*#                 Total Flows from site (eventually to Cedar Creek)
*#
*#------------------|-------------------------------------------------------------|
----------------------
| ADD HYD (TotalF    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 05:ToEast       78.28    4.133    1.42  21.99    .000
                     +ID2 02:TSouth       15.52     .895    1.00  18.50    .000
                      ============================================================
                      SUM 03:TotalF       93.80    4.536    1.42  21.41    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0015----------------------------------------------------------------------
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
  ** END OF RUN :   9

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




----------------------
| START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
----------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 010
    NSTORM=   1
          #  1=Kit10yr.3hr
--------------------------------------------------------------------------------
010:0002----------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project # : [161414214]
*#  Date       : 11-18-2024
*#  Modeller   : [Amy Kyle]
*#  Company    : Stantec Consulting Ltd. (Waterloo)
*#  License #  : 4730904
*#
*#  This hydrologic analysis prepared to provide pond sizing
*#  for the 2509 Cedar Creek Road SWM Facility
*#  The storm events modelled are:
*#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
*#  and the Regional Event
*#*****************************************************************************
--------------------------------------------------------------------------------
010:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 10-yr, 3hr Chicago Storm - Kitchener IDF
| Ptotal=  56.28 mm|    Comments: 10-yr, 3hr Chicago Storm - Kitchener IDF
--------------------
               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   3.160 |    .83  29.808 |   1.58  12.832 |   2.33   4.548
               .17   3.560 |    .92  70.748 |   1.67  10.862 |   2.42   4.218
               .25   4.067 |   1.00 169.551 |   1.75   9.368 |   2.50   3.931
               .33   4.729 |   1.08  89.762 |   1.83   8.203 |   2.58   3.678
               .42   5.623 |   1.17  51.823 |   1.92   7.274 |   2.67   3.454
               .50   6.884 |   1.25  34.566 |   2.00   6.519 |   2.75   3.255
               .58   8.770 |   1.33  25.132 |   2.08   5.895 |   2.83   3.076
               .67  11.826 |   1.42  19.351 |   2.17   5.372 |   2.92   2.915
               .75  17.407 |   1.50  15.520 |   2.25   4.928 |   3.00   2.770

--------------------------------------------------------------------------------
010:0003----------------------------------------------------------------------
*#============================================================================
*# Pre-Development Drainage Area (Internal Catchments)
*#============================================================================
*#------------------|-------------------------------------------------------------|
*#
*#                       Existing internal area draining to the east
*#
*#------------------|-------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=    7.06   Curve Number   (CN)=68.00
| 01:105    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .330

     Unit Hyd Qpeak  (cms)=     .817

     PEAK FLOW       (cms)=     .325 (i)
     TIME TO PEAK    (hrs)=    1.450
     RUNOFF VOLUME    (mm)=   17.217
     TOTAL RAINFALL   (mm)=   56.282
     RUNOFF COEFFICIENT   =     .306

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

--------------------------------------------------------------------------------
010:0004----------------------------------------------------------------------
*#
*#    Small external area entering site from east and draining south / east
*#
*#------------------|-------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .73   Curve Number   (CN)=70.00
| 02:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .147

     PEAK FLOW       (cms)=     .050 (i)
     TIME TO PEAK    (hrs)=    1.250
     RUNOFF VOLUME    (mm)=   18.339
     TOTAL RAINFALL   (mm)=   56.282
     RUNOFF COEFFICIENT   =     .326

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

--------------------------------------------------------------------------------
010:0005----------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#
*#                       Total existing area draining to the east
*#
*#------------------|-------------------------------------------------------------|
----------------------
| ADD HYD (IntEst    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:105           7.06     .325    1.45  17.22    .000
                     +ID2 02:104            .73     .050    1.25  18.34    .000
                      ============================================================
                      SUM 03:IntEst        7.79     .364    1.42  17.32    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0006----------------------------------------------------------------------
*#
*#                    Existing internal area draining to the south
*#
*#------------------|-------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=   11.00   Curve Number   (CN)=70.00
| 04:106    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .540

     Unit Hyd Qpeak  (cms)=     .778

     PEAK FLOW       (cms)=     .389 (i)
     TIME TO PEAK    (hrs)=    1.717
     RUNOFF VOLUME    (mm)=   18.340
     TOTAL RAINFALL   (mm)=   56.282
     RUNOFF COEFFICIENT   =     .326

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

--------------------------------------------------------------------------------
010:0007----------------------------------------------------------------------
*#============================================================================
*# Total Pre-Development Drainage Area (Including Large External Catchments)
*#============================================================================
*#------------------|-------------------------------------------------------------|
*#
*#  External industrial catchment and part of Hwy 401, draining south into the
*#                        site and flowing south / east.
*#
*#------------------|-------------------------------------------------------------|
----------------------
| CALIB STANDHYD     |   Area    (ha)=   55.94
| 02:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      44.75       11.19
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       1.50        2.00
     Length            (m)=    1750.00       30.00
     Mannings n             =      .025        .250

     Max.eff.Inten.(mm/hr)=      97.77      154.91
                 over (min)       19.00       24.00
     Storage Coeff.  (min)=      18.82 (ii)  23.81 (ii)
     Unit Hyd. Tpeak (min)=      19.00       24.00
     Unit Hyd. peak  (cms)=        .06         .05
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.92        2.85         4.592 (iii)
     TIME TO PEAK    (hrs)=       1.30        1.45         1.383
     RUNOFF VOLUME    (mm)=      54.28       25.55        31.297
     TOTAL RAINFALL   (mm)=      56.28       56.28        56.282
     RUNOFF COEFFICIENT   =        .96         .45          .556

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
010:0008----------------------------------------------------------------------
*#*%------------------|-------------------------------------------------------------|
*#
*#  External catchment containing a portion of Cedar Creek Road, a portion of
*#         industrial area, and a grassed area near Hwy 401 off-ramp,
*#           draining south into site and flowing south / east.
*#
*#------------------|-------------------------------------------------------------|
----------------------
| CALIB STANDHYD     |   Area    (ha)=   14.55
| 06:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
----------------------
                          IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.73        5.82
     Dep. Storage     (mm)=       2.00        5.00
     Average Slope     (%)=       2.30        2.00
     Length            (m)=    1050.00       30.00
     Mannings n             =      .025        .250

     Max.eff.Inten.(mm/hr)=     124.30       61.34
                 over (min)       11.00       18.00
     Storage Coeff.  (min)=      11.07 (ii)  18.29 (ii)
     Unit Hyd. Tpeak (min)=      11.00       18.00
```

```
      Unit Hyd. peak  (cms)=        .10          .06
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .51          .59          .980 (iii)
      TIME TO PEAK    (hrs)=       1.17         1.35         1.267
      RUNOFF VOLUME    (mm)=      54.28        16.77        22.394
      TOTAL RAINFALL   (mm)=      56.28        56.28        56.282
      RUNOFF COEFFICIENT   =        .96          .30          .398

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

010:0009----------------------------------------------------------------------------
*#
*# External catchment west of site, containing exisiting industrial
*# property draining into private SWM feature and then onto site flowing east
*#
*#------------------|---------------------------------------------------------|
--------------------
| DESIGN STANDHYD    |   Area    (ha)=   12.64
| 07:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=      10.11         2.53
      Dep. Storage     (mm)=        .80         1.50
      Average Slope     (%)=       3.10         3.10
      Length            (m)=     290.29        40.00
      Mannings n            =       .013         .250

      Max.eff.Inten.(mm/hr)=     169.55       112.10
                  over (min)=       3.00         9.00
      Storage Coeff.  (min)=       2.79 (ii)    8.70 (ii)
      Unit Hyd. Tpeak (min)=       3.00         9.00
      Unit Hyd. peak  (cms)=        .39          .13
                                                          *TOTALS*
      PEAK FLOW       (cms)=       2.53          .52         2.765 (iii)
      TIME TO PEAK    (hrs)=       1.02         1.17         1.017
      RUNOFF VOLUME    (mm)=      55.48        19.71        37.598
      TOTAL RAINFALL   (mm)=      56.28        56.28        56.282
      RUNOFF COEFFICIENT   =        .99          .35          .668

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

01400>
01401> ----------------------------------------------------------------------------
01402> 010:0010----------------------------------------------------------------------
01403> *#----------------|---------------------------------------------------------|
01404> *#
01405> *#                      Infiltration in External SWM Feature
01406> *#
01407> *#----------------|---------------------------------------------------------|
01408> --------------------
01409> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
01410> |  IN>07:(102   )   |
01411> | OUT<08:(xSWinf)   |    =========  OUTLFOW STORAGE TABLE  =========
01412> --------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01413>                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
01414>                            .000  .0000E+00   |     .018  .3759E+00
01415>                            .018  .4380E-01   |     .000  .0000E+00
01416>
01417>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01418>     -------------------        (ha)     (cms)     (hrs)        (mm)
01419>     INFLOW >07: (102   )      12.64     2.765     1.017      37.598
01420>     OUTFLOW<08: (xSWinf)      10.45      .018      .883      37.596
01421>    OVERFLOW<09: (OVF-xI)       2.19      .422     1.600      37.598
01422>
01423>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
01424>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=     1.57
01425>                    PERCENTAGE OF TIME OVERFLOWING    (%)=     1.15
01426>
01427>
01428>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .651
01429>                    TIME SHIFT OF PEAK FLOW          (min)=    -8.00
01430>                    MAXIMUM  STORAGE   USED       (ha.m.)=.3759E+00
01431>
01432> ----------------------------------------------------------------------------
01433> 010:0011----------------------------------------------------------------------
01434> *#
01435> *#                      Total existing area draining to the east
01436> *#
01437> *#------------------|---------------------------------------------------------|
01438> ------------------------
01439> | ADD HYD (ToEast    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01440> ------------------------ (ha)     (cms)   (hrs)   (mm)    (cms)
01441>                       ID1 02:100          55.94    4.592    1.38  31.30    .000
01442>                      +ID2 03:IntEst        7.79     .364    1.42  17.32    .000
01443>                      +ID3 06:101          14.55     .980    1.27  22.39    .000
01444>                      +ID4 09:OVF-xI        2.19     .422    1.60  37.60    .000
01445>                       ========================================================
01446>                       SUM 05:ToEast       80.47    5.862    1.38  28.51    .000
01447>
01448>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01449>
01450> ----------------------------------------------------------------------------
01451> 010:0012----------------------------------------------------------------------
01452> *#----------------|---------------------------------------------------------|
01453> *#
01454> *# External catchment west of the site, containing a portion of existing
01455> *# industrial property, draining east into the site and flowing south.
01456> *#
01457> *#----------------|---------------------------------------------------------|
01458> ---------------------
01459> | DESIGN STANDHYD    |   Area    (ha)=    4.52
01460> | 01:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
01461> ---------------------
01462>                              IMPERVIOUS    PERVIOUS (i)
01463>      Surface Area     (ha)=       3.62          .90
01464>      Dep. Storage     (mm)=        .80         1.50
01465>      Average Slope     (%)=       5.30         5.30
01466>      Length            (m)=     173.59        40.00
01467>      Mannings n            =       .013         .250
01468>
01469>      Max.eff.Inten.(mm/hr)=     169.55       117.15
01470>                  over (min)=       2.00         7.00
01471>      Storage Coeff.  (min)=       1.75 (ii)    6.69 (ii)
01472>      Unit Hyd. Tpeak (min)=       2.00         7.00
01473>      Unit Hyd. peak  (cms)=        .61          .17
01474>                                                          *TOTALS*
01475>      PEAK FLOW       (cms)=       1.01          .21         1.112 (iii)
01476>      TIME TO PEAK    (hrs)=       1.00         1.12         1.000
01477>      RUNOFF VOLUME    (mm)=      55.48        19.71        37.598
01478>      TOTAL RAINFALL   (mm)=      56.28        56.28        56.282
01479>      RUNOFF COEFFICIENT   =        .99          .35          .668
01480>
01481>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01482>            CN* =  50.0    Ia = Dep. Storage  (Above)
01483>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01484>            THAN THE STORAGE COEFFICIENT.
01485>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01486>
01487> ----------------------------------------------------------------------------
01488> 010:0013----------------------------------------------------------------------
01489> *#----------------|---------------------------------------------------------|
01490> *#
01491> *#                            Total Flows to the south
01492> *#
01493> *#----------------|---------------------------------------------------------|
01494> ------------------------
01495> | ADD HYD (TSouth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01496> ------------------------ (ha)     (cms)   (hrs)   (mm)    (cms)
01497>                       ID1 04:106          11.00     .389    1.72  18.34    .000
01498>                      +ID2 01:103           4.52    1.112    1.00  37.60    .000
01499>                       ========================================================
01500>                       SUM 02:TSouth       15.52    1.133    1.00  23.95    .000
01501>
01502>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01503>
01504> ----------------------------------------------------------------------------
01505> 010:0014----------------------------------------------------------------------
01506> *#
01507> *#                  Total Flows from site (eventually to Cedar Creek)
01508> *#
01509> *#----------------|---------------------------------------------------------|
01510> ------------------------
01511> | ADD HYD (TotalF    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01512> ------------------------ (ha)     (cms)   (hrs)   (mm)    (cms)
01513>                       ID1 05:ToEast       80.47    5.862    1.38  28.51    .000
01514>                      +ID2 02:TSouth       15.52    1.133    1.00  23.95    .000
01515>                       ========================================================
01516>                       SUM 03:TotalF       95.99    6.395    1.38  27.77    .000
01517>
01518>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01519>
01520> ----------------------------------------------------------------------------
01521> 010:0015----------------------------------------------------------------------
01522> ----------------------------------------------------------------------------
01523> 010:0002----------------------------------------------------------------------
01524> ----------------------------------------------------------------------------
01525> 010:0002----------------------------------------------------------------------
01526> ----------------------------------------------------------------------------
01527> 010:0002----------------------------------------------------------------------
01528>   ** END OF RUN :  24
01529>
01530> ****************************************************************************
01531>
01532>
01533>
01534>
01535>
01536> --------------------
01537> | START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
01538> --------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
01539>     TZERO =   .00 hrs on        0
01540>     METOUT=   2 (output = METRIC)
01541>     NRUN  = 025
01542>     NSTORM=   1
01543>                #  1=Kit25yr.3hr
01544> ----------------------------------------------------------------------------
01545> 025:0002----------------------------------------------------------------------
01546> *#**************************************************************************
01547> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project # : [161414214]
01548> *#  Date        : 11-18-2024
01549> *#  Modeller    : [Amy Kyle]
01550> *#  Company     : Stantec Consulting Ltd. (Waterloo)
01551> *#  License #   : 4730904
01552> *#
01553> *#  This hydrologic analysis prepared to provide pond sizing
01554> *#  for the 2509 Cedar Creek Road SWM Facility
01555> *#  The storm events modelled are:
01556> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
01557> *#  and the Regional Event
01558> *#**************************************************************************
01559> ----------------------------------------------------------------------------
01560> 025:0002----------------------------------------------------------------------
01561> --------------------
01562> | READ STORM       |    Filename: 25-yr, 3hr Chicago Storm - Kitchener IDF
01563> | Ptotal=  68.26 mm|    Comments: 25-yr, 3hr Chicago Storm - Kitchener IDF
01564> --------------------
01565>                TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01566>                 hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01567>                 .08   3.567 |    .83  38.324 |   1.58  16.257 |   2.33   5.336
01568>                 .17   4.072 |    .92  87.426 |   1.67  13.647 |   2.42   4.912
01569>                 .25   4.719 |   1.00 191.557 |   1.75  11.668 |   2.50   4.544
01570>                 .33   5.571 |   1.08 109.318 |   1.83  10.127 |   2.58   4.222
01571>                 .42   6.733 |   1.17  65.637 |   1.92   8.900 |   2.67   3.938
01572>                 .50   8.387 |   1.25  44.391 |   2.00   7.906 |   2.75   3.686
01573>                 .58  10.876 |   1.33  32.362 |   2.08   7.088 |   2.83   3.461
01574>                 .67  14.925 |   1.42  24.846 |   2.17   6.405 |   2.92   3.260
01575>                 .75  22.291 |   1.50  19.811 |   2.25   5.829 |   3.00   3.079
01576>
01577> ----------------------------------------------------------------------------
01578> 025:0003----------------------------------------------------------------------
01579> *#========================================================================
01580> *# Pre-Development Drainage Area (Internal Catchments)
01581> *#========================================================================
01582> *#----------------|---------------------------------------------------------|
01583> *#
01584> *#                      Existing internal area draining to the east
01585> *#
01586> *#----------------|---------------------------------------------------------|
01587> ----------------------
01588> | DESIGN NASHYD    |   Area    (ha)=    7.06   Curve Number   (CN)=68.00
01589> | 01:105    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01590> ----------------------   U.H. Tp(hrs)=    .330
01591>
01592>      Unit Hyd Qpeak  (cms)=     .817
01593>
01594>      PEAK FLOW       (cms)=     .453 (i)
01595>      TIME TO PEAK    (hrs)=    1.450
01596>      RUNOFF VOLUME    (mm)=   23.923
01597>      TOTAL RAINFALL   (mm)=   68.256
01598>      RUNOFF COEFFICIENT   =     .350
01599>
01600>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01601>
01602> ----------------------------------------------------------------------------
01603> 025:0004----------------------------------------------------------------------
01604> *#
01605> *#    Small external area entering site from east and draining south / east
01606> *#
01607> *#----------------|---------------------------------------------------------|
01608> ----------------------
01609> | DESIGN NASHYD    |   Area    (ha)=     .73   Curve Number   (CN)=70.00
01610> | 02:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01611> ----------------------   U.H. Tp(hrs)=    .190
01612>
01613>      Unit Hyd Qpeak  (cms)=     .147
01614>
01615>      PEAK FLOW       (cms)=     .068 (i)
01616>      TIME TO PEAK    (hrs)=    1.250
01617>      RUNOFF VOLUME    (mm)=   25.376
01618>      TOTAL RAINFALL   (mm)=   68.256
01619>      RUNOFF COEFFICIENT   =     .372
01620>
```

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

------------------------------------------------------------------------------
025:0005------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
*#
*#                     Total existing area draining to the east
*#
*#------------------|---------------------------------------------------------|
---------------------
| ADD HYD (IntEst    ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 01:105          7.06     .453   1.45  23.92    .000
                       +ID2 02:104           .73     .068   1.25  25.38    .000
                        ==========================================================
                        SUM 03:IntEst        7.79     .508   1.42  24.06    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
025:0006------------------------------------------------------------------------
*#
*#                   Existing internal area draining to the south
*#
*#------------------|---------------------------------------------------------|
---------------------
| DESIGN NASHYD      |   Area    (ha)=   11.00   Curve Number    (CN)=70.00
| 04:106    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .540

     Unit Hyd Qpeak  (cms)=     .778

     PEAK FLOW       (cms)=     .544 (i)
     TIME TO PEAK    (hrs)=    1.717
     RUNOFF VOLUME    (mm)=   25.376
     TOTAL RAINFALL   (mm)=   68.256
     RUNOFF COEFFICIENT   =     .372

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

------------------------------------------------------------------------------
025:0007------------------------------------------------------------------------
*#==========================================================================
*# Total Pre-Development Drainage Area (Including Large External Catchments)
*#==========================================================================
*#------------------|---------------------------------------------------------|
*#
*#  External industrial catchment and part of Hwy 401, draining south into the
*#                        site and flowing south / east.
*#
*#------------------|---------------------------------------------------------|
---------------------
| CALIB STANDHYD     |   Area    (ha)=   55.94
| 02:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
----------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     44.75        11.19
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      1.50         2.00
     Length            (m)=   1750.00        30.00
     Mannings n            =      .025         .250

     Max.eff.Inten.(mm/hr)=    121.93       217.67
                over (min)       17.00        22.00
     Storage Coeff.  (min)=     17.23 (ii)   21.58 (ii)
     Unit Hyd. Tpeak (min)=     17.00        22.00
     Unit Hyd. peak  (cms)=       .07          .05
                                                    *TOTALS*
     PEAK FLOW       (cms)=      2.42         4.08      6.269 (iii)
     TIME TO PEAK    (hrs)=      1.27         1.42      1.367
     RUNOFF VOLUME    (mm)=     66.25        34.40     40.774
     TOTAL RAINFALL   (mm)=     68.26        68.26     68.256
     RUNOFF COEFFICIENT   =       .97          .50       .597

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
025:0008------------------------------------------------------------------------
*#*%----------------|---------------------------------------------------------|
*#
*#  External catchment containing a portion of Cedar Creek Road, a portion of
*#         industrial area, and a grassed area near Hwy 401 off-ramp,
*#            draining south into site and flowing south / east.
*#
*#------------------|---------------------------------------------------------|
---------------------
| CALIB STANDHYD     |   Area    (ha)=   14.55
| 06:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
----------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      8.73         5.82
     Dep. Storage     (mm)=      2.00         5.00
     Average Slope     (%)=      2.30         2.00
     Length            (m)=   1050.00        30.00
     Mannings n            =      .025         .250

     Max.eff.Inten.(mm/hr)=    150.44        86.79
                over (min)       10.00        17.00
     Storage Coeff.  (min)=     10.26 (ii)   16.54 (ii)
     Unit Hyd. Tpeak (min)=     10.00        17.00
     Unit Hyd. peak  (cms)=       .11          .07
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .62          .86      1.343 (iii)
     TIME TO PEAK    (hrs)=      1.15         1.33      1.267
     RUNOFF VOLUME    (mm)=     66.25        23.42     29.847
     TOTAL RAINFALL   (mm)=     68.26        68.26     68.256
     RUNOFF COEFFICIENT   =       .97          .34       .437

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
025:0009------------------------------------------------------------------------
*#
*# External catchment west of site, containing exisiting industrial
*# property draining into private SWM feature and then onto site flowing east
*#
*#------------------|---------------------------------------------------------|
---------------------
| DESIGN STANDHYD    |   Area    (ha)=   12.64
| 07:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=     10.11         2.53
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      3.10         3.10
     Length            (m)=   290.29        40.00
     Mannings n            =      .013         .250

     Max.eff.Inten.(mm/hr)=    191.56       150.65
                over (min)       3.00         8.00
     Storage Coeff.  (min)=      2.66 (ii)    7.91 (ii)
     Unit Hyd. Tpeak (min)=      3.00         8.00
     Unit Hyd. peak  (cms)=       .41          .14
                                                    *TOTALS*
     PEAK FLOW       (cms)=      2.92          .73       3.301 (iii)
     TIME TO PEAK    (hrs)=      1.02         1.17       1.017
     RUNOFF VOLUME    (mm)=     67.46        27.04      47.250
     TOTAL RAINFALL   (mm)=     68.26        68.26      68.256
     RUNOFF COEFFICIENT   =       .99          .40        .692

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
025:0010------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
*#
*#                        Infiltration in External SWM Feature
*#
*#------------------|---------------------------------------------------------|
---------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>07:(102    )   |
| OUT<08:(xSWinf)    |    =========  OUTFLOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00     |     .018  .3759E+00
                           .018  .4380E-01     |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (102   )      12.64     3.301     1.017     47.250
     OUTFLOW<08: (xSWinf)       8.32      .018      .850     47.249
    OVERFLOW<09: (OVF-xI)       4.32     1.421     1.283     47.250

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        4
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=     1.87
                    PERCENTAGE OF TIME OVERFLOWING    (%)=     1.37


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .545
                    TIME SHIFT OF PEAK FLOW       (min)=   -10.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3759E+00

------------------------------------------------------------------------------
025:0011------------------------------------------------------------------------
*#
*#                     Total existing area draining to the east
*#
*#------------------|---------------------------------------------------------|
---------------------
| ADD HYD (ToEast    ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 02:100         55.94    6.269   1.37  40.77    .000
                       +ID2 03:IntEst       7.79     .508   1.42  24.06    .000
                       +ID3 06:101         14.55    1.343   1.27  29.85    .000
                       +ID4 09:OVF-xI       4.32    1.421   1.28  47.25    .000
                        ==========================================================
                        SUM 05:ToEast       82.60    9.198   1.33  37.61    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
025:0012------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
*#
*# External catchment west of the site, containing a portion of existing
*# industrial property, draining east into the site and flowing south.
*#
*#------------------|---------------------------------------------------------|
---------------------
| DESIGN STANDHYD    |   Area    (ha)=    4.52
| 01:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------

                           IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      3.62          .90
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      5.30         5.30
     Length            (m)=   173.59        40.00
     Mannings n            =      .013         .250

     Max.eff.Inten.(mm/hr)=    191.56       159.27
                over (min)       2.00         6.00
     Storage Coeff.  (min)=      1.66 (ii)    6.04 (ii)
     Unit Hyd. Tpeak (min)=      2.00         6.00
     Unit Hyd. peak  (cms)=       .63          .19
                                                    *TOTALS*
     PEAK FLOW       (cms)=      1.15          .29       1.319 (iii)
     TIME TO PEAK    (hrs)=      1.00         1.12       1.000
     RUNOFF VOLUME    (mm)=     67.46        27.04      47.250
     TOTAL RAINFALL   (mm)=     68.26        68.26      68.256
     RUNOFF COEFFICIENT   =       .99          .40        .692

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
025:0013------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
*#
*#                              Total Flows to the south
*#
*#------------------|---------------------------------------------------------|
-------------------------
| ADD HYD (TSouth    ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 04:106         11.00     .544   1.72  25.38    .000
                       +ID2 01:103          4.52    1.319   1.00  47.25    .000
                        ==========================================================
                        SUM 02:TSouth      15.52    1.350   1.00  31.75    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
025:0014------------------------------------------------------------------------
*#
*#                  Total Flows from site (eventually to Cedar Creek)
*#
*#------------------|---------------------------------------------------------|
-------------------------
| ADD HYD (TotalF    ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 05:ToEast      82.60    9.198   1.33  37.61    .000
                       +ID2 02:TSouth      15.52    1.350   1.00  31.75    .000
                        ==========================================================
                        SUM 03:TotalF      98.12    9.935   1.33  36.68    .000
```

```
01891>
01892>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01893>
01894> ------------------------------------------------------------------------------
01895> 025:0015------------------------------------------------------------------------
01896> ------------------------------------------------------------------------------
01897> 025:0002------------------------------------------------------------------------
01898> ------------------------------------------------------------------------------
01899> 025:0002------------------------------------------------------------------------
01900> ------------------------------------------------------------------------------
01901> 025:0002------------------------------------------------------------------------
01902> ------------------------------------------------------------------------------
01903> 025:0002------------------------------------------------------------------------
01904>   ** END OF RUN :  49
01905>
01906> ********************************************************************************
01907>
01908>
01909>
01910>
01911>
01912> --------------------
01913> | START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
01914> --------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
01915>     TZERO =   .00 hrs on       0
01916>     METOUT=   2 (output = METRIC)
01917>     NRUN  = 050
01918>     NSTORM=   1
01919>               #  1=Kit50yr.3hr
01920> ------------------------------------------------------------------------------
01921> 050:0002------------------------------------------------------------------------
01922> *#*****************************************************************************
01923> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project # : [161414214]
01924> *#  Date        : 11-18-2024
01925> *#  Modeller    : [Amy Kyle]
01926> *#  Company     : Stantec Consulting Ltd. (Waterloo)
01927> *#  License #   : 4730904
01928> *#
01929> *#  This hydrologic analysis prepared to provide pond sizing
01930> *#  for the 2509 Cedar Creek Road SWM Facility
01931> *#  The storm events modelled are:
01932> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
01933> *#  and the Regional Event
01934> *#*****************************************************************************
01935> ------------------------------------------------------------------------------
01936> 050:0002------------------------------------------------------------------------
01937> --------------------
01938> | READ STORM       |    Filename: 50-yr, 3hr Chicago Storm - Kitchener IDF
01939> | Ptotal=  77.24 mm|    Comments: 50-yr, 3hr Chicago Storm - Kitchener IDF
01940> --------------------
01941>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01942>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01943>                .08   3.816 |    .83  44.095 |   1.58  18.483 |   2.33   5.829
01944>                .17   4.387 |    .92  99.987 |   1.67  15.446 |   2.42   5.344
01945>                .25   5.123 |   1.00 214.691 |   1.75  13.144 |   2.50   4.924
01946>                .33   6.098 |   1.08 124.641 |   1.83  11.355 |   2.58   4.558
01947>                .42   7.433 |   1.17  75.450 |   1.92   9.934 |   2.67   4.235
01948>                .50   9.341 |   1.25  51.107 |   2.00   8.785 |   2.75   3.950
01949>                .58  12.226 |   1.33  37.204 |   2.08   7.841 |   2.83   3.697
01950>                .67  16.932 |   1.42  28.478 |   2.17   7.055 |   2.92   3.470
01951>                .75  25.505 |   1.50  22.619 |   2.25   6.393 |   3.00   3.267
01952>
01953> ------------------------------------------------------------------------------
01954> 050:0003------------------------------------------------------------------------
01955> *#============================================================================
01956> *# Pre-Development Drainage Area (Internal Catchments)
01957> *#============================================================================
01958> *#-----------------|--------------------------------------------------------|
01959> *#
01960> *#                     Existing internal area draining to the east
01961> *#
01962> *#-----------------|--------------------------------------------------------|
01963> ----------------------
01964> | DESIGN NASHYD      |   Area    (ha)=    7.06   Curve Number    (CN)=68.00
01965> | 01:105    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01966> ----------------------   U.H. Tp(hrs)=    .330
01967>
01968>     Unit Hyd Qpeak  (cms)=     .817
01969>
01970>     PEAK FLOW       (cms)=     .563 (i)
01971>     TIME TO PEAK    (hrs)=    1.450
01972>     RUNOFF VOLUME    (mm)=   29.376
01973>     TOTAL RAINFALL   (mm)=   77.237
01974>     RUNOFF COEFFICIENT   =     .380
01975>
01976>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01977>
01978> ------------------------------------------------------------------------------
01979> 050:0004------------------------------------------------------------------------
01980> *#
01981> *#    Small external area entering site from east and draining south / east
01982> *#
01983> *#-----------------|--------------------------------------------------------|
01984> ----------------------
01985> | DESIGN NASHYD      |   Area    (ha)=     .73   Curve Number    (CN)=70.00
01986> | 02:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01987> ----------------------   U.H. Tp(hrs)=    .190
01988>
01989>     Unit Hyd Qpeak  (cms)=     .147
01990>
01991>     PEAK FLOW       (cms)=     .084 (i)
01992>     TIME TO PEAK    (hrs)=    1.250
01993>     RUNOFF VOLUME    (mm)=   31.074
01994>     TOTAL RAINFALL   (mm)=   77.237
01995>     RUNOFF COEFFICIENT   =     .402
01996>
01997>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01998>
01999> ------------------------------------------------------------------------------
02000> 050:0005------------------------------------------------------------------------
02001> *#-----------------|--------------------------------------------------------|
02002> *#
02003> *#                     Total existing area draining to the east
02004> *#
02005> *#-----------------|--------------------------------------------------------|
02006> ----------------------
02007> | ADD HYD (IntEst    ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
02008> ----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
02009>                      ID1 01:105            7.06     .563    1.45  29.38    .000
02010>                     +ID2 02:104             .73     .084    1.25  31.07    .000
02011>                      ========================================================
02012>                      SUM 03:IntEst         7.79     .631    1.42  29.53    .000
02013>
02014>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02015>
02016> ------------------------------------------------------------------------------
02017> 050:0006------------------------------------------------------------------------
02018> *#
02019> *#                     Existing internal area draining to the south
02020> *#
02021> *#-----------------|--------------------------------------------------------|
02022> ----------------------
02023> | DESIGN NASHYD      |   Area    (ha)=   11.00   Curve Number    (CN)=70.00
02024> | 04:106    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02025> ----------------------   U.H. Tp(hrs)=    .540
02026>
02027>     Unit Hyd Qpeak  (cms)=     .778
02028>
02029>     PEAK FLOW       (cms)=     .673 (i)
02030>     TIME TO PEAK    (hrs)=    1.717
02031>     RUNOFF VOLUME    (mm)=   31.074
02032>     TOTAL RAINFALL   (mm)=   77.237
02033>     RUNOFF COEFFICIENT   =     .402
02034>
02035>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02036>
02037> ------------------------------------------------------------------------------
02038> 050:0007------------------------------------------------------------------------
02039> *#============================================================================
02040> *# Total Pre-Development Drainage Area (Including Large External Catchments)
02041> *#============================================================================
02042> *#-----------------|--------------------------------------------------------|
02043> *#
02044> *#  External industrial catchment and part of Hwy 401, draining south into the
02045> *#                     site and flowing south / east.
02046> *#
02047> *#-----------------|--------------------------------------------------------|
02048> ----------------------
02049> | CALIB STANDHYD     |   Area    (ha)=   55.94
02050> | 02:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
02051> ----------------------
02052>                              IMPERVIOUS    PERVIOUS (i)
02053>     Surface Area     (ha)=      44.75         11.19
02054>     Dep. Storage     (mm)=       2.00          5.00
02055>     Average Slope     (%)=       1.50          2.00
02056>     Length            (m)=    1750.00         30.00
02057>     Mannings n            =       .025          .250
02058>
02059>     Max.eff.Inten.(mm/hr)=     142.00        275.95
02060>               over (min)       16.00         20.00
02061>     Storage Coeff.  (min)=     16.21 (ii)    20.17 (ii)
02062>     Unit Hyd. Tpeak (min)=     16.00         20.00
02063>     Unit Hyd. peak  (cms)=       .07           .06
02064>                                                          *TOTALS*
02065>     PEAK FLOW       (cms)=      2.84          5.18          7.793 (iii)
02066>     TIME TO PEAK    (hrs)=      1.25          1.38          1.333
02067>     RUNOFF VOLUME    (mm)=     75.23         41.39         48.163
02068>     TOTAL RAINFALL   (mm)=     77.24         77.24         77.237
02069>     RUNOFF COEFFICIENT   =       .97           .54           .624
02070>
02071>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02072>           CN* =  50.0   Ia = Dep. Storage  (Above)
02073>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02074>           THAN THE STORAGE COEFFICIENT.
02075>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02076>
02077> ------------------------------------------------------------------------------
02078> 050:0008------------------------------------------------------------------------
02079> *#*%----------------|--------------------------------------------------------|
02080> *#
02081> *#  External catchment containing a portion of Cedar Creek Road, a portion of
02082> *#         industrial area, and a grassed area near Hwy 401 off-ramp,
02083> *#            draining south into site and flowing south / east.
02084> *#
02085> *#-----------------|--------------------------------------------------------|
02086> ----------------------
02087> | CALIB STANDHYD     |   Area    (ha)=   14.55
02088> | 06:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
02089> ----------------------
02090>                              IMPERVIOUS    PERVIOUS (i)
02091>     Surface Area     (ha)=       8.73          5.82
02092>     Dep. Storage     (mm)=       2.00          5.00
02093>     Average Slope     (%)=       2.30          2.00
02094>     Length            (m)=    1050.00         30.00
02095>     Mannings n            =       .025          .250
02096>
02097>     Max.eff.Inten.(mm/hr)=     169.67        114.64
02098>               over (min)       10.00         15.00
02099>     Storage Coeff.  (min)=      9.77 (ii)    15.40 (ii)
02100>     Unit Hyd. Tpeak (min)=      10.00         15.00
02101>     Unit Hyd. peak  (cms)=        .11           .07
02102>                                                          *TOTALS*
02103>     PEAK FLOW       (cms)=        .72          1.12          1.707 (iii)
02104>     TIME TO PEAK    (hrs)=       1.15          1.30          1.233
02105>     RUNOFF VOLUME    (mm)=      75.23         28.84         35.803
02106>     TOTAL RAINFALL   (mm)=      77.24         77.24         77.237
02107>     RUNOFF COEFFICIENT   =        .97           .37           .464
02108>
02109>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02110>           CN* =  50.0   Ia = Dep. Storage  (Above)
02111>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02112>           THAN THE STORAGE COEFFICIENT.
02113>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02114>
02115> ------------------------------------------------------------------------------
02116> 050:0009------------------------------------------------------------------------
02117> *#
02118> *# External catchment west of site, containing exisiting industrial
02119> *# property draining into private SWM feature and then onto site flowing east
02120> *#
02121> *#-----------------|--------------------------------------------------------|
02122> ----------------------
02123> | DESIGN STANDHYD    |   Area    (ha)=   12.64
02124> | 07:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
02125> ----------------------
02126>                              IMPERVIOUS    PERVIOUS (i)
02127>     Surface Area     (ha)=      10.11          2.53
02128>     Dep. Storage     (mm)=        .80          1.50
02129>     Average Slope     (%)=       3.10          3.10
02130>     Length            (m)=     290.29         40.00
02131>     Mannings n            =       .013          .250
02132>
02133>     Max.eff.Inten.(mm/hr)=     214.69        188.85
02134>               over (min)        3.00          7.00
02135>     Storage Coeff.  (min)=       2.54 (ii)     7.34 (ii)
02136>     Unit Hyd. Tpeak (min)=       3.00          7.00
02137>     Unit Hyd. peak  (cms)=        .42           .16
02138>                                                          *TOTALS*
02139>     PEAK FLOW       (cms)=       3.30           .93          3.858 (iii)
02140>     TIME TO PEAK    (hrs)=       1.02          1.13          1.017
02141>     RUNOFF VOLUME    (mm)=      76.44         32.95         54.694
02142>     TOTAL RAINFALL   (mm)=      77.24         77.24         77.237
02143>     RUNOFF COEFFICIENT   =        .99           .43           .708
02144>
02145>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02146>           CN* =  50.0   Ia = Dep. Storage  (Above)
02147>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02148>           THAN THE STORAGE COEFFICIENT.
02149>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02150>
02151> ------------------------------------------------------------------------------
02152> 050:0010------------------------------------------------------------------------
02153> *#-----------------|--------------------------------------------------------|
02154> *#
02155> *#                     Infiltration in External SWM Feature
02156> *#
02157> *#-----------------|--------------------------------------------------------|
02158> ----------------------
02159> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
02160> |  IN>07:(102   )    |
```

```
| OUT<08:(xSWinf)   |    =========  OUTLFOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
                             .000  .0000E+00   |     .018  .3759E+00
                             .018  .4380E-01   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >07: (102   )      12.64     3.858     1.017     54.694
     OUTFLOW<08: (xSWinf)       7.19      .018      .817     54.693
    OVERFLOW<09: (OVF-xI)       5.45     2.263     1.200     54.694

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=     1.97
                  PERCENTAGE OF TIME OVERFLOWING    (%)=     1.44


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .467
                  TIME SHIFT OF PEAK FLOW          (min)=   -12.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.3759E+00

--------------------------------------------------------------------------------
050:0011--------------------------------------------------------------------------
*#
*#                    Total existing area draining to the east
*#
*#-----------------|------------------------------------------------------------|
----------------------
| ADD HYD (ToEast    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 02:100          55.94    7.793    1.33  48.16    .000
                     +ID2 03:IntEst        7.79     .631    1.42  29.53    .000
                     +ID3 06:101          14.55    1.707    1.23  35.80    .000
                     +ID4 09:OVF-xI        5.45    2.263    1.20  54.69    .000
                      ==========================================================
                      SUM 05:ToEast       83.73   11.506    1.30  44.71    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0012--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*# External catchment west of the site, containing a portion of existing
*# industrial property, draining east into the site and flowing south.
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    4.52
| 01:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.62          .90
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       5.30         5.30
     Length            (m)=     173.59        40.00
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=     214.69       195.13
                  over (min)       2.00         6.00
     Storage Coeff.  (min)=       1.59 (ii)    5.62 (ii)
     Unit Hyd. Tpeak (min)=       2.00         6.00
     Unit Hyd. peak  (cms)=        .64          .20
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.30          .36          1.513 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.10          1.000
     RUNOFF VOLUME    (mm)=      76.44        32.95         54.694
     TOTAL RAINFALL   (mm)=      77.24        77.24         77.237
     RUNOFF COEFFICIENT   =        .99          .43           .708

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0013--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#                          Total Flows to the south
*#
*#-----------------|------------------------------------------------------------|
----------------------
| ADD HYD (TSouth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 04:106          11.00     .673    1.72  31.07    .000
                     +ID2 01:103           4.52    1.513    1.00  54.69    .000
                      ==========================================================
                      SUM 02:TSouth       15.52    1.554    1.00  37.95    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0014--------------------------------------------------------------------------
*#
*#                Total Flows from site (eventually to Cedar Creek)
*#
*#-----------------|------------------------------------------------------------|
----------------------
| ADD HYD (TotalF    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 05:ToEast       83.73   11.506    1.30  44.71    .000
                     +ID2 02:TSouth       15.52    1.554    1.00  37.95    .000
                      ==========================================================
                      SUM 03:TotalF       99.25   12.393    1.28  43.65    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0015--------------------------------------------------------------------------
--------------------------------------------------------------------------------
050:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
050:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
050:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
050:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
050:0002--------------------------------------------------------------------------
  ** END OF RUN :  99

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




----------------------
| START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
----------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 100
    NSTORM=   1
             #  1=Kit100yr.3hr
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
*#******************************************************************************
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
----------------------
| READ STORM       |    Filename: 100-yr, 3hr Chicago Storm - Kitchener ID
| Ptotal=  87.07 mm|    Comments: 100-yr, 3hr Chicago Storm - Kitchener ID
----------------------
               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .08   4.087 |    .83  50.502 |   1.58  20.973 |   2.33   6.373
               .17   4.733 |    .92 113.675 |   1.67  17.458 |   2.42   5.820
               .25   5.569 |   1.00 239.354 |   1.75  14.796 |   2.50   5.342
               .33   6.681 |   1.08 141.249 |   1.83  12.729 |   2.58   4.926
               .42   8.210 |   1.17  86.233 |   1.92  11.089 |   2.67   4.561
               .50  10.405 |   1.25  58.548 |   2.00   9.765 |   2.75   4.239
               .58  13.734 |   1.33  42.595 |   2.08   8.679 |   2.83   3.953
               .67  19.179 |   1.42  32.533 |   2.17   7.777 |   2.92   3.698
               .75  29.096 |   1.50  25.760 |   2.25   7.018 |   3.00   3.469

--------------------------------------------------------------------------------
100:0003--------------------------------------------------------------------------
*#==============================================================================
*# Pre-Development Drainage Area (Internal Catchments)
*#==============================================================================
*#-----------------|------------------------------------------------------------|
*#
*#                    Existing internal area draining to the east
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=    7.06   Curve Number   (CN)=68.00
| 01:105    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .330

     Unit Hyd Qpeak  (cms)=     .817

     PEAK FLOW       (cms)=     .691 (i)
     TIME TO PEAK    (hrs)=    1.450
     RUNOFF VOLUME    (mm)=   35.699
     TOTAL RAINFALL   (mm)=   87.067
     RUNOFF COEFFICIENT   =     .410

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

--------------------------------------------------------------------------------
100:0004--------------------------------------------------------------------------
*#
*#    Small external area entering site from east and draining south / east
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .73   Curve Number   (CN)=70.00
| 02:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .147

     PEAK FLOW       (cms)=     .103 (i)
     TIME TO PEAK    (hrs)=    1.250
     RUNOFF VOLUME    (mm)=   37.658
     TOTAL RAINFALL   (mm)=   87.067
     RUNOFF COEFFICIENT   =     .433

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

--------------------------------------------------------------------------------
100:0005--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#                    Total existing area draining to the east
*#
*#-----------------|------------------------------------------------------------|
----------------------
| ADD HYD (IntEst    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 01:105           7.06     .691    1.45  35.70    .000
                     +ID2 02:104            .73     .103    1.25  37.66    .000
                      ==========================================================
                      SUM 03:IntEst        7.79     .773    1.42  35.88    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0006--------------------------------------------------------------------------
*#
*#                    Existing internal area draining to the south
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=   11.00   Curve Number   (CN)=70.00
| 04:106    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .540

     Unit Hyd Qpeak  (cms)=     .778

     PEAK FLOW       (cms)=     .823 (i)
     TIME TO PEAK    (hrs)=    1.700
     RUNOFF VOLUME    (mm)=   37.659
     TOTAL RAINFALL   (mm)=   87.067
     RUNOFF COEFFICIENT   =     .433

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

--------------------------------------------------------------------------------
100:0007--------------------------------------------------------------------------
*#==============================================================================
*# Total Pre-Development Drainage Area (Including Large External Catchments)
*#==============================================================================
*#-----------------|------------------------------------------------------------|
*#
*#  External industrial catchment and part of Hwy 401, draining south into the
*#                        site and flowing south / east.
*#
*#-----------------|------------------------------------------------------------|
----------------------
| CALIB STANDHYD     |   Area    (ha)=   55.94
| 02:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
```

```
      Surface Area     (ha)=      44.75        11.19
      Dep. Storage     (mm)=       2.00         5.00
      Average Slope     (%)=       1.50         2.00
      Length            (m)=    1750.00        30.00
      Mannings n           =       .025         .250

      Max.eff.Inten.(mm/hr)=     164.76       338.74
                  over (min)      15.00        19.00
      Storage Coeff.  (min)=      15.28 (ii)   18.92 (ii)
      Unit Hyd. Tpeak (min)=      15.00        19.00
      Unit Hyd. peak  (cms)=        .07          .06
                                                          *TOTALS*
      PEAK FLOW       (cms)=       3.31         6.46          9.501 (iii)
      TIME TO PEAK    (hrs)=       1.23         1.37          1.317
      RUNOFF VOLUME    (mm)=      85.06        49.32         56.471
      TOTAL RAINFALL   (mm)=      87.07        87.07         87.067
      RUNOFF COEFFICIENT   =        .98          .57           .649

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
100:0008--------------------------------------------------------------------------
*#*%----------------|-----------------------------------------------------------|
*#
*#  External catchment containing a portion of Cedar Creek Road, a portion of
*#          industrial area, and a grassed area near Hwy 401 off-ramp,
*#             draining south into site and flowing south / east.
*#
*#----------------|-----------------------------------------------------------|
----------------------
| CALIB STANDHYD    |   Area    (ha)=   14.55
| 06:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       8.73         5.82
      Dep. Storage     (mm)=       2.00         5.00
      Average Slope     (%)=       2.30         2.00
      Length            (m)=    1050.00        30.00
      Mannings n           =       .025         .250

      Max.eff.Inten.(mm/hr)=     195.75       143.31
                  over (min)       9.00        14.00
      Storage Coeff.  (min)=       9.23 (ii)   14.37 (ii)
      Unit Hyd. Tpeak (min)=       9.00        14.00
      Unit Hyd. peak  (cms)=        .12          .08
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .83         1.43          2.103 (iii)
      TIME TO PEAK    (hrs)=       1.13         1.28          1.217
      RUNOFF VOLUME    (mm)=      85.06        35.14         42.627
      TOTAL RAINFALL   (mm)=      87.07        87.07         87.067
      RUNOFF COEFFICIENT   =        .98          .40           .490

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
100:0009--------------------------------------------------------------------------
*#
*# External catchment west of site, containing exisiting industrial
*# property draining into private SWM feature and then onto site flowing east
*#
*#----------------|-----------------------------------------------------------|
----------------------
| DESIGN STANDHYD   |   Area    (ha)=   12.64
| 07:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=      10.11         2.53
      Dep. Storage     (mm)=        .80         1.50
      Average Slope     (%)=       3.10         3.10
      Length            (m)=     290.29        40.00
      Mannings n           =       .013         .250

      Max.eff.Inten.(mm/hr)=     239.35       228.73
                  over (min)       2.00         7.00
      Storage Coeff.  (min)=       2.43 (ii)    6.88 (ii)
      Unit Hyd. Tpeak (min)=       2.00         7.00
      Unit Hyd. peak  (cms)=        .49          .16
                                                          *TOTALS*
      PEAK FLOW       (cms)=       3.81         1.15          4.403 (iii)
      TIME TO PEAK    (hrs)=       1.00         1.13          1.017
      RUNOFF VOLUME    (mm)=      86.27        39.75         63.011
      TOTAL RAINFALL   (mm)=      87.07        87.07         87.067
      RUNOFF COEFFICIENT   =        .99          .46           .724

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
100:0010--------------------------------------------------------------------------
*#----------------|-----------------------------------------------------------|
*#
*#                      Infiltration in External SWM Feature
*#
*#----------------|-----------------------------------------------------------|
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>07:(102   )   |
| OUT<08:(xSWinf)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .018  .3759E+00
                           .018  .4380E-01   |     .000  .0000E+00

      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
      ---------------            (ha)     (cms)     (hrs)       (mm)
      INFLOW >07: (102   )      12.64     4.403     1.017     63.011
      OUTFLOW<08: (xSWinf)       6.24      .018      .783     63.010
     OVERFLOW<09: (OVF-xI)       6.40     3.189     1.133     63.011

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=     2.02
                    PERCENTAGE OF TIME OVERFLOWING    (%)=     1.48


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .409
                    TIME SHIFT OF PEAK FLOW         (min)=   -14.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3759E+00

--------------------------------------------------------------------------------
100:0011--------------------------------------------------------------------------
*#
*#                      Total existing area draining to the east
*#
*#----------------|-----------------------------------------------------------|
----------------------
| ADD HYD (ToEast    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 02:100          55.94    9.501   1.32  56.47    .000
                     +ID2 03:IntEst         7.79     .773   1.42  35.88    .000
                     +ID3 06:101           14.55    2.103   1.22  42.63    .000
                     +ID4 09:OVF-xI         6.40    3.189   1.13  63.01    .000
                       ============================================================
                       SUM 05:ToEast       84.68   14.037   1.28  52.69    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0012--------------------------------------------------------------------------
*#----------------|-----------------------------------------------------------|
*#
*# External catchment west of the site, containing a portion of existing
*# industrial property, draining east into the site and flowing south.
*#
*#----------------|-----------------------------------------------------------|
----------------------
| DESIGN STANDHYD   |   Area    (ha)=   4.52
| 01:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       3.62         .90
      Dep. Storage     (mm)=        .80         1.50
      Average Slope     (%)=       5.30         5.30
      Length            (m)=     173.59        40.00
      Mannings n           =       .013         .250

      Max.eff.Inten.(mm/hr)=     239.35       247.90
                  over (min)       2.00         5.00
      Storage Coeff.  (min)=       1.52 (ii)    5.19 (ii)
      Unit Hyd. Tpeak (min)=       2.00         5.00
      Unit Hyd. peak  (cms)=        .66          .22
                                                          *TOTALS*
      PEAK FLOW       (cms)=       1.46          .46          1.767 (iii)
      TIME TO PEAK    (hrs)=       1.00         1.08          1.000
      RUNOFF VOLUME    (mm)=      86.27        39.75         63.011
      TOTAL RAINFALL   (mm)=      87.07        87.07         87.067
      RUNOFF COEFFICIENT   =        .99          .46           .724

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
100:0013--------------------------------------------------------------------------
*#----------------|-----------------------------------------------------------|
*#
*#                          Total Flows to the south
*#
*#----------------|-----------------------------------------------------------|
----------------------
| ADD HYD (TSouth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 04:106          11.00     .823   1.70  37.66    .000
                     +ID2 01:103            4.52    1.767   1.00  63.01    .000
                       ============================================================
                       SUM 02:TSouth       15.52    1.819   1.00  45.04    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0014--------------------------------------------------------------------------
*#
*#                  Total Flows from site (eventually to Cedar Creek)
*#
*#----------------|-----------------------------------------------------------|
----------------------
| ADD HYD (TotalF    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 05:ToEast       84.68   14.037   1.28  52.69    .000
                     +ID2 02:TSouth        15.52    1.819   1.00  45.04    .000
                       ============================================================
                       SUM 03:TotalF      100.20   15.108   1.27  51.51    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0015--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
--------------------------------------------------------------------------------
100:0002--------------------------------------------------------------------------
  ** END OF RUN : 499

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




--------------------
| START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
--------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 500
    NSTORM=   1
          #  1=hurhaz48.stm
--------------------------------------------------------------------------------
500:0002--------------------------------------------------------------------------
*#*****************************************************************************
*#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project # : [161414214]
*#  Date        : 11-18-2024
*#  Modeller    : [Amy Kyle]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   : 4730904
*#
*#  This hydrologic analysis prepared to provide pond sizing
*#  for the 2509 Cedar Creek Road SWM Facility
*#  The storm events modelled are:
*#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
*#  and the Regional Event
*#*****************************************************************************
--------------------------------------------------------------------------------
500:0002--------------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: REGIONAL STORM
| Ptotal= 285.00 mm|    Comments: REGIONAL STORM
--------------------
               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
```

```
02701>               .25   2.000 |  12.25   2.000 |  24.25   2.000 |  36.25   6.000
02702>               .50   2.000 |  12.50   2.000 |  24.50   2.000 |  36.50   6.000
02703>               .75   2.000 |  12.75   2.000 |  24.75   2.000 |  36.75   6.000
02704>              1.00   2.000 |  13.00   2.000 |  25.00   2.000 |  37.00   6.000
02705>              1.25   2.000 |  13.25   2.000 |  25.25   2.000 |  37.25   4.000
02706>              1.50   2.000 |  13.50   2.000 |  25.50   2.000 |  37.50   4.000
02707>              1.75   2.000 |  13.75   2.000 |  25.75   2.000 |  37.75   4.000
02708>              2.00   2.000 |  14.00   2.000 |  26.00   2.000 |  38.00   4.000
02709>              2.25   2.000 |  14.25   2.000 |  26.25   2.000 |  38.25   6.000
02710>              2.50   2.000 |  14.50   2.000 |  26.50   2.000 |  38.50   6.000
02711>              2.75   2.000 |  14.75   2.000 |  26.75   2.000 |  38.75   6.000
02712>              3.00   2.000 |  15.00   2.000 |  27.00   2.000 |  39.00   6.000
02713>              3.25   2.000 |  15.25   2.000 |  27.25   2.000 |  39.25  13.000
02714>              3.50   2.000 |  15.50   2.000 |  27.50   2.000 |  39.50  13.000
02715>              3.75   2.000 |  15.75   2.000 |  27.75   2.000 |  39.75  13.000
02716>              4.00   2.000 |  16.00   2.000 |  28.00   2.000 |  40.00  13.000
02717>              4.25   2.000 |  16.25   2.000 |  28.25   2.000 |  40.25  17.000
02718>              4.50   2.000 |  16.50   2.000 |  28.50   2.000 |  40.50  17.000
02719>              4.75   2.000 |  16.75   2.000 |  28.75   2.000 |  40.75  17.000
02720>              5.00   2.000 |  17.00   2.000 |  29.00   2.000 |  41.00  17.000
02721>              5.25   2.000 |  17.25   2.000 |  29.25   2.000 |  41.25  13.000
02722>              5.50   2.000 |  17.50   2.000 |  29.50   2.000 |  41.50  13.000
02723>              5.75   2.000 |  17.75   2.000 |  29.75   2.000 |  41.75  13.000
02724>              6.00   2.000 |  18.00   2.000 |  30.00   2.000 |  42.00  13.000
02725>              6.25   2.000 |  18.25   2.000 |  30.25   2.000 |  42.25  23.000
02726>              6.50   2.000 |  18.50   2.000 |  30.50   2.000 |  42.50  23.000
02727>              6.75   2.000 |  18.75   2.000 |  30.75   2.000 |  42.75  23.000
02728>              7.00   2.000 |  19.00   2.000 |  31.00   2.000 |  43.00  23.000
02729>              7.25   2.000 |  19.25   2.000 |  31.25   2.000 |  43.25  13.000
02730>              7.50   2.000 |  19.50   2.000 |  31.50   2.000 |  43.50  13.000
02731>              7.75   2.000 |  19.75   2.000 |  31.75   2.000 |  43.75  13.000
02732>              8.00   2.000 |  20.00   2.000 |  32.00   2.000 |  44.00  13.000
02733>              8.25   2.000 |  20.25   2.000 |  32.25   2.000 |  44.25  13.000
02734>              8.50   2.000 |  20.50   2.000 |  32.50   2.000 |  44.50  13.000
02735>              8.75   2.000 |  20.75   2.000 |  32.75   2.000 |  44.75  13.000
02736>              9.00   2.000 |  21.00   2.000 |  33.00   2.000 |  45.00  13.000
02737>              9.25   2.000 |  21.25   2.000 |  33.25   2.000 |  45.25  53.000
02738>              9.50   2.000 |  21.50   2.000 |  33.50   2.000 |  45.50  53.000
02739>              9.75   2.000 |  21.75   2.000 |  33.75   2.000 |  45.75  53.000
02740>             10.00   2.000 |  22.00   2.000 |  34.00   2.000 |  46.00  53.000
02741>             10.25   2.000 |  22.25   2.000 |  34.25   2.000 |  46.25  38.000
02742>             10.50   2.000 |  22.50   2.000 |  34.50   2.000 |  46.50  38.000
02743>             10.75   2.000 |  22.75   2.000 |  34.75   2.000 |  46.75  38.000
02744>             11.00   2.000 |  23.00   2.000 |  35.00   2.000 |  47.00  38.000
02745>             11.25   2.000 |  23.25   2.000 |  35.25   3.000 |  47.25  13.000
02746>             11.50   2.000 |  23.50   2.000 |  35.50   3.000 |  47.50  13.000
02747>             11.75   2.000 |  23.75   2.000 |  35.75   3.000 |  47.75  13.000
02748>             12.00   2.000 |  24.00   2.000 |  36.00   3.000 |  48.00  13.000
02749>
02750> --------------------------------------------------------------------------------
02751> 500:0003------------------------------------------------------------------------
02752> *#======================================================================
02753> *# Pre-Development Drainage Area (Internal Catchments)
02754> *#======================================================================
02755> *#------------------|---------------------------------------------------------|
02756> *#
02757> *#                      Existing internal area draining to the east
02758> *#
02759> *#------------------|---------------------------------------------------------|
02760> ----------------------
02761> | DESIGN NASHYD      |   Area    (ha)=    7.06   Curve Number   (CN)=68.00
02762> | 01:105    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02763> ----------------------   U.H. Tp(hrs)=    .330
02764>
02765>      Unit Hyd Qpeak  (cms)=     .817
02766>
02767>      PEAK FLOW       (cms)=     .873 (i)
02768>      TIME TO PEAK    (hrs)=   46.083
02769>      RUNOFF VOLUME    (mm)=  199.421
02770>      TOTAL RAINFALL   (mm)=  285.000
02771>      RUNOFF COEFFICIENT   =     .700
02772>
02773>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02774>
02775> --------------------------------------------------------------------------------
02776> 500:0004------------------------------------------------------------------------
02777> *#
02778> *#    Small external area entering site from east and draining south / east
02779> *#
02780> *#------------------|---------------------------------------------------------|
02781> ----------------------
02782> | DESIGN NASHYD      |   Area    (ha)=     .73   Curve Number   (CN)=70.00
02783> | 02:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02784> ----------------------   U.H. Tp(hrs)=    .190
02785>
02786>      Unit Hyd Qpeak  (cms)=     .147
02787>
02788>      PEAK FLOW       (cms)=     .095 (i)
02789>      TIME TO PEAK    (hrs)=   46.017
02790>      RUNOFF VOLUME    (mm)=  204.845
02791>      TOTAL RAINFALL   (mm)=  285.000
02792>      RUNOFF COEFFICIENT   =     .719
02793>
02794>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02795>
02796> --------------------------------------------------------------------------------
02797> 500:0005------------------------------------------------------------------------
02798> *#------------------|---------------------------------------------------------|
02799> *#
02800> *#                      Total existing area draining to the east
02801> *#
02802> *#------------------|---------------------------------------------------------|
02803> ----------------------
02804> | ADD HYD (IntEst    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02805> ----------------------                    (ha)     (cms)   (hrs)    (mm)   (cms)
02806>                       ID1 01:105          7.06     .873   46.08 199.42    .000
02807>                      +ID2 02:104           .73     .095   46.02 204.85    .000
02808>                       ========================================================
02809>                       SUM 03:IntEst       7.79     .967   46.07 199.93    .000
02810>
02811>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02812>
02813> --------------------------------------------------------------------------------
02814> 500:0006------------------------------------------------------------------------
02815> *#
02816> *#                      Existing internal area draining to the south
02817> *#
02818> *#------------------|---------------------------------------------------------|
02819> ----------------------
02820> | DESIGN NASHYD      |   Area    (ha)=   11.00   Curve Number   (CN)=70.00
02821> | 04:106    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02822> ----------------------   U.H. Tp(hrs)=    .540
02823>
02824>      Unit Hyd Qpeak  (cms)=     .778
02825>
02826>      PEAK FLOW       (cms)=    1.242 (i)
02827>      TIME TO PEAK    (hrs)=   46.367
02828>      RUNOFF VOLUME    (mm)=  204.845
02829>      TOTAL RAINFALL   (mm)=  285.000
02830>      RUNOFF COEFFICIENT   =     .719
02831>
02832>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02833>
02834> --------------------------------------------------------------------------------
02835> 500:0007------------------------------------------------------------------------
02836> *#======================================================================
02837> *# Total Pre-Development Drainage Area (Including Large External Catchments)
02838> *#======================================================================
02839> *#------------------|---------------------------------------------------------|
02840> *#
02841> *#  External industrial catchment and part of Hwy 401, draining south into the
02842> *#                        site and flowing south / east.
02843> *#
02844> *#------------------|---------------------------------------------------------|
02845> ----------------------
02846> | CALIB STANDHYD     |   Area    (ha)=   55.94
02847> | 02:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
02848> ----------------------
02849>                                IMPERVIOUS    PERVIOUS (i)
02850>      Surface Area      (ha)=      44.75         11.19
02851>      Dep. Storage      (mm)=       2.00          5.00
02852>      Average Slope      (%)=       1.50          2.00
02853>      Length            (m)=    1750.00         30.00
02854>      Mannings n            =       .025          .250
02855>
02856>      Max.eff.Inten.(mm/hr)=      53.00        201.34
02857>                   over (min)       24.00         29.00
02858>      Storage Coeff.  (min)=      24.04 (ii)    28.53 (ii)
02859>      Unit Hyd. Tpeak (min)=      24.00         29.00
02860>      Unit Hyd. peak  (cms)=        .05           .04
02861>                                                          *TOTALS*
02862>      PEAK FLOW       (cms)=       1.50          5.46          6.944 (iii)
02863>      TIME TO PEAK    (hrs)=      46.15         46.25         46.233
02864>      RUNOFF VOLUME    (mm)=     282.86        231.78        242.090
02865>      TOTAL RAINFALL   (mm)=     285.00        285.00        285.000
02866>      RUNOFF COEFFICIENT   =        .99           .81           .849
02867>
02868>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02869>            CN* =  50.0    Ia = Dep. Storage  (Above)
02870>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02871>            THAN THE STORAGE COEFFICIENT.
02872>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02873>
02874> --------------------------------------------------------------------------------
02875> 500:0008------------------------------------------------------------------------
02876> *#*%----------------|---------------------------------------------------------|
02877> *#
02878> *#  External catchment containing a portion of Cedar Creek Road, a portion of
02879> *#         industrial area, and a grassed area near Hwy 401 off-ramp,
02880> *#            draining south into site and flowing south / east.
02881> *#
02882> *#------------------|---------------------------------------------------------|
02883> ----------------------
02884> | CALIB STANDHYD     |   Area    (ha)=   14.55
02885> | 06:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
02886> ----------------------
02887>                                IMPERVIOUS    PERVIOUS (i)
02888>      Surface Area      (ha)=       8.73          5.82
02889>      Dep. Storage      (mm)=       2.00          5.00
02890>      Average Slope      (%)=       2.30          2.00
02891>      Length            (m)=    1050.00         30.00
02892>      Mannings n            =       .025          .250
02893>
02894>      Max.eff.Inten.(mm/hr)=      53.00         98.81
02895>                   over (min)       16.00         22.00
02896>      Storage Coeff.  (min)=      15.57 (ii)    21.53 (ii)
02897>      Unit Hyd. Tpeak (min)=      16.00         22.00
02898>      Unit Hyd. peak  (cms)=        .07           .05
02899>                                                          *TOTALS*
02900>      PEAK FLOW       (cms)=        .31          1.47          1.778 (iii)
02901>      TIME TO PEAK    (hrs)=      46.03         46.13         46.100
02902>      RUNOFF VOLUME    (mm)=     282.92        198.59        211.296
02903>      TOTAL RAINFALL   (mm)=     285.00        285.00        285.000
02904>      RUNOFF COEFFICIENT   =        .99           .70           .741
02905>
02906>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02907>            CN* =  50.0    Ia = Dep. Storage  (Above)
02908>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02909>            THAN THE STORAGE COEFFICIENT.
02910>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02911>
02912> --------------------------------------------------------------------------------
02913> 500:0009------------------------------------------------------------------------
02914> *#
02915> *# External catchment west of site, containing exisiting industrial
02916> *# property draining into private SWM feature and then onto site flowing east
02917> *#
02918> *#------------------|---------------------------------------------------------|
02919> ----------------------
02920> | DESIGN STANDHYD    |   Area    (ha)=   12.64
02921> | 07:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
02922> ----------------------
02923>                                IMPERVIOUS    PERVIOUS (i)
02924>      Surface Area      (ha)=      10.11          2.53
02925>      Dep. Storage      (mm)=        .80          1.50
02926>      Average Slope      (%)=       3.10          3.10
02927>      Length            (m)=     290.29         40.00
02928>      Mannings n            =       .013          .250
02929>
02930>      Max.eff.Inten.(mm/hr)=      53.00        119.98
02931>                   over (min)        4.00         10.00
02932>      Storage Coeff.  (min)=       4.45 (ii)    10.20 (ii)
02933>      Unit Hyd. Tpeak (min)=       4.00         10.00
02934>      Unit Hyd. peak  (cms)=        .26           .11
02935>                                                          *TOTALS*
02936>      PEAK FLOW       (cms)=        .93           .83          1.765 (iii)
02937>      TIME TO PEAK    (hrs)=      46.00         46.00         46.000
02938>      RUNOFF VOLUME    (mm)=     284.17        209.52        246.871
02939>      TOTAL RAINFALL   (mm)=     285.00        285.00        285.000
02940>      RUNOFF COEFFICIENT   =       1.00           .74           .866
02941>
02942>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02943>            CN* =  50.0    Ia = Dep. Storage  (Above)
02944>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02945>            THAN THE STORAGE COEFFICIENT.
02946>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02947>
02948> --------------------------------------------------------------------------------
02949> 500:0010------------------------------------------------------------------------
02950> *#------------------|---------------------------------------------------------|
02951> *#
02952> *#                          Infiltration in External SWM Feature
02953> *#
02954> *#------------------|---------------------------------------------------------|
02955> ----------------------
02956> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
02957> |  IN>07:(102    )   |
02958> | OUT<08:(xSWinf)    |    =========  OUTFLOW STORAGE TABLE  =========
02959> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
02960>                             (cms)     (ha.m.)   |    (cms)    (ha.m.)
02961>                              .000  .0000E+00    |     .018  .3759E+00
02962>                              .018  .4380E-01    |     .000  .0000E+00
02963>
02964>      ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
02965>      --------------------         (ha)     (cms)     (hrs)       (mm)
02966>      INFLOW >07: (102    )       12.64     1.765    46.000    246.871
02967>      OUTFLOW<08: (xSWinf)         2.73      .018     4.833    246.884
02968>     OVERFLOW<09: (OVF-xI)         9.91     1.746    46.000    246.871
02969>
02970>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
```

```
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=    15.28
                    PERCENTAGE OF TIME OVERFLOWING    (%)=     8.41


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.020
                    TIME SHIFT OF PEAK FLOW         (min)= -2470.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3759E+00

--------------------------------------------------------------------------------
500:0011-----------------------------------------------------------------------
*#
*#                      Total existing area draining to the east
*#
*#-----------------|--------------------------------------------------------|
------------------------
| ADD HYD (ToEast    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 02:100           55.94    6.944   46.23 242.09    .000
                    +ID2 03:IntEst         7.79     .967   46.07 199.93    .000
                    +ID3 06:101           14.55    1.778   46.10 211.30    .000
                    +ID4 09:OVF-xI         9.91    1.746   46.00 246.87    .000
                     ============================================================
                     SUM 05:ToEast        88.19   11.200   46.05 233.82    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
500:0012-----------------------------------------------------------------------
*#-----------------|--------------------------------------------------------|
*#
*# External catchment west of the site, containing a portion of existing
*# industrial property, draining east into the site and flowing south.
*#
*#-----------------|--------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    4.52
| 01:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.62          .90
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       5.30         5.30
     Length            (m)=     173.59        40.00
     Mannings n             =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00       120.05
               over (min)        3.00         8.00
     Storage Coeff.  (min)=      2.78 (ii)    7.68 (ii)
     Unit Hyd. Tpeak (min)=      3.00         8.00
     Unit Hyd. peak  (cms)=       .39          .15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .33          .30          .633 (iii)
     TIME TO PEAK    (hrs)=     45.73        46.00        46.000
     RUNOFF VOLUME    (mm)=    284.18       209.52       246.871
     TOTAL RAINFALL   (mm)=    285.00       285.00       285.000
     RUNOFF COEFFICIENT   =      1.00          .74          .866

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
500:0013-----------------------------------------------------------------------
*#-----------------|--------------------------------------------------------|
*#
*#                          Total Flows to the south
*#
*#-----------------|--------------------------------------------------------|
------------------------
| ADD HYD (TSouth    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 04:106           11.00    1.242   46.37 204.85    .000
                    +ID2 01:103            4.52     .633   46.00 246.87    .000
                     ============================================================
                     SUM 02:TSouth        15.52    1.755   46.02 217.08    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
500:0014-----------------------------------------------------------------------
*#
*#                Total Flows from site (eventually to Cedar Creek)
*#
*#-----------------|--------------------------------------------------------|
------------------------
| ADD HYD (TotalF    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                     ID1 05:ToEast        88.19   11.200   46.05 233.82    .000
                    +ID2 02:TSouth        15.52    1.755   46.02 217.08    .000
                     ============================================================
                     SUM 03:TotalF       103.71   12.937   46.03 231.32    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
500:0015-----------------------------------------------------------------------
--------------------------------------------------------------------------------
500:0002-----------------------------------------------------------------------
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500:0002-----------------------------------------------------------------------
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500:0002-----------------------------------------------------------------------
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500:0002-----------------------------------------------------------------------
--------------------------------------------------------------------------------
500:0002-----------------------------------------------------------------------
--------------------------------------------------------------------------------
500:0002-----------------------------------------------------------------------
--------------------------------------------------------------------------------
500:0002-----------------------------------------------------------------------
      FINISH
--------------------------------------------------------------------------------
*******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
   Simulation ended on 2024-11-18     at 11:13:34
===============================================================================

```

```
00001> ================================================================================
00002>
00003>   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
00004>   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
00005>   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
00006>       S  W W W  M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
00007>   SSSSS   W W   M   M  H   H    Y    M   M   OOO            9      9   =========
00008>                                                          9   9  9   9   # 4730904
00009>         StormWater Management HYdrologic Model            999    999    =========
00010>
00011> ********************************************************************************
00012> ***************************** SWMHYMO Ver/4.05 ***********************************
00013> *********  A single event and continuous hydrologic simulation model  *********
00014> *********     based on the principles of HYMO and its successors      *********
00015> *********                  OTTHYMO-83 and OTTHYMO-89.                  *********
00016> ********************************************************************************
00017> ******** Distributed by:  J.F. Sabourin and Associates Inc.           *********
00018> *********                  Ottawa,  Ontario: (613) 836-3884           *********
00019> *********                  Gatineau, Quebec: (819) 243-6858           *********
00020> *********                  E-Mail: swmhymo@jfsa.Com                   *********
00021> ********************************************************************************
00022>
00023> ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00024> +++++++++ Licensed user: Stantec Consulting Ltd. (Kitchener)          +++++++++
00025> +++++++++                 Kitchener            SERIAL#:4730904       +++++++++
00026> ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
00027>
00028> ********************************************************************************
00029> *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++             *********
00030> *********           Maximum value for ID numbers  :     10            *********
00031> *********           Max. number of rainfall points: 105408            *********
00032> *********           Max. number of flow points    : 105408            *********
00033> ********************************************************************************
00034>
00035>
00036> **********************   D E T A I L E D   O U T P U T   **********************
00037> ********************************************************************************
00038> *         DATE: 2024-11-18     TIME: 10:47:21     RUN COUNTER: 000606         *
00039> ********************************************************************************
00040> * Input   filename: C:\SWMHYMO\CEDARC~1\11-18-~1\CCrPost.dat                    *
00041> * Output  filename: C:\SWMHYMO\CEDARC~1\11-18-~1\CCrPost.out                   *
00042> * Summary filename: C:\SWMHYMO\CEDARC~1\11-18-~1\CCrPost.sum                   *
00043> * User comments:                                                              *
00044> * 1:_____________________________________________________________________     *
00045> * 2:_____________________________________________________________________     *
00046> * 3:_____________________________________________________________________     *
00047> ********************************************************************************
00048>
00049> --------------------------------------------------------------------------------
00050> 001:0001--------------------------------------------------------------------------
00051> *#*******************************************************************************
00052> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project #: [161414214]
00053> *#  Date        : 11/13/2024
00054> *#  Modeller    : [Amy Kyle]
00055> *#  Company     : Stantec Consulting Ltd. (Waterloo)
00056> *#  License #   : 4730904
00057> *#
00058> *#  This hydrologic analysis prepared to provide pond sizing
00059> *#  for the 2509 Cedar Creek Road SWM Facility
00060> *#  The storm events modelled are:
00061> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
00062> *#  and the Regional Event
00063> *#*******************************************************************************
00064> --------------------
00065> | START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
00066> --------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
00067>     TZERO =   .00 hrs on       0
00068>     METOUT=   2 (output = METRIC)
00069>     NRUN  = 001
00070>     NSTORM=   1
00071>              #  1=Kit25mm.4hr
00072> --------------------------------------------------------------------------------
00073> 001:0002--------------------------------------------------------------------------
00074> --------------------
00075> | READ STORM       |    Filename: 25 mm, 4hr Chicago Storm - Kitchener IDF
00076> | Ptotal=  25.00 mm|    Comments: 25 mm, 4hr Chicago Storm - Kitchener IDF
00077> --------------------
00078>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00079>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00080>                .08   1.465 |   1.08   4.024 |   2.08   5.764 |   3.08   2.074
00081>                .17   1.540 |   1.17   4.814 |   2.17   4.969 |   3.17   1.977
00082>                .25   1.625 |   1.25   6.025 |   2.25   4.374 |   3.25   1.889
00083>                .33   1.720 |   1.33   8.114 |   2.33   3.913 |   3.33   1.810
00084>                .42   1.829 |   1.42  12.526 |   2.42   3.545 |   3.42   1.737
00085>                .50   1.955 |   1.50  27.198 |   2.50   3.245 |   3.50   1.671
00086>                .58   2.101 |   1.58  74.855 |   2.58   2.994 |   3.58   1.610
00087>                .67   2.274 |   1.67  31.410 |   2.67   2.782 |   3.67   1.553
00088>                .75   2.482 |   1.75  16.819 |   2.75   2.601 |   3.75   1.501
00089>                .83   2.736 |   1.83  11.357 |   2.83   2.443 |   3.83   1.453
00090>                .92   3.055 |   1.92   8.563 |   2.92   2.305 |   3.92   1.408
00091>               1.00   3.468 |   2.00   6.882 |   3.00   2.183 |   4.00   1.366
00092>
00093> --------------------------------------------------------------------------------
00094> 001:0003--------------------------------------------------------------------------
00095> *#-----------------|------------------------------------------------------------|
00096> *#=================================================================
00097> *# Proposed Drainage Conditions (Internal Areas)
00098> *#=================================================================
00099> *#-----------------|------------------------------------------------------------|
00100> *#
00101> *#    Small portion of West Road Ditch draining offsite to the east through
00102> *#                            By-Pass Storm Sewer(BPSS)
00103> *#
00104> *#-----------------|------------------------------------------------------------|
00105> ----------------------
00106> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
00107> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00108> ----------------------  U.H. Tp(hrs)=    .260
00109>
00110>     Unit Hyd Qpeak  (cms)=     .021
00111>
00112>     PEAK FLOW       (cms)=     .001 (i)
00113>     TIME TO PEAK    (hrs)=    1.917
00114>     RUNOFF VOLUME    (mm)=    1.986
00115>     TOTAL RAINFALL   (mm)=   25.000
00116>     RUNOFF COEFFICIENT   =     .079
00117>
00118>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00119>
00120> --------------------------------------------------------------------------------
00121> 001:0004--------------------------------------------------------------------------
00122> *#-----------------|------------------------------------------------------------|
00123> *#
00124> *#  Proposed developed catchment draining offsite to the east through BPSS
00125> *#
00126> *#-----------------|------------------------------------------------------------|
00127> ----------------------
00128> | DESIGN STANDHYD    |   Area    (ha)=     .64
00129> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
00130> ----------------------
00131>                             IMPERVIOUS    PERVIOUS (i)
00132>     Surface Area     (ha)=        .58          .06
00133>     Dep. Storage     (mm)=        .80         1.50
00134>     Average Slope     (%)=       2.00         2.00
00135>     Length            (m)=      65.32        40.00
00136>     Mannings n            =       .013         .250
00137>
00138>     Max.eff.Inten.(mm/hr)=      74.85        90.91
00139>                 over (min)       2.00         9.00
00140>     Storage Coeff.  (min)=       1.80 (ii)    9.14 (ii)
00141>     Unit Hyd. Tpeak (min)=       2.00         9.00
00142>     Unit Hyd. peak  (cms)=        .60          .12
00143>                                                          *TOTALS*
00144>     PEAK FLOW       (cms)=        .06          .01          .067 (iii)
00145>     TIME TO PEAK    (hrs)=       1.58         1.72         1.583
00146>     RUNOFF VOLUME    (mm)=      24.20         8.08        16.141
00147>     TOTAL RAINFALL   (mm)=      25.00        25.00        25.000
00148>     RUNOFF COEFFICIENT   =        .97          .32          .646
00149>
00150>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00151>           CN* =  50.0    Ia = Dep. Storage  (Above)
00152>        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00153>             THAN THE STORAGE COEFFICIENT.
00154>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00155>
00156> --------------------------------------------------------------------------------
00157> 001:0005--------------------------------------------------------------------------
00158> *#-----------------|------------------------------------------------------------|
00159> *#
00160> *# Proposed internal grassed area and plunge pool draining offsite to the east
00161> *#
00162> *#-----------------|------------------------------------------------------------|
00163> ----------------------
00164> | DESIGN NASHYD      |   Area    (ha)=     .55   Curve Number   (CN)=50.00
00165> | 03:203    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00166> ----------------------  U.H. Tp(hrs)=    .080
00167>
00168>     Unit Hyd Qpeak  (cms)=     .263
00169>
00170>     PEAK FLOW       (cms)=     .005 (i)
00171>     TIME TO PEAK    (hrs)=    1.667
00172>     RUNOFF VOLUME    (mm)=    1.990
00173>     TOTAL RAINFALL   (mm)=   25.000
00174>     RUNOFF COEFFICIENT   =     .080
00175>
00176>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00177>
00178> --------------------------------------------------------------------------------
00179> 001:0006--------------------------------------------------------------------------
00180> *#-----------------|------------------------------------------------------------|
00181> *#
00182> *#          Total internal area draining onto agricultural area to the east
00183> *#
00184> *#-----------------|------------------------------------------------------------|
00185> ----------------------
00186> | ADD HYD (IntUcE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00187> ----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
00188>                        ID1 01:200          .14     .001    1.92   1.99     .000
00189>                       +ID2 02:201          .64     .067    1.58  16.14     .000
00190>                       +ID3 03:203          .55     .005    1.67   1.99     .000
00191>                        ================================================================
00192>                        SUM 05:IntUcE       1.33     .071    1.58   8.80     .000
00193>
00194>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00195>
00196> --------------------------------------------------------------------------------
00197> 001:0007--------------------------------------------------------------------------
00198> *#-----------------|------------------------------------------------------------|
00199> *#
00200> *#             Proposed industrial lots draining to Rear Lot Ditch
00201> *#
00202> *#-----------------|------------------------------------------------------------|
00203> ----------------------
00204> | DESIGN STANDHYD    |   Area    (ha)=    8.82
00205> | 10:202    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
00206> ----------------------
00207>                             IMPERVIOUS    PERVIOUS (i)
00208>     Surface Area     (ha)=       7.94          .88
00209>     Dep. Storage     (mm)=        .80         1.50
00210>     Average Slope     (%)=       2.00         2.00
00211>     Length            (m)=     242.49        40.00
00212>     Mannings n            =       .013         .250
00213>
00214>     Max.eff.Inten.(mm/hr)=      74.85        10.94
00215>                 over (min)       4.00        21.00
00216>     Storage Coeff.  (min)=       3.96 (ii)   21.07 (ii)
00217>     Unit Hyd. Tpeak (min)=       4.00        21.00
00218>     Unit Hyd. peak  (cms)=        .28          .05
00219>                                                          *TOTALS*
00220>     PEAK FLOW       (cms)=       1.08          .02         1.085 (iii)
00221>     TIME TO PEAK    (hrs)=       1.62         1.97         1.617
00222>     RUNOFF VOLUME    (mm)=      24.20         3.89        20.138
00223>     TOTAL RAINFALL   (mm)=      25.00        25.00        25.000
00224>     RUNOFF COEFFICIENT   =        .97          .16          .806
00225>
00226>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00227>           CN* =  50.0    Ia = Dep. Storage  (Above)
00228>        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00229>             THAN THE STORAGE COEFFICIENT.
00230>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00231>
00232> --------------------------------------------------------------------------------
00233> 001:0008--------------------------------------------------------------------------
00234> *#-----------------|------------------------------------------------------------|
00235> *#
00236> *#    External agricultural area draining onsite and entering Rear Lot Ditch
00237> *#
00238> *#-----------------|------------------------------------------------------------|
00239> ----------------------
00240> | DESIGN NASHYD      |   Area    (ha)=     .73   Curve Number   (CN)=70.00
00241> | 07:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00242> ----------------------  U.H. Tp(hrs)=    .190
00243>
00244>     Unit Hyd Qpeak  (cms)=     .147
00245>
00246>     PEAK FLOW       (cms)=     .010 (i)
00247>     TIME TO PEAK    (hrs)=    1.817
00248>     RUNOFF VOLUME    (mm)=    4.172
00249>     TOTAL RAINFALL   (mm)=   25.000
00250>     RUNOFF COEFFICIENT   =     .167
00251>
00252>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00253>
00254> --------------------------------------------------------------------------------
00255> 001:0009--------------------------------------------------------------------------
00256> *#-----------------|------------------------------------------------------------|
00257> *#
00258> *#      Total area entering Rear Lot Ditch and entering SWMF at East inlet
00259> *#
00260> *#-----------------|------------------------------------------------------------|
00261> ----------------------
00262> | ADD HYD (RLswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00263> ----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
00264>                        ID1 10:202          8.82    1.085    1.62  20.14     .000
00265>                       +ID2 07:104           .73     .010    1.82   4.17     .000
00266>                        ================================================================
00267>                        SUM 08:RLswl         9.55    1.089    1.62  18.92     .000
00268>
00269>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00270>
```

```
00271> ------------------------------------------------------------------------------
00272> 001:0010------------------------------------------------------------------------
00273> *#-----------------|----------------------------------------------------------|
00274> *#
00275> *#   Proposed industrial lots draining to East Road Ditch within catchment,
00276> *#                          and new internal roadway
00277> *#
00278> *#-----------------|----------------------------------------------------------|
00279> ---------------------
00280> | DESIGN STANDHYD     |   Area     (ha)=    4.92
00281> | 01:204     DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
00282> ---------------------
00283>                              IMPERVIOUS    PERVIOUS (i)
00284>      Surface Area     (ha)=       4.43         .49
00285>      Dep. Storage     (mm)=        .80        1.50
00286>      Average Slope     (%)=       2.00        2.00
00287>      Length            (m)=     181.11       40.00
00288>      Mannings n            =       .013        .250
00289>
00290>      Max.eff.Inten.(mm/hr)=      74.85       11.23
00291>                 over (min)       3.00       20.00
00292>      Storage Coeff.  (min)=       3.33 (ii)  20.25 (ii)
00293>      Unit Hyd. Tpeak (min)=       3.00       20.00
00294>      Unit Hyd. peak  (cms)=        .35         .06
00295>                                                          *TOTALS*
00296>      PEAK FLOW       (cms)=        .65         .01          .654 (iii)
00297>      TIME TO PEAK    (hrs)=       1.60        1.95         1.600
00298>      RUNOFF VOLUME    (mm)=      24.20        3.89        20.138
00299>      TOTAL RAINFALL   (mm)=      25.00       25.00        25.000
00300>      RUNOFF COEFFICIENT   =        .97         .16          .806
00301>
00302>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00303>            CN* =  50.0   Ia = Dep. Storage  (Above)
00304>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00305>            THAN THE STORAGE COEFFICIENT.
00306>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00307>
00308> ------------------------------------------------------------------------------
00309> 001:0011------------------------------------------------------------------------
00310> *#-----------------|----------------------------------------------------------|
00311> *#
00312> *#              Proposed SWM facility catchment (infiltration basin)
00313> *#
00314> *#-----------------|----------------------------------------------------------|
00315> ---------------------
00316> | DESIGN NASHYD       |   Area     (ha)=    1.63   Curve Number    (CN)=57.00
00317> | 09:205     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
00318> ---------------------   U.H. Tp(hrs)=    .350
00319>
00320>      Unit Hyd Qpeak  (cms)=     .178
00321>
00322>      PEAK FLOW       (cms)=     .009 (i)
00323>      TIME TO PEAK    (hrs)=    2.033
00324>      RUNOFF VOLUME    (mm)=    2.567
00325>      TOTAL RAINFALL   (mm)=   25.000
00326>      RUNOFF COEFFICIENT   =     .103
00327>
00328>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00329>
00330> ------------------------------------------------------------------------------
00331> 001:0012------------------------------------------------------------------------
00332> *#-----------------|----------------------------------------------------------|
00333> *#
00334> *#                          All flows entering SWM facility
00335> *#
00336> *#-----------------|----------------------------------------------------------|
00337> -------------------------
00338> | ADD HYD (ToSWM     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00339> ----------------------   ----             (ha)     (cms)   (hrs)   (mm)    (cms)
00340>                        ID1 07:104          .73      .010   1.82    4.17    .000
00341>                       +ID2 09:205         1.63      .009   2.03    2.57    .000
00342>                       +ID3 10:202         8.82     1.085   1.62   20.14    .000
00343>                       +ID4 01:204         4.92      .654   1.60   20.14    .000
00344>                        ========================================================
00345>                        SUM 06:ToSWM       16.10     1.734   1.60   17.64    .000
00346>
00347>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00348>
00349> ------------------------------------------------------------------------------
00350> 001:0013------------------------------------------------------------------------
00351> *#
00352> *#                       Infiltration Portion of SWM facility
00353> *#
00354> *#-----------------|----------------------------------------------------------|
00355> ---------------------
00356> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00357> |  IN>06:(ToSWM )   |
00358> | OUT<07:(SWMinf)   |    =========  OUTLFOW STORAGE TABLE  =========
00359> ---------------------   OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00360>                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
00361>                            .000  .0000E+00    |     .044  .6364E+00
00362>                            .044  .5530E-01    |     .000  .0000E+00
00363>
00364>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00365>      ---------------            (ha)     (cms)     (hrs)       (mm)
00366>      INFLOW >06: (ToSWM )      16.10     1.734     1.600     17.635
00367>      OUTFLOW<07: (SWMinf)      16.10      .044     1.533     17.635
00368>     OVERFLOW<08: (OVF-I )        .00      .000      .000       .000
00369>
00370>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00371>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00372>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00373>
00374>
00375>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=    2.537
00376>                     TIME SHIFT OF PEAK FLOW          (min)=    -4.00
00377>                     MAXIMUM  STORAGE   USED       (ha.m.)=.2379E+00
00378>
00379> ------------------------------------------------------------------------------
00380> 001:0014------------------------------------------------------------------------
00381> *#-----------------|----------------------------------------------------------|
00382> *#
00383> *#                     Active Storage Portion of SWM facility
00384> *#
00385> *#-----------------|----------------------------------------------------------|
00386> ---------------------
00387> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
00388> |  IN>08:(OVF-I )   |
00389> | OUT<01:(SWMout)   |    =========  OUTLFOW STORAGE TABLE  =========
00390> ---------------------   OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00391>                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
00392>                            .000  .0000E+00    |    1.479  .3245E+00
00393>                            .202  .1059E+00    |    2.606  .4367E+00
00394>                            .689  .2141E+00    |    4.101  .5560E+00
00395>       *** WARNING: Inflow hydrograph is dry.
00396>
00397>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00398>      ---------------            (ha)     (cms)     (hrs)       (mm)
00399>      INFLOW >08: (OVF-I )        .00      .000      .000       .000
00400>      OUTFLOW<01: (SWMout)        .00      .000      .000       .000
00401>     OVERFLOW<02: (OVF   )        .64      .000      .000       .000
00402>
00403>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00404>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00405>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00406>
00407>
00408> *** WARNING: Inflow and ouflow hydrographs are dry.
00409>
00410> ------------------------------------------------------------------------------
00411> 001:0015------------------------------------------------------------------------
00412> *#-----------------|----------------------------------------------------------|
00413> *#
00414> *#    West Road Ditch, conveying external drainage from the west around the
00415> *#                   proposed SWM facility to Outlet Channel
00416> *#
00417> *#-----------------|----------------------------------------------------------|
00418> ---------------------
00419> | DESIGN NASHYD       |   Area     (ha)=    1.22   Curve Number    (CN)=50.00
00420> | 02:206     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
00421> ---------------------   U.H. Tp(hrs)=    .810
00422>
00423>      Unit Hyd Qpeak  (cms)=     .058
00424>
00425>      PEAK FLOW       (cms)=     .003 (i)
00426>      TIME TO PEAK    (hrs)=    2.650
00427>      RUNOFF VOLUME    (mm)=    1.989
00428>      TOTAL RAINFALL   (mm)=   25.000
00429>      RUNOFF COEFFICIENT   =     .080
00430>
00431>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00432>
00433> ------------------------------------------------------------------------------
00434> 001:0016------------------------------------------------------------------------
00435> *#-----------------|----------------------------------------------------------|
00436> *#
00437> *#        Grassed area south of SWM facility draining offsite to the south
00438> *#
00439> *#-----------------|----------------------------------------------------------|
00440> ---------------------
00441> | DESIGN NASHYD       |   Area     (ha)=     .14   Curve Number    (CN)=50.00
00442> | 10:207     DT= 1.00 |   Ia       (mm)=   1.500   # of Linear Res.(N)= 3.00
00443> ---------------------   U.H. Tp(hrs)=    .070
00444>
00445>      Unit Hyd Qpeak  (cms)=     .076
00446>
00447>      PEAK FLOW       (cms)=     .001 (i)
00448>      TIME TO PEAK    (hrs)=    1.650
00449>      RUNOFF VOLUME    (mm)=    1.989
00450>      TOTAL RAINFALL   (mm)=   25.000
00451>      RUNOFF COEFFICIENT   =     .080
00452>
00453>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00454>
00455> ------------------------------------------------------------------------------
00456> 001:0017------------------------------------------------------------------------
00457> *#-----------------|----------------------------------------------------------|
00458> *#
00459> *#                Total Flows to the east from internal catchments
00460> *#
00461> *#-----------------|----------------------------------------------------------|
00462> ----------------------
00463> | ADD HYD (IntE     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00464> ----------------------   ----             (ha)     (cms)   (hrs)   (mm)    (cms)
00465>                        ID1 05:IntUcE       1.33     .071   1.58   8.80    .000
00466>                       +ID2 01:SWMout        .00     .000    .00    .00    .000
00467>                       +ID3 02:206          1.22     .003   2.65   1.99    .000
00468>                        ========================================================
00469>                        SUM 07:IntE         2.55     .071   1.58   5.54    .000
00470>
00471>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00472>
00473> ------------------------------------------------------------------------------
00474> 001:0018------------------------------------------------------------------------
00475> *#-----------------|----------------------------------------------------------|
00476> *#==========================================================================
00477> *# Proposed Drainage Conditions (Including External Catchment Flows to Ditches)
00478> *#==========================================================================
00479> *#-----------------|----------------------------------------------------------|
00480> *#
00481> *# External industrial catchment and part of Hwy 401, draining south across
00482> *#                   Cedar Creek Road and entering BPSS
00483> *#
00484> *#-----------------|----------------------------------------------------------|
00485> ---------------------
00486> | CALIB STANDHYD      |   Area     (ha)=   55.94
00487> | 03:100     DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
00488> ---------------------
00489>                              IMPERVIOUS    PERVIOUS (i)
00490>      Surface Area     (ha)=      44.75       11.19
00491>      Dep. Storage     (mm)=       2.00        5.00
00492>      Average Slope     (%)=       1.50        2.00
00493>      Length            (m)=    1750.00       30.00
00494>      Mannings n            =       .025        .250
00495>
00496>      Max.eff.Inten.(mm/hr)=      28.37       24.81
00497>                 over (min)       31.00       41.00
00498>      Storage Coeff.  (min)=      30.88 (ii)  41.25 (ii)
00499>      Unit Hyd. Tpeak (min)=      31.00       41.00
00500>      Unit Hyd. peak  (cms)=        .04         .03
00501>                                                          *TOTALS*
00502>      PEAK FLOW       (cms)=        .56         .45          .935 (iii)
00503>      TIME TO PEAK    (hrs)=       2.07        2.32         2.217
00504>      RUNOFF VOLUME    (mm)=      23.00        6.46         9.772
00505>      TOTAL RAINFALL   (mm)=      25.00       25.00        25.000
00506>      RUNOFF COEFFICIENT   =        .92         .26          .391
00507>
00508>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00509>            CN* =  50.0   Ia = Dep. Storage  (Above)
00510>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00511>            THAN THE STORAGE COEFFICIENT.
00512>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00513>
00514> ------------------------------------------------------------------------------
00515> 001:0019------------------------------------------------------------------------
00516> *#-----------------|----------------------------------------------------------|
00517> *#
00518> *#  External catchment containing a portion of Cedar Creek Road, a portion
00519> *#  of industrial area, and a grassed area near Hwy 401 off-ramp, entering BPSS
00520> *#
00521> *#-----------------|----------------------------------------------------------|
00522> ---------------------
00523> | CALIB STANDHYD      |   Area     (ha)=   14.55
00524> | 07:101     DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
00525> ---------------------
00526>                              IMPERVIOUS    PERVIOUS (i)
00527>      Surface Area     (ha)=       8.73        5.82
00528>      Dep. Storage     (mm)=       2.00        5.00
00529>      Average Slope     (%)=       2.30        2.00
00530>      Length            (m)=    1050.00       30.00
00531>      Mannings n            =       .025        .250
00532>
00533>      Max.eff.Inten.(mm/hr)=      41.23        8.25
00534>                 over (min)       17.00       33.00
00535>      Storage Coeff.  (min)=      17.21 (ii)  33.32 (ii)
00536>      Unit Hyd. Tpeak (min)=      17.00       33.00
00537>      Unit Hyd. peak  (cms)=        .07         .03
00538>                                                          *TOTALS*
00539>      PEAK FLOW       (cms)=        .16         .08          .197 (iii)
00540>      TIME TO PEAK    (hrs)=       1.83        2.20         1.867
```

```
00541>      RUNOFF VOLUME    (mm)=      23.00         3.61          6.516
00542>      TOTAL RAINFALL   (mm)=      25.00        25.00         25.000
00543>      RUNOFF COEFFICIENT   =        .92          .14           .261
00544>
00545>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00546>            CN* =  50.0    Ia = Dep. Storage  (Above)
00547>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00548>            THAN THE STORAGE COEFFICIENT.
00549>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00550>
00551> ---------------------------------------------------------------------------
00552> 001:0020-----------------------------------------------------------------------
00553> *#-----------------|-------------------------------------------------------|
00554> *#
00555> *#     Total area draining offsite to east onto agricultural area to the east
00556> *#
00557> *#-----------------|-------------------------------------------------------|
00558>  ----------------------
00559> | ADD HYD (UCtoE     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00560>  ----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
00561>                       ID1 05:IntUcE        1.33     .071    1.58   8.80    .000
00562>                      +ID2 03:100          55.94     .935    2.22   9.77    .000
00563>                      +ID3 07:101          14.55     .197    1.87   6.52    .000
00564>                       ========================================================
00565>                       SUM 09:UCtoE         71.82    1.108    2.18   9.09    .000
00566>
00567>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00568>
00569> ---------------------------------------------------------------------------
00570> 001:0021-----------------------------------------------------------------------
00571> *#-----------------|-------------------------------------------------------|
00572> *#
00573> *#   Large external catchment west of site containing industrial property,
00574> *#  draining into private SWM feature and then into West Road Ditch, routing
00575> *#              around SWM facility and entering Outlet Channel
00576> *#
00577> *#-----------------|-------------------------------------------------------|
00578>  ----------------------
00579> | DESIGN STANDHYD    |   Area    (ha)=   12.64
00580> | 04:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
00581>  ----------------------
00582>                              IMPERVIOUS    PERVIOUS (i)
00583>      Surface Area     (ha)=      10.11         2.53
00584>      Dep. Storage     (mm)=        .80         1.50
00585>      Average Slope     (%)=       3.10         3.10
00586>      Length            (m)=     290.29        40.00
00587>      Mannings n           =       .013         .250
00588>
00589>      Max.eff.Inten.(mm/hr)=      74.85        19.51
00590>                   over (min)        4.00        16.00
00591>      Storage Coeff.  (min)=       3.87 (ii)   15.77 (ii)
00592>      Unit Hyd. Tpeak (min)=       4.00        16.00
00593>      Unit Hyd. peak  (cms)=        .29          .07
00594>                                                          *TOTALS*
00595>      PEAK FLOW       (cms)=        .97          .08         1.002 (iii)
00596>      TIME TO PEAK    (hrs)=       1.62         1.87         1.617
00597>      RUNOFF VOLUME    (mm)=      24.20         4.72        14.463
00598>      TOTAL RAINFALL   (mm)=      25.00        25.00        25.000
00599>      RUNOFF COEFFICIENT   =        .97          .19          .579
00600>
00601>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00602>            CN* =  50.0    Ia = Dep. Storage  (Above)
00603>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00604>            THAN THE STORAGE COEFFICIENT.
00605>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00606>
00607> ---------------------------------------------------------------------------
00608> 001:0022-----------------------------------------------------------------------
00609> *#-----------------|-------------------------------------------------------|
00610> *#
00611> *#                      Infiltration in External SWM Feature
00612> *#
00613> *#-----------------|-------------------------------------------------------|
00614>  ----------------------
00615> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
00616> |  IN>04:(102    )   |
00617> | OUT<05:(xSWinf)    |    =========  OUTLFOW STORAGE TABLE  =========
00618>  ----------------------   OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
00619>                             (cms)     (ha.m.)   |    (cms)    (ha.m.)
00620>                              .000  .0000E+00    |     .018  .3759E+00
00621>                              .018  .4380E-01    |     .000  .0000E+00
00622>
00623>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
00624>      -------------------         (ha)     (cms)     (hrs)       (mm)
00625>      INFLOW >04: (102    )      12.64     1.002     1.617     14.463
00626>      OUTFLOW<05: (xSWinf)       12.64      .018     1.583     14.463
00627>     OVERFLOW<06: (OVF-xI)         .00      .000      .000       .000
00628>
00629>                      TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
00630>                      CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
00631>                      PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
00632>
00633>
00634>                      PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.797
00635>                      TIME SHIFT OF PEAK FLOW          (min)=    -2.00
00636>                      MAXIMUM  STORAGE   USED       (ha.m.)=.1636E+00
00637>
00638> ---------------------------------------------------------------------------
00639> 001:0023-----------------------------------------------------------------------
00640> *#-----------------|-------------------------------------------------------|
00641> *#
00642> *#    External catchment west of the site, containing a portion of existing
00643> *#   industrial property, draining east into West Road Ditch, routing around
00644> *#                      SWM facility and entering Outlet Channel
00645> *#
00646> *#-----------------|-------------------------------------------------------|
00647>  ----------------------
00648> | DESIGN STANDHYD    |   Area    (ha)=    4.52
00649> | 07:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
00650>  ----------------------
00651>                              IMPERVIOUS    PERVIOUS (i)
00652>      Surface Area     (ha)=       3.62          .90
00653>      Dep. Storage     (mm)=        .80         1.50
00654>      Average Slope     (%)=       5.30         5.30
00655>      Length            (m)=     173.59        40.00
00656>      Mannings n           =       .013         .250
00657>
00658>      Max.eff.Inten.(mm/hr)=      74.85        22.59
00659>                   over (min)        2.00        12.00
00660>      Storage Coeff.  (min)=       2.42 (ii)   11.97 (ii)
00661>      Unit Hyd. Tpeak (min)=       2.00        12.00
00662>      Unit Hyd. peak  (cms)=        .49          .09
00663>                                                          *TOTALS*
00664>      PEAK FLOW       (cms)=        .42          .04          .430 (iii)
00665>      TIME TO PEAK    (hrs)=       1.58         1.78         1.583
00666>      RUNOFF VOLUME    (mm)=      24.20         4.73        14.463
00667>      TOTAL RAINFALL   (mm)=      25.00        25.00        25.000
00668>      RUNOFF COEFFICIENT   =        .97          .19          .579
00669>
00670>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00671>            CN* =  50.0    Ia = Dep. Storage  (Above)
00672>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00673>            THAN THE STORAGE COEFFICIENT.
00674>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00675>
00676> ---------------------------------------------------------------------------
00677> 001:0024-----------------------------------------------------------------------
00678> *#-----------------|-------------------------------------------------------|
00679> *#
00680> *#                        Total Flows through West Road Ditch
00681> *#
00682> *#-----------------|-------------------------------------------------------|
00683>  ----------------------
00684> | ADD HYD (WRswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00685>  ----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
00686>                       ID1 06:OVF-xI         .00      .000    .00    .00     .000
00687>                      +ID2 07:103           4.52      .430   1.58  14.46     .000
00688>                      +ID3 02:206           1.22      .003   2.65   1.99     .000
00689>                       ========================================================
00690>                       SUM 08:WRswl          5.74      .430   1.58  11.81     .000
00691>
00692>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00693>
00694> ---------------------------------------------------------------------------
00695> 001:0025-----------------------------------------------------------------------
00696> *#-----------------|-------------------------------------------------------|
00697> *#
00698> | DESIGN NASHYD      |   Area    (ha)=    1.13   Curve Number   (CN)=50.00
00699> | 05:208    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00700>  ----------------------   U.H. Tp(hrs)=    .850
00701>
00702>      Unit Hyd Qpeak  (cms)=     .051
00703>
00704>      PEAK FLOW       (cms)=     .003 (i)
00705>      TIME TO PEAK    (hrs)=    2.700
00706>      RUNOFF VOLUME    (mm)=    1.989
00707>      TOTAL RAINFALL   (mm)=   25.000
00708>      RUNOFF COEFFICIENT   =     .080
00709>
00710>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00711>
00712> ---------------------------------------------------------------------------
00713> 001:0026-----------------------------------------------------------------------
00714> *#-----------------|-------------------------------------------------------|
00715> *#
00716> *#                        Total Flows through Outlet Channel
00717> *#
00718> *#-----------------|-------------------------------------------------------|
00719>  ----------------------
00720> | ADD HYD (OutChan   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00721>  ----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
00722>                       ID1 01:SWMout         .00      .000    .00    .00     .000
00723>                      +ID2 08:WRswl         5.74      .430   1.58  11.81     .000
00724>                      +ID3 05:208           1.13      .003   2.70   1.99     .000
00725>                       ========================================================
00726>                       SUM 03:OutChan        6.87      .430   1.58  10.20     .000
00727>
00728>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00729>
00730> ---------------------------------------------------------------------------
00731> 001:0027-----------------------------------------------------------------------
00732> *#-----------------|-------------------------------------------------------|
00733> *#
00734> *#              Total Flows to the east (eventually to Cedar Creek)
00735> *#
00736> *#-----------------|-------------------------------------------------------|
00737>  ----------------------
00738> | ADD HYD (TotE      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00739>  ----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
00740>                       ID1 01:SWMout         .00      .000    .00    .00     .000
00741>                      +ID2 08:WRswl         5.74      .430   1.58  11.81     .000
00742>                      +ID3 09:UCtoE        71.82     1.108   2.18   9.09     .000
00743>                       ========================================================
00744>                       SUM 04:TotE          77.56     1.161   2.17   9.30     .000
00745>
00746>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00747>
00748> ---------------------------------------------------------------------------
00749> 001:0028-----------------------------------------------------------------------
00750> *#-----------------|-------------------------------------------------------|
00751> *#
00752> *#                           Total Flows from the Site
00753> *#
00754> *#-----------------|-------------------------------------------------------|
00755>  ----------------------
00756> | ADD HYD (AllFlo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00757>  ----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
00758>                       ID1 04:TotE          77.56     1.161   2.17   9.30     .000
00759>                      +ID2 10:207            .14      .001   1.65   1.99     .000
00760>                       ========================================================
00761>                       SUM 06:AllFlo        77.70     1.161   2.17   9.28     .000
00762>
00763>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00764>
00765> ---------------------------------------------------------------------------
00766> 001:0029-----------------------------------------------------------------------
00767> *#
00768> *#   Catchments required for By-Pass Storm Sewer (BPSS) sizing - added again
00769> *#                             for ease of modelling
00770> *#
00771> *#-----------------|-------------------------------------------------------|
00772>  ----------------------
00773> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
00774> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00775>  ----------------------   U.H. Tp(hrs)=    .260
00776>
00777>      Unit Hyd Qpeak  (cms)=     .021
00778>
00779>      PEAK FLOW       (cms)=     .001 (i)
00780>      TIME TO PEAK    (hrs)=    1.917
00781>      RUNOFF VOLUME    (mm)=    1.986
00782>      TOTAL RAINFALL   (mm)=   25.000
00783>      RUNOFF COEFFICIENT   =     .079
00784>
00785>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00786>
00787> ---------------------------------------------------------------------------
00788> 001:0030-----------------------------------------------------------------------
00789> *#-----------------|-------------------------------------------------------|
00790> *#
00791>  ----------------------
00792> | DESIGN STANDHYD    |   Area    (ha)=     .64
00793> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
00794>  ----------------------
00795>                              IMPERVIOUS    PERVIOUS (i)
00796>      Surface Area     (ha)=        .58          .06
00797>      Dep. Storage     (mm)=        .80         1.50
00798>      Average Slope     (%)=       2.00         2.00
00799>      Length            (m)=      65.32        40.00
00800>      Mannings n           =       .013         .250
00801>
00802>      Max.eff.Inten.(mm/hr)=      74.85        90.91
00803>                   over (min)        2.00         9.00
00804>      Storage Coeff.  (min)=       1.80 (ii)    9.14 (ii)
00805>      Unit Hyd. Tpeak (min)=       2.00         9.00
00806>      Unit Hyd. peak  (cms)=        .60          .12
00807>                                                          *TOTALS*
00808>      PEAK FLOW       (cms)=        .06          .01          .067 (iii)
00809>      TIME TO PEAK    (hrs)=       1.58         1.72         1.583
00810>      RUNOFF VOLUME    (mm)=      24.20        25.00        16.141
00811>      TOTAL RAINFALL   (mm)=      25.00        25.00        25.000
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00811>      RUNOFF COEFFICIENT   =        .97          .32           .646
00812>
00813>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00814>            CN* =  50.0    Ia = Dep. Storage  (Above)
00815>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00816>            THAN THE STORAGE COEFFICIENT.
00817>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00818>
00819> ---------------------------------------------------------------------------
00820> 001:0031-----------------------------------------------------------------------
00821> *#------------------|-------------------------------------------------------|
00822> ---------------------
00823> | CALIB STANDHYD     |   Area    (ha)=   55.94
00824> | 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
00825> ---------------------
00826>                                IMPERVIOUS    PERVIOUS (i)
00827>      Surface Area     (ha)=      44.75         11.19
00828>      Dep. Storage     (mm)=       2.00          5.00
00829>      Average Slope     (%)=       1.50          2.00
00830>      Length            (m)=    1750.00         30.00
00831>      Mannings n             =       .025          .250
00832>
00833>      Max.eff.Inten.(mm/hr)=      28.37         24.81
00834>                 over (min)       31.00         41.00
00835>      Storage Coeff.  (min)=      30.88 (ii)    41.25 (ii)
00836>      Unit Hyd. Tpeak (min)=      31.00         41.00
00837>      Unit Hyd. peak  (cms)=        .04           .03
00838>                                                          *TOTALS*
00839>      PEAK FLOW       (cms)=        .56           .45          .935 (iii)
00840>      TIME TO PEAK    (hrs)=       2.07          2.32         2.217
00841>      RUNOFF VOLUME    (mm)=      23.00          6.46         9.772
00842>      TOTAL RAINFALL   (mm)=      25.00         25.00        25.000
00843>      RUNOFF COEFFICIENT   =        .92           .26          .391
00844>
00845>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00846>            CN* =  50.0    Ia = Dep. Storage  (Above)
00847>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00848>            THAN THE STORAGE COEFFICIENT.
00849>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00850>
00851> ---------------------------------------------------------------------------
00852> 001:0032-----------------------------------------------------------------------
00853> *#------------------|-------------------------------------------------------|
00854> ---------------------
00855> | CALIB STANDHYD     |   Area    (ha)=   14.55
00856> | 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
00857> ---------------------
00858>                                IMPERVIOUS    PERVIOUS (i)
00859>      Surface Area     (ha)=       8.73          5.82
00860>      Dep. Storage     (mm)=       2.00          5.00
00861>      Average Slope     (%)=       2.30          2.00
00862>      Length            (m)=    1050.00         30.00
00863>      Mannings n             =       .025          .250
00864>
00865>      Max.eff.Inten.(mm/hr)=      41.23          8.25
00866>                 over (min)       17.00         33.00
00867>      Storage Coeff.  (min)=      17.21 (ii)    33.32 (ii)
00868>      Unit Hyd. Tpeak (min)=      17.00         33.00
00869>      Unit Hyd. peak  (cms)=        .07           .03
00870>                                                          *TOTALS*
00871>      PEAK FLOW       (cms)=        .16           .08          .197 (iii)
00872>      TIME TO PEAK    (hrs)=       1.83          2.20         1.867
00873>      RUNOFF VOLUME    (mm)=      23.00          3.61         6.516
00874>      TOTAL RAINFALL   (mm)=      25.00         25.00        25.000
00875>      RUNOFF COEFFICIENT   =        .92           .14          .261
00876>
00877>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
00878>            CN* =  50.0    Ia = Dep. Storage  (Above)
00879>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
00880>            THAN THE STORAGE COEFFICIENT.
00881>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00882>
00883> ---------------------------------------------------------------------------
00884> 001:0033-----------------------------------------------------------------------
00885> *#------------------|-------------------------------------------------------|
00886> ------------------------
00887> | ADD HYD (BPSS      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
00888> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
00889>                      ID1 01:200            .14      .001    1.92   1.99    .000
00890>                     +ID2 02:201            .64      .067    1.58  16.14    .000
00891>                     +ID3 03:100          55.94      .935    2.22   9.77    .000
00892>                     +ID4 07:101          14.55      .197    1.87   6.52    .000
00893>                      ==========================================================
00894>                      SUM 06:BPSS          71.27    1.107    2.18   9.15    .000
00895>
00896>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
00897>
00898> ---------------------------------------------------------------------------
00899> 001:0034-----------------------------------------------------------------------
00900>   ** END OF RUN :   1
00901>
00902> ***************************************************************************
00903>
00904>
00905>
00906>
00907>
00908> --------------------
00909> | START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
00910> --------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
00911>     TZERO =   .00 hrs on       0
00912>     METOUT=   2 (output = METRIC)
00913>     NRUN  = 002
00914>     NSTORM=   1
00915>               #  1=Kit2yr.3hr
00916> ---------------------------------------------------------------------------
00917> 002:0002-----------------------------------------------------------------------
00918> *#***************************************************************************
00919> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project #: [161414214]
00920> *#  Date        : 11/13/2024
00921> *#  Modeller    : [Amy Kyle]
00922> *#  Company     : Stantec Consulting Ltd. (Waterloo)
00923> *#  License #   : 4730904
00924> *#
00925> *#  This hydrologic analysis prepared to provide pond sizing
00926> *#  for the 2509 Cedar Creek Road SWM Facility
00927> *#  The storm events modelled are:
00928> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
00929> *#  and the Regional Event
00930> *#***************************************************************************
00931> ---------------------------------------------------------------------------
00932> 002:0002-----------------------------------------------------------------------
00933> --------------------
00934> | READ STORM       |    Filename: 2-yr, 3hr Chicago Storm - Kitchener IDF
00935> | Ptotal=  34.27 mm|    Comments: 2-yr, 3hr Chicago Storm - Kitchener IDF
00936> --------------------
00937>              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
00938>               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
00939>               .08   2.837 |    .83  15.850 |   1.58   7.979 |   2.33   3.697
00940>               .17   3.094 |    .92  36.885 |   1.67   7.027 |   2.42   3.501
00941>               .25   3.409 |   1.00 109.401 |   1.75   6.286 |   2.50   3.326
00942>               .33   3.803 |   1.08  47.437 |   1.83   5.694 |   2.58   3.169
00943>               .42   4.314 |   1.17  26.381 |   1.92   5.211 |   2.67   3.028
00944>               .50   5.002 |   1.25  18.051 |   2.00   4.807 |   2.75   2.899
00945>               .58   5.982 |   1.33  13.687 |   2.08   4.466 |   2.83   2.783
00946>               .67   7.493 |   1.42  11.030 |   2.17   4.173 |   2.92   2.676
00947>               .75  10.127 |   1.50   9.251 |   2.25   3.920 |   3.00   2.578
00948>
00949> ---------------------------------------------------------------------------
00950> 002:0003-----------------------------------------------------------------------
00951> *#------------------|-------------------------------------------------------|
00952> *#=======================================================================
00953> *# Proposed Drainage Conditions (Internal Areas)
00954> *#=======================================================================
00955> *#------------------|-------------------------------------------------------|
00956> *#
00957> *#    Small portion of West Road Ditch draining offsite to the east through
00958> *#                            By-Pass Storm Sewer(BPSS)
00959> *#
00960> *#------------------|-------------------------------------------------------|
00961> ---------------------
00962> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
00963> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
00964> ---------------------  U.H. Tp(hrs)=    .260
00965>
00966>      Unit Hyd Qpeak  (cms)=     .021
00967>
00968>      PEAK FLOW       (cms)=     .001 (i)
00969>      TIME TO PEAK    (hrs)=    1.350
00970>      RUNOFF VOLUME    (mm)=    3.741
00971>      TOTAL RAINFALL   (mm)=   34.271
00972>      RUNOFF COEFFICIENT   =     .109
00973>
00974>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
00975>
00976> ---------------------------------------------------------------------------
00977> 002:0004-----------------------------------------------------------------------
00978> *#------------------|-------------------------------------------------------|
00979> *#
00980> *#  Proposed developed catchment draining offsite to the east through BPSS
00981> *#
00982> *#------------------|-------------------------------------------------------|
00983> ---------------------
00984> | DESIGN STANDHYD    |   Area    (ha)=     .64
00985> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
00986> ---------------------
00987>                                IMPERVIOUS    PERVIOUS (i)
00988>      Surface Area     (ha)=        .58           .06
00989>      Dep. Storage     (mm)=        .80          1.50
00990>      Average Slope     (%)=       2.00          2.00
00991>      Length            (m)=      65.32         40.00
00992>      Mannings n             =       .013          .250
00993>
00994>      Max.eff.Inten.(mm/hr)=     109.40        168.34
00995>                 over (min)        2.00          7.00
00996>      Storage Coeff.  (min)=       1.55 (ii)     7.28 (ii)
00997>      Unit Hyd. Tpeak (min)=       2.00          7.00
00998>      Unit Hyd. peak  (cms)=        .65           .16
00999>                                                          *TOTALS*
01000>      PEAK FLOW       (cms)=        .09           .02          .103 (iii)
01001>      TIME TO PEAK    (hrs)=       1.00          1.10         1.000
01002>      RUNOFF VOLUME    (mm)=      33.47         13.61        23.542
01003>      TOTAL RAINFALL   (mm)=      34.27         34.27        34.271
01004>      RUNOFF COEFFICIENT   =        .98           .40          .687
01005>
01006>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01007>            CN* =  50.0    Ia = Dep. Storage  (Above)
01008>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01009>            THAN THE STORAGE COEFFICIENT.
01010>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01011>
01012> ---------------------------------------------------------------------------
01013> 002:0005-----------------------------------------------------------------------
01014> *#------------------|-------------------------------------------------------|
01015> *#
01016> *# Proposed internal grassed area and plunge pool draining offsite to the east
01017> *#
01018> *#------------------|-------------------------------------------------------|
01019> ---------------------
01020> | DESIGN NASHYD      |   Area    (ha)=     .55   Curve Number   (CN)=50.00
01021> | 03:203    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01022> ---------------------  U.H. Tp(hrs)=    .080
01023>
01024>      Unit Hyd Qpeak  (cms)=     .263
01025>
01026>      PEAK FLOW       (cms)=     .010 (i)
01027>      TIME TO PEAK    (hrs)=    1.083
01028>      RUNOFF VOLUME    (mm)=    3.745
01029>      TOTAL RAINFALL   (mm)=   34.271
01030>      RUNOFF COEFFICIENT   =     .109
01031>
01032>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01033>
01034> ---------------------------------------------------------------------------
01035> 002:0006-----------------------------------------------------------------------
01036> *#------------------|-------------------------------------------------------|
01037> *#
01038> *#          Total internal area draining onto agricultural area to the east
01039> *#
01040> *#------------------|-------------------------------------------------------|
01041> ------------------------
01042> | ADD HYD (IntUcE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01043> ------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
01044>                      ID1 01:200            .14      .001    1.35   3.74    .000
01045>                     +ID2 02:201            .64      .103    1.00  23.54    .000
01046>                     +ID3 03:203            .55      .010    1.08   3.74    .000
01047>                      ==========================================================
01048>                      SUM 05:IntUcE         1.33      .109    1.00  13.27    .000
01049>
01050>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01051>
01052> ---------------------------------------------------------------------------
01053> 002:0007-----------------------------------------------------------------------
01054> *#------------------|-------------------------------------------------------|
01055> *#
01056> *#             Proposed industrial lots draining to Rear Lot Ditch
01057> *#
01058> *#------------------|-------------------------------------------------------|
01059> ---------------------
01060> | DESIGN STANDHYD    |   Area    (ha)=    8.82
01061> | 10:202    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
01062> ---------------------
01063>                                IMPERVIOUS    PERVIOUS (i)
01064>      Surface Area     (ha)=       7.94           .88
01065>      Dep. Storage     (mm)=        .80          1.50
01066>      Average Slope     (%)=       2.00          2.00
01067>      Length            (m)=     242.49         40.00
01068>      Mannings n             =       .013          .250
01069>
01070>      Max.eff.Inten.(mm/hr)=     109.40         23.44
01071>                 over (min)        3.00         16.00
01072>      Storage Coeff.  (min)=       3.41 (ii)     16.02 (ii)
01073>      Unit Hyd. Tpeak (min)=       3.00         16.00
01074>      Unit Hyd. peak  (cms)=        .34           .07
01075>                                                          *TOTALS*
01076>      PEAK FLOW       (cms)=       1.69           .03         1.695 (iii)
01077>      TIME TO PEAK    (hrs)=       1.02          1.30         1.017
01078>      RUNOFF VOLUME    (mm)=      33.47          7.00        28.177
01079>      TOTAL RAINFALL   (mm)=      34.27         34.27        34.271
01080>      RUNOFF COEFFICIENT   =        .98           .20          .822
```

```
01081>
01082>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01083>            CN* =  50.0    Ia = Dep. Storage  (Above)
01084>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01085>            THAN THE STORAGE COEFFICIENT.
01086>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01087>
01088> ------------------------------------------------------------------------------
01089> 002:0008----------------------------------------------------------------------
01090> *#-----------------|----------------------------------------------------------|
01091> *#
01092> *#    External agricultural area draining onsite and entering Rear Lot Ditch
01093> *#
01094> *#-----------------|----------------------------------------------------------|
01095> ---------------------
01096> | DESIGN NASHYD     |   Area    (ha)=     .73   Curve Number   (CN)=70.00
01097> | 07:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01098> ---------------------   U.H. Tp(hrs)=    .190
01099>
01100>      Unit Hyd Qpeak  (cms)=     .147
01101>
01102>      PEAK FLOW       (cms)=     .018 (i)
01103>      TIME TO PEAK    (hrs)=    1.250
01104>      RUNOFF VOLUME    (mm)=    7.583
01105>      TOTAL RAINFALL   (mm)=   34.271
01106>      RUNOFF COEFFICIENT   =     .221
01107>
01108>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01109>
01110> ------------------------------------------------------------------------------
01111> 002:0009----------------------------------------------------------------------
01112> *#-----------------|----------------------------------------------------------|
01113> *#
01114> *#       Total area entering Rear Lot Ditch and entering SWMF at East inlet
01115> *#
01116> *#-----------------|----------------------------------------------------------|
01117> ------------------------
01118> | ADD HYD (RLswl     ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
01119> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
01120>                      ID1 10:202            8.82    1.695    1.02  28.18    .000
01121>                     +ID2 07:104             .73     .018    1.25   7.58    .000
01122>                      ========================================================
01123>                      SUM 08:RLswl           9.55    1.700    1.02  26.60    .000
01124>
01125>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01126>
01127> ------------------------------------------------------------------------------
01128> 002:0010----------------------------------------------------------------------
01129> *#-----------------|----------------------------------------------------------|
01130> *#
01131> *#   Proposed industrial lots draining to East Road Ditch within catchment,
01132> *#                          and new internal roadway
01133> *#
01134> *#-----------------|----------------------------------------------------------|
01135> ---------------------
01136> | DESIGN STANDHYD    |   Area    (ha)=    4.92
01137> | 01:204    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
01138> ---------------------
01139>                              IMPERVIOUS    PERVIOUS (i)
01140>      Surface Area     (ha)=       4.43         .49
01141>      Dep. Storage     (mm)=        .80        1.50
01142>      Average Slope     (%)=       2.00        2.00
01143>      Length            (m)=     181.11       40.00
01144>      Mannings n            =       .013        .250
01145>
01146>      Max.eff.Inten.(mm/hr)=     109.40       24.32
01147>                 over (min)        3.00       15.00
01148>      Storage Coeff.  (min)=       2.86 (ii)   15.28 (ii)
01149>      Unit Hyd. Tpeak (min)=       3.00       15.00
01150>      Unit Hyd. peak  (cms)=        .39         .07
01151>                                                      *TOTALS*
01152>      PEAK FLOW       (cms)=        .99         .02         .990 (iii)
01153>      TIME TO PEAK    (hrs)=       1.02        1.28        1.017
01154>      RUNOFF VOLUME    (mm)=      33.47        7.00       28.177
01155>      TOTAL RAINFALL   (mm)=      34.27       34.27       34.271
01156>      RUNOFF COEFFICIENT   =        .98         .20         .822
01157>
01158>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01159>            CN* = 50.0    Ia = Dep. Storage  (Above)
01160>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01161>            THAN THE STORAGE COEFFICIENT.
01162>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01163>
01164> ------------------------------------------------------------------------------
01165> 002:0011----------------------------------------------------------------------
01166> *#-----------------|----------------------------------------------------------|
01167> *#
01168> *#              Proposed SWM facility catchment (infiltration basin)
01169> *#
01170> *#-----------------|----------------------------------------------------------|
01171> ---------------------
01172> | DESIGN NASHYD     |   Area    (ha)=    1.63   Curve Number   (CN)=57.00
01173> | 09:205    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01174> ---------------------   U.H. Tp(hrs)=    .350
01175>
01176>      Unit Hyd Qpeak  (cms)=     .178
01177>
01178>      PEAK FLOW       (cms)=     .018 (i)
01179>      TIME TO PEAK    (hrs)=    1.467
01180>      RUNOFF VOLUME    (mm)=    4.786
01181>      TOTAL RAINFALL   (mm)=   34.271
01182>      RUNOFF COEFFICIENT   =     .140
01183>
01184>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01185>
01186> ------------------------------------------------------------------------------
01187> 002:0012----------------------------------------------------------------------
01188> *#-----------------|----------------------------------------------------------|
01189> *#
01190> *#                          All flows entering SWM facility
01191> *#
01192> *#-----------------|----------------------------------------------------------|
01193> ------------------------
01194> | ADD HYD (ToSWM     ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
01195> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
01196>                      ID1 07:104             .73     .018    1.25   7.58    .000
01197>                     +ID2 09:205            1.63     .018    1.47   4.79    .000
01198>                     +ID3 10:202            8.82    1.695    1.02  28.18    .000
01199>                     +ID4 01:204            4.92     .990    1.02  28.18    .000
01200>                      ========================================================
01201>                      SUM 06:ToSWM          16.10    2.693    1.02  24.88    .000
01202>
01203>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01204>
01205> ------------------------------------------------------------------------------
01206> 002:0013----------------------------------------------------------------------
01207> *#
01208> *#                      Infiltration Portion of SWM facility
01209> *#
01210> *#-----------------|----------------------------------------------------------|
01211> ---------------------
01212> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
01213> |  IN>06:(ToSWM )   |
01214> | OUT<07:(SWMinf)   |    =========  OUTLFOW STORAGE TABLE  =========
01215> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01216>                              (cms)     (ha.m.)   |    (cms)    (ha.m.)
01217>                              .000  .0000E+00   |    .044  .6364E+00
01218>                              .044  .5530E-01   |    .000  .0000E+00
01219>
01220>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01221>      ---------------------       (ha)     (cms)     (hrs)       (mm)
01222>      INFLOW >06: (ToSWM )      16.10     2.693     1.017     24.875
01223>      OUTFLOW<07: (SWMinf)      16.10      .044      .933     24.875
01224>     OVERFLOW<08: (OVF-I )        .00      .000      .000       .000
01225>
01226>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =         0
01227>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
01228>                     PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
01229>
01230>
01231>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=     1.634
01232>                     TIME SHIFT OF PEAK FLOW          (min)=     -5.00
01233>                     MAXIMUM  STORAGE   USED       (ha.m.)=.3610E+00
01234>
01235> ------------------------------------------------------------------------------
01236> 002:0014----------------------------------------------------------------------
01237> *#-----------------|----------------------------------------------------------|
01238> *#
01239> *#                    Active Storage Portion of SWM facility
01240> *#
01241> *#-----------------|----------------------------------------------------------|
01242> ---------------------
01243> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
01244> |  IN>08:(OVF-I )   |
01245> | OUT<01:(SWMout)   |    =========  OUTLFOW STORAGE TABLE  =========
01246> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01247>                              (cms)     (ha.m.)   |    (cms)    (ha.m.)
01248>                              .000  .0000E+00   |    1.479  .3245E+00
01249>                              .202  .1059E+00   |    2.606  .4367E+00
01250>                              .689  .2141E+00   |    4.101  .5560E+00
01251>       *** WARNING: Inflow hydrograph is dry.
01252>
01253>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01254>      ---------------------       (ha)     (cms)     (hrs)       (mm)
01255>      INFLOW >08: (OVF-I )         .00      .000      .000       .000
01256>      OUTFLOW<01: (SWMout)         .00      .000      .000       .000
01257>     OVERFLOW<02: (OVF   )         .64      .000      .000       .000
01258>
01259>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =         0
01260>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
01261>                     PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
01262>
01263>
01264> *** WARNING: Inflow and ouflow hydrographs are dry.
01265>
01266> ------------------------------------------------------------------------------
01267> 002:0015----------------------------------------------------------------------
01268> *#-----------------|----------------------------------------------------------|
01269> *#
01270> *#    West Road Ditch, conveying external drainage from the west around the
01271> *#                   proposed SWM facility to Outlet Channel
01272> *#
01273> *#-----------------|----------------------------------------------------------|
01274> ---------------------
01275> | DESIGN NASHYD     |   Area    (ha)=    1.22   Curve Number   (CN)=50.00
01276> | 02:206    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01277> ---------------------   U.H. Tp(hrs)=    .810
01278>
01279>      Unit Hyd Qpeak  (cms)=     .058
01280>
01281>      PEAK FLOW       (cms)=     .006 (i)
01282>      TIME TO PEAK    (hrs)=    2.117
01283>      RUNOFF VOLUME    (mm)=    3.744
01284>      TOTAL RAINFALL   (mm)=   34.271
01285>      RUNOFF COEFFICIENT   =     .109
01286>
01287>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01288>
01289> ------------------------------------------------------------------------------
01290> 002:0016----------------------------------------------------------------------
01291> *#-----------------|----------------------------------------------------------|
01292> *#
01293> *#        Grassed area south of SWM facility draining offsite to the south
01294> *#
01295> *#-----------------|----------------------------------------------------------|
01296> ---------------------
01297> | DESIGN NASHYD     |   Area    (ha)=     .14   Curve Number   (CN)=50.00
01298> | 10:207    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01299> ---------------------   U.H. Tp(hrs)=    .070
01300>
01301>      Unit Hyd Qpeak  (cms)=     .076
01302>
01303>      PEAK FLOW       (cms)=     .003 (i)
01304>      TIME TO PEAK    (hrs)=    1.083
01305>      RUNOFF VOLUME    (mm)=    3.744
01306>      TOTAL RAINFALL   (mm)=   34.271
01307>      RUNOFF COEFFICIENT   =     .109
01308>
01309>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01310>
01311> ------------------------------------------------------------------------------
01312> 002:0017----------------------------------------------------------------------
01313> *#-----------------|----------------------------------------------------------|
01314> *#
01315> *#                Total Flows to the east from internal catchments
01316> *#
01317> *#-----------------|----------------------------------------------------------|
01318> ---------------------
01319> | ADD HYD (IntE      ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
01320> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
01321>                      ID1 05:IntUcE          1.33     .109    1.00  13.27    .000
01322>                     +ID2 01:SWMout           .00     .000     .00    .00    .000
01323>                     +ID3 02:206             1.22     .006    2.12   3.74    .000
01324>                      ========================================================
01325>                      SUM 07:IntE            2.55     .109    1.00   8.71    .000
01326>
01327>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01328>
01329> ------------------------------------------------------------------------------
01330> 002:0018----------------------------------------------------------------------
01331> *#-----------------|----------------------------------------------------------|
01332> *#==============================================================================
01333> *# Proposed Drainage Conditions (Including External Catchment Flows to Ditches)
01334> *#==============================================================================
01335> *#-----------------|----------------------------------------------------------|
01336> *#
01337> *# External industrial catchment and part of Hwy 401, draining south across
01338> *#                   Cedar Creek Road and entering BPSS
01339> *#
01340> *#-----------------|----------------------------------------------------------|
01341> ---------------------
01342> | CALIB STANDHYD    |   Area    (ha)=   55.94
01343> | 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
01344> ---------------------
01345>                              IMPERVIOUS    PERVIOUS (i)
01346>      Surface Area     (ha)=      44.75        11.19
01347>      Dep. Storage     (mm)=       2.00         5.00
01348>      Average Slope     (%)=       1.50         2.00
01349>      Length            (m)=    1750.00        30.00
01350>      Mannings n            =       .025         .250
```

```
01351>
01352>     Max.eff.Inten.(mm/hr)=      47.63        51.47
01353>                  over (min)       25.00        33.00
01354>     Storage Coeff.  (min)=      25.09 (ii)   32.84 (ii)
01355>     Unit Hyd. Tpeak (min)=      25.00        33.00
01356>     Unit Hyd. peak  (cms)=        .05          .03
01357>                                                      *TOTALS*
01358>     PEAK FLOW       (cms)=        .92          .92      1.734 (iii)
01359>     TIME TO PEAK    (hrs)=       1.40         1.62      1.517
01360>     RUNOFF VOLUME    (mm)=      32.27        11.30     15.492
01361>     TOTAL RAINFALL   (mm)=      34.27        34.27     34.271
01362>     RUNOFF COEFFICIENT   =        .94          .33       .452
01363>
01364>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01365>           CN* =  50.0    Ia = Dep. Storage  (Above)
01366>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01367>           THAN THE STORAGE COEFFICIENT.
01368>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01369>
01370> ---------------------------------------------------------------------------
01371> 002:0019-----------------------------------------------------------------------
01372> *#-----------------|-------------------------------------------------------|
01373> *#
01374> *#  External catchment containing a portion of Cedar Creek Road, a portion
01375> *#  of industrial area, and a grassed area near Hwy 401 off-ramp, entering BPSS
01376> *#
01377> *#-----------------|-------------------------------------------------------|
01378> ----------------------
01379> | CALIB STANDHYD     |   Area    (ha)=   14.55
01380> | 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
01381> ----------------------
01382>                              IMPERVIOUS    PERVIOUS (i)
01383>     Surface Area     (ha)=       8.73         5.82
01384>     Dep. Storage     (mm)=       2.00         5.00
01385>     Average Slope     (%)=       2.30         2.00
01386>     Length            (m)=    1050.00        30.00
01387>     Mannings n            =       .025         .250
01388>
01389>     Max.eff.Inten.(mm/hr)=      66.55        18.29
01390>                  over (min)       14.00        26.00
01391>     Storage Coeff.  (min)=      14.21 (ii)   25.93 (ii)
01392>     Unit Hyd. Tpeak (min)=      14.00        26.00
01393>     Unit Hyd. peak  (cms)=        .08          .04
01394>                                                      *TOTALS*
01395>     PEAK FLOW       (cms)=        .26          .17       .354 (iii)
01396>     TIME TO PEAK    (hrs)=       1.20         1.50      1.300
01397>     RUNOFF VOLUME    (mm)=      32.27         6.73     10.559
01398>     TOTAL RAINFALL   (mm)=      34.27        34.27     34.271
01399>     RUNOFF COEFFICIENT   =        .94          .20       .308
01400>
01401>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01402>           CN* =  50.0    Ia = Dep. Storage  (Above)
01403>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01404>           THAN THE STORAGE COEFFICIENT.
01405>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01406>
01407> ---------------------------------------------------------------------------
01408> 002:0020-----------------------------------------------------------------------
01409> *#-----------------|-------------------------------------------------------|
01410> *#
01411> *#     Total area draining offsite to east onto agricultural area to the east
01412> *#
01413> *#-----------------|-------------------------------------------------------|
01414> ------------------------
01415> | ADD HYD (UCtoE     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01416> ------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
01417>                      ID1 05:IntUcE         1.33     .109    1.00  13.27    .000
01418>                     +ID2 03:100           55.94    1.734    1.52  15.49    .000
01419>                     +ID3 07:101           14.55     .354    1.30  10.56    .000
01420>                      ========================================================
01421>                      SUM 09:UCtoE         71.82    2.070    1.50  14.45    .000
01422>
01423>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01424>
01425> ---------------------------------------------------------------------------
01426> 002:0021-----------------------------------------------------------------------
01427> *#-----------------|-------------------------------------------------------|
01428> *#
01429> *#   Large external catchment west of site containing industrial property,
01430> *#  draining into private SWM feature and then into West Road Ditch, routing
01431> *#              around SWM facility and entering Outlet Channel
01432> *#
01433> *#-----------------|-------------------------------------------------------|
01434> ----------------------
01435> | DESIGN STANDHYD    |   Area    (ha)=   12.64
01436> | 04:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
01437> ----------------------
01438>                              IMPERVIOUS    PERVIOUS (i)
01439>     Surface Area     (ha)=      10.11         2.53
01440>     Dep. Storage     (mm)=        .80         1.50
01441>     Average Slope     (%)=       3.10         3.10
01442>     Length            (m)=     290.29        40.00
01443>     Mannings n            =       .013         .250
01444>
01445>     Max.eff.Inten.(mm/hr)=     109.40        40.60
01446>                  over (min)        3.00        12.00
01447>     Storage Coeff.  (min)=       3.33 (ii)   12.20 (ii)
01448>     Unit Hyd. Tpeak (min)=       3.00        12.00
01449>     Unit Hyd. peak  (cms)=        .35          .09
01450>                                                      *TOTALS*
01451>     PEAK FLOW       (cms)=       1.52          .17      1.577 (iii)
01452>     TIME TO PEAK    (hrs)=       1.02         1.22      1.017
01453>     RUNOFF VOLUME    (mm)=      33.47         8.38     20.926
01454>     TOTAL RAINFALL   (mm)=      34.27        34.27     34.271
01455>     RUNOFF COEFFICIENT   =        .98          .24       .611
01456>
01457>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01458>           CN* =  50.0    Ia = Dep. Storage  (Above)
01459>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01460>           THAN THE STORAGE COEFFICIENT.
01461>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01462>
01463> ---------------------------------------------------------------------------
01464> 002:0022-----------------------------------------------------------------------
01465> *#-----------------|-------------------------------------------------------|
01466> *#
01467> *#                        Infiltration in External SWM Feature
01468> *#
01469> *#-----------------|-------------------------------------------------------|
01470> ----------------------
01471> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
01472> |  IN>04:(102    )   |
01473> | OUT<05:(xSWinf)    |    =========  OUTLFOW STORAGE TABLE  =========
01474> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
01475>                             (cms)     (ha.m.)   |    (cms)    (ha.m.)
01476>                              .000  .0000E+00    |     .018  .3759E+00
01477>                              .018  .4380E-01    |     .000  .0000E+00
01478>
01479>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
01480>     -------------------         (ha)     (cms)     (hrs)       (mm)
01481>     INFLOW >04: (102    )      12.64     1.577     1.017     20.926
01482>     OUTFLOW<05: (xSWinf)       12.64      .018      .967     20.926
01483>    OVERFLOW<06: (OVF-xI)         .00      .000      .000       .000
01484>
01485>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
01486>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
01487>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
01488>
01489>
01490>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.141
01491>                    TIME SHIFT OF PEAK FLOW          (min)=    -3.00
01492>                    MAXIMUM  STORAGE   USED       (ha.m.)=.2478E+00
01493>
01494> ---------------------------------------------------------------------------
01495> 002:0023-----------------------------------------------------------------------
01496> *#-----------------|-------------------------------------------------------|
01497> *#
01498> *#    External catchment west of the site, containing a portion of existing
01499> *#   industrial property, draining east into West Road Ditch, routing around
01500> *#                    SWM facility and entering Outlet Channel
01501> *#
01502> *#-----------------|-------------------------------------------------------|
01503> ----------------------
01504> | DESIGN STANDHYD    |   Area    (ha)=    4.52
01505> | 07:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
01506> ----------------------
01507>                              IMPERVIOUS    PERVIOUS (i)
01508>     Surface Area     (ha)=       3.62          .90
01509>     Dep. Storage     (mm)=        .80         1.50
01510>     Average Slope     (%)=       5.30         5.30
01511>     Length            (m)=     173.59        40.00
01512>     Mannings n            =       .013         .250
01513>
01514>     Max.eff.Inten.(mm/hr)=     109.40        45.49
01515>                  over (min)        2.00         9.00
01516>     Storage Coeff.  (min)=       2.08 (ii)    9.30 (ii)
01517>     Unit Hyd. Tpeak (min)=       2.00         9.00
01518>     Unit Hyd. peak  (cms)=        .54          .12
01519>                                                      *TOTALS*
01520>     PEAK FLOW       (cms)=        .63          .07       .655 (iii)
01521>     TIME TO PEAK    (hrs)=       1.00         1.17      1.000
01522>     RUNOFF VOLUME    (mm)=      33.47         8.38     20.926
01523>     TOTAL RAINFALL   (mm)=      34.27        34.27     34.271
01524>     RUNOFF COEFFICIENT   =        .98          .24       .611
01525>
01526>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01527>           CN* =  50.0    Ia = Dep. Storage  (Above)
01528>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01529>           THAN THE STORAGE COEFFICIENT.
01530>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01531>
01532> ---------------------------------------------------------------------------
01533> 002:0024-----------------------------------------------------------------------
01534> *#-----------------|-------------------------------------------------------|
01535> *#
01536> *#                        Total Flows through West Road Ditch
01537> *#
01538> *#-----------------|-------------------------------------------------------|
01539> ------------------------
01540> | ADD HYD (WRswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01541> ------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
01542>                      ID1 06:OVF-xI          .00      .000     .00    .00    .000
01543>                     +ID2 07:103            4.52     .655    1.00  20.93    .000
01544>                     +ID3 02:206            1.22     .006    2.12   3.74    .000
01545>                      ========================================================
01546>                      SUM 08:WRswl          5.74     .655    1.00  17.27    .000
01547>
01548>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01549>
01550> ---------------------------------------------------------------------------
01551> 002:0025-----------------------------------------------------------------------
01552> *#-----------------|-------------------------------------------------------|
01553> ----------------------
01554> | DESIGN NASHYD      |   Area    (ha)=    1.13   Curve Number   (CN)=50.00
01555> | 05:208    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01556> ----------------------   U.H. Tp(hrs)=    .850
01557>
01558>     Unit Hyd Qpeak  (cms)=     .051
01559>
01560>     PEAK FLOW       (cms)=     .005 (i)
01561>     TIME TO PEAK    (hrs)=    2.167
01562>     RUNOFF VOLUME    (mm)=    3.744
01563>     TOTAL RAINFALL   (mm)=   34.271
01564>     RUNOFF COEFFICIENT   =     .109
01565>
01566>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01567>
01568> ---------------------------------------------------------------------------
01569> 002:0026-----------------------------------------------------------------------
01570> *#-----------------|-------------------------------------------------------|
01571> *#
01572> *#                        Total Flows through Outlet Channel
01573> *#
01574> *#-----------------|-------------------------------------------------------|
01575> ------------------------
01576> | ADD HYD (OutChan   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01577> ------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
01578>                      ID1 01:SWMout          .00      .000     .00    .00    .000
01579>                     +ID2 08:WRswl          5.74     .655    1.00  17.27    .000
01580>                     +ID3 05:208            1.13     .005    2.17   3.74    .000
01581>                      ========================================================
01582>                      SUM 03:OutChan        6.87     .655    1.00  15.05    .000
01583>
01584>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01585>
01586> ---------------------------------------------------------------------------
01587> 002:0027-----------------------------------------------------------------------
01588> *#-----------------|-------------------------------------------------------|
01589> *#
01590> *#              Total Flows to the east (eventually to Cedar Creek)
01591> *#
01592> *#-----------------|-------------------------------------------------------|
01593> ------------------------
01594> | ADD HYD (TotE      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01595> ------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
01596>                      ID1 01:SWMout          .00      .000     .00    .00    .000
01597>                     +ID2 08:WRswl          5.74     .655    1.00  17.27    .000
01598>                     +ID3 09:UCtoE         71.82    2.070    1.50  14.45    .000
01599>                      ========================================================
01600>                      SUM 04:TotE           77.56    2.169    1.50  14.66    .000
01601>
01602>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01603>
01604> ---------------------------------------------------------------------------
01605> 002:0028-----------------------------------------------------------------------
01606> *#-----------------|-------------------------------------------------------|
01607> *#
01608> *#                        Total Flows from the Site
01609> *#
01610> *#-----------------|-------------------------------------------------------|
01611> ------------------------
01612> | ADD HYD (AllFlo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01613> ------------------------                  (ha)     (cms)   (hrs)   (mm)    (cms)
01614>                      ID1 04:TotE           77.56    2.169    1.50  14.66    .000
01615>                     +ID2 10:207             .14     .003    1.08   3.74    .000
01616>                      ========================================================
01617>                      SUM 06:AllFlo         77.70    2.170    1.50  14.64    .000
01618>
01619>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01620>
```

```
01621> ------------------------------------------------------------------------------
01622> 002:0029------------------------------------------------------------------------
01623> *#
01624> *#   Catchments required for By-Pass Storm Sewer (BPSS) sizing - added again
01625> *#                          for ease of modelling
01626> *#
01627> *#-----------------|----------------------------------------------------------|
01628> ----------------------
01629> | DESIGN NASHYD     |   Area    (ha)=     .14   Curve Number    (CN)=50.00
01630> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01631> ----------------------   U.H. Tp(hrs)=    .260
01632>
01633>      Unit Hyd Qpeak  (cms)=     .021
01634>
01635>      PEAK FLOW       (cms)=     .001 (i)
01636>      TIME TO PEAK    (hrs)=    1.350
01637>      RUNOFF VOLUME    (mm)=    3.741
01638>      TOTAL RAINFALL   (mm)=   34.271
01639>      RUNOFF COEFFICIENT   =     .109
01640>
01641>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01642>
01643> ------------------------------------------------------------------------------
01644> 002:0030------------------------------------------------------------------------
01645> *#-----------------|----------------------------------------------------------|
01646> ----------------------
01647> | DESIGN STANDHYD    |   Area    (ha)=     .64
01648> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
01649> ----------------------
01650>                              IMPERVIOUS    PERVIOUS (i)
01651>      Surface Area     (ha)=       .58          .06
01652>      Dep. Storage     (mm)=       .80         1.50
01653>      Average Slope     (%)=      2.00         2.00
01654>      Length            (m)=     65.32        40.00
01655>      Mannings n             =     .013         .250
01656>
01657>      Max.eff.Inten.(mm/hr)=     109.40       168.34
01658>                over (min)        2.00         7.00
01659>      Storage Coeff.  (min)=       1.55 (ii)    7.28 (ii)
01660>      Unit Hyd. Tpeak (min)=       2.00         7.00
01661>      Unit Hyd. peak  (cms)=        .65          .16
01662>                                                          *TOTALS*
01663>      PEAK FLOW       (cms)=        .09          .02          .103 (iii)
01664>      TIME TO PEAK    (hrs)=       1.00         1.10         1.000
01665>      RUNOFF VOLUME    (mm)=      33.47        13.61        23.542
01666>      TOTAL RAINFALL   (mm)=      34.27        34.27        34.271
01667>      RUNOFF COEFFICIENT   =        .98          .40          .687
01668>
01669>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01670>            CN* =  50.0    Ia = Dep. Storage  (Above)
01671>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01672>            THAN THE STORAGE COEFFICIENT.
01673>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01674>
01675> ------------------------------------------------------------------------------
01676> 002:0031------------------------------------------------------------------------
01677> *#-----------------|----------------------------------------------------------|
01678> ----------------------
01679> | CALIB STANDHYD     |   Area    (ha)=   55.94
01680> | 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
01681> ----------------------
01682>                              IMPERVIOUS    PERVIOUS (i)
01683>      Surface Area     (ha)=      44.75        11.19
01684>      Dep. Storage     (mm)=       2.00         5.00
01685>      Average Slope     (%)=       1.50         2.00
01686>      Length            (m)=    1750.00        30.00
01687>      Mannings n             =       .025         .250
01688>
01689>      Max.eff.Inten.(mm/hr)=      47.63        51.47
01690>                over (min)       25.00        33.00
01691>      Storage Coeff.  (min)=       25.09 (ii)   32.84 (ii)
01692>      Unit Hyd. Tpeak (min)=       25.00        33.00
01693>      Unit Hyd. peak  (cms)=         .05          .03
01694>                                                          *TOTALS*
01695>      PEAK FLOW       (cms)=         .92          .92         1.734 (iii)
01696>      TIME TO PEAK    (hrs)=        1.40         1.62         1.517
01697>      RUNOFF VOLUME    (mm)=       32.27        11.30        15.492
01698>      TOTAL RAINFALL   (mm)=       34.27        34.27        34.271
01699>      RUNOFF COEFFICIENT   =         .94          .33          .452
01700>
01701>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01702>            CN* =  50.0    Ia = Dep. Storage  (Above)
01703>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01704>            THAN THE STORAGE COEFFICIENT.
01705>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01706>
01707> ------------------------------------------------------------------------------
01708> 002:0032------------------------------------------------------------------------
01709> *#-----------------|----------------------------------------------------------|
01710> ----------------------
01711> | CALIB STANDHYD     |   Area    (ha)=   14.55
01712> | 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
01713> ----------------------
01714>                              IMPERVIOUS    PERVIOUS (i)
01715>      Surface Area     (ha)=       8.73         5.82
01716>      Dep. Storage     (mm)=       2.00         5.00
01717>      Average Slope     (%)=       2.30         2.00
01718>      Length            (m)=    1050.00        30.00
01719>      Mannings n             =       .025         .250
01720>
01721>      Max.eff.Inten.(mm/hr)=      66.55        18.29
01722>                over (min)       14.00        26.00
01723>      Storage Coeff.  (min)=       14.21 (ii)   25.93 (ii)
01724>      Unit Hyd. Tpeak (min)=       14.00        26.00
01725>      Unit Hyd. peak  (cms)=         .08          .04
01726>                                                          *TOTALS*
01727>      PEAK FLOW       (cms)=         .26          .17          .354 (iii)
01728>      TIME TO PEAK    (hrs)=        1.20         1.50         1.300
01729>      RUNOFF VOLUME    (mm)=       32.27         6.73        10.559
01730>      TOTAL RAINFALL   (mm)=       34.27        34.27        34.271
01731>      RUNOFF COEFFICIENT   =         .94          .20          .308
01732>
01733>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01734>            CN* = 50.0    Ia = Dep. Storage  (Above)
01735>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01736>            THAN THE STORAGE COEFFICIENT.
01737>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01738>
01739> ------------------------------------------------------------------------------
01740> 002:0033------------------------------------------------------------------------
01741> *#-----------------|----------------------------------------------------------|
01742> ------------------------
01743> | ADD HYD (BPSS      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01744> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
01745>                     ID1 01:200            .14     .001    1.35   3.74    .000
01746>                    +ID2 02:201            .64     .103    1.00  23.54    .000
01747>                    +ID3 03:100          55.94    1.734    1.52  15.49    .000
01748>                    +ID4 07:101          14.55     .354    1.30  10.56    .000
01749>                     ==========================================================
01750>                     SUM 06:BPSS          71.27    2.067    1.50  14.53    .000
01751>
01752>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01753>
01754> ------------------------------------------------------------------------------
01755> 002:0034------------------------------------------------------------------------
01756> ------------------------------------------------------------------------------
01757> 002:0002------------------------------------------------------------------------
01758>   ** END OF RUN :   4
01759>
01760> ******************************************************************************
01761>
01762>
01763>
01764>
01765>
01766> --------------------
01767> | START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
01768> --------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
01769>     TZERO =   .00 hrs on        0
01770>     METOUT=   2 (output = METRIC)
01771>     NRUN  = 005
01772>     NSTORM=   1
01773>               #  1=Kit5yr.3hr
01774> ------------------------------------------------------------------------------
01775> 005:0002------------------------------------------------------------------------
01776> *#*****************************************************************************
01777> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project #: [161414214]
01778> *#  Date        : 11/13/2024
01779> *#  Modeller    : [Amy Kyle]
01780> *#  Company     : Stantec Consulting Ltd. (Waterloo)
01781> *#  License #   : 4730904
01782> *#
01783> *#  This hydrologic analysis prepared to provide pond sizing
01784> *#  for the 2509 Cedar Creek Road SWM Facility
01785> *#  The storm events modelled are:
01786> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
01787> *#  and the Regional Event
01788> *#*****************************************************************************
01789> ------------------------------------------------------------------------------
01790> 005:0002------------------------------------------------------------------------
01791> --------------------
01792> | READ STORM       |    Filename: 5-yr, 3hr Chicago Storm - Kitchener IDF
01793> | Ptotal=  47.26 mm|    Comments: 5-yr, 3hr Chicago Storm - Kitchener IDF
01794> --------------------
01795>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
01796>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
01797>                .08   3.031 |    .83  24.598 |   1.58  11.053 |   2.33   4.231
01798>                .17   3.380 |    .92  57.395 |   1.67   9.458 |   2.42   3.949
01799>                .25   3.819 |   1.00 139.288 |   1.75   8.241 |   2.50   3.701
01800>                .33   4.385 |   1.08  72.741 |   1.83   7.286 |   2.58   3.483
01801>                .42   5.141 |   1.17  42.120 |   1.92   6.519 |   2.67   3.288
01802>                .50   6.195 |   1.25  28.378 |   2.00   5.892 |   2.75   3.114
01803>                .58   7.751 |   1.33  20.884 |   2.08   5.370 |   2.83   2.957
01804>                .67  10.239 |   1.42  16.280 |   2.17   4.930 |   2.92   2.815
01805>                .75  14.725 |   1.50  13.216 |   2.25   4.554 |   3.00   2.687
01806>
01807> ------------------------------------------------------------------------------
01808> 005:0003------------------------------------------------------------------------
01809> *#-----------------|----------------------------------------------------------|
01810> *#==========================================================================
01811> *# Proposed Drainage Conditions (Internal Areas)
01812> *#==========================================================================
01813> *#-----------------|----------------------------------------------------------|
01814> *#
01815> *#    Small portion of West Road Ditch draining offsite to the east through
01816> *#                          By-Pass Storm Sewer(BPSS)
01817> *#
01818> *#-----------------|----------------------------------------------------------|
01819> ----------------------
01820> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
01821> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01822> ----------------------   U.H. Tp(hrs)=    .260
01823>
01824>      Unit Hyd Qpeak  (cms)=     .021
01825>
01826>      PEAK FLOW       (cms)=     .003 (i)
01827>      TIME TO PEAK    (hrs)=    1.367
01828>      RUNOFF VOLUME    (mm)=    6.981
01829>      TOTAL RAINFALL   (mm)=   47.258
01830>      RUNOFF COEFFICIENT   =     .148
01831>
01832>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01833>
01834> ------------------------------------------------------------------------------
01835> 005:0004------------------------------------------------------------------------
01836> *#-----------------|----------------------------------------------------------|
01837> *#
01838> *#  Proposed developed catchment draining offsite to the east through BPSS
01839> *#
01840> *#-----------------|----------------------------------------------------------|
01841> ----------------------
01842> | DESIGN STANDHYD    |   Area    (ha)=     .64
01843> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
01844> ----------------------
01845>                              IMPERVIOUS    PERVIOUS (i)
01846>      Surface Area     (ha)=       .58          .06
01847>      Dep. Storage     (mm)=       .80         1.50
01848>      Average Slope     (%)=      2.00         2.00
01849>      Length            (m)=     65.32        40.00
01850>      Mannings n             =     .013         .250
01851>
01852>      Max.eff.Inten.(mm/hr)=     139.29       286.71
01853>                over (min)        1.00         6.00
01854>      Storage Coeff.  (min)=       1.41 (ii)    6.04 (ii)
01855>      Unit Hyd. Tpeak (min)=       1.00         6.00
01856>      Unit Hyd. peak  (cms)=        .86          .19
01857>                                                          *TOTALS*
01858>      PEAK FLOW       (cms)=        .12          .04          .143 (iii)
01859>      TIME TO PEAK    (hrs)=       1.00         1.08         1.000
01860>      RUNOFF VOLUME    (mm)=      46.46        22.56        34.507
01861>      TOTAL RAINFALL   (mm)=      47.26        47.26        47.258
01862>      RUNOFF COEFFICIENT   =        .98          .48          .730
01863>
01864>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01865>            CN* =  50.0    Ia = Dep. Storage  (Above)
01866>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01867>            THAN THE STORAGE COEFFICIENT.
01868>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01869>
01870> ------------------------------------------------------------------------------
01871> 005:0005------------------------------------------------------------------------
01872> *#-----------------|----------------------------------------------------------|
01873> *#
01874> *# Proposed internal grassed area and plunge pool draining offsite to the east
01875> *#
01876> *#-----------------|----------------------------------------------------------|
01877> ----------------------
01878> | DESIGN NASHYD      |   Area    (ha)=     .55   Curve Number   (CN)=50.00
01879> | 03:203    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01880> ----------------------   U.H. Tp(hrs)=    .080
01881>
01882>      Unit Hyd Qpeak  (cms)=     .263
01883>
01884>      PEAK FLOW       (cms)=     .019 (i)
01885>      TIME TO PEAK    (hrs)=    1.100
01886>      RUNOFF VOLUME    (mm)=    6.985
01887>      TOTAL RAINFALL   (mm)=   47.258
01888>      RUNOFF COEFFICIENT   =     .148
01889>
01890>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
```

```
01891>
01892> ----------------------------------------------------------------------------
01893> 005:0006----------------------------------------------------------------------
01894> *#-----------------|--------------------------------------------------------|
01895> *#
01896> *#          Total internal area draining onto agricultural area to the east
01897> *#
01898> *#-----------------|--------------------------------------------------------|
01899> ----------------------
01900> | ADD HYD (IntUcE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01901> ----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
01902>                      ID1 01:200           .14      .003    1.37   6.98    .000
01903>                     +ID2 02:201           .64      .143    1.00  34.51    .000
01904>                     +ID3 03:203           .55      .019    1.10   6.98    .000
01905>                      ========================================================
01906>                      SUM 05:IntUcE        1.33     .155    1.00  20.23    .000
01907>
01908>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01909>
01910> ----------------------------------------------------------------------------
01911> 005:0007----------------------------------------------------------------------
01912> *#-----------------|--------------------------------------------------------|
01913> *#
01914> *#             Proposed industrial lots draining to Rear Lot Ditch
01915> *#
01916> *#-----------------|--------------------------------------------------------|
01917> ----------------------
01918> | DESIGN STANDHYD    |   Area    (ha)=    8.82
01919> | 10:202    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
01920> ----------------------
01921>                                IMPERVIOUS    PERVIOUS (i)
01922>      Surface Area     (ha)=       7.94          .88
01923>      Dep. Storage     (mm)=        .80         1.50
01924>      Average Slope     (%)=       2.00         2.00
01925>      Length            (m)=     242.49        40.00
01926>      Mannings n             =      .013         .250
01927>
01928>      Max.eff.Inten.(mm/hr)=     139.29        47.27
01929>                    over (min)       3.00        13.00
01930>      Storage Coeff.  (min)=       3.09 (ii)   12.62 (ii)
01931>      Unit Hyd. Tpeak (min)=       3.00        13.00
01932>      Unit Hyd. peak  (cms)=        .37          .09
01933>                                                        *TOTALS*
01934>      PEAK FLOW       (cms)=       2.26          .07         2.283 (iii)
01935>      TIME TO PEAK    (hrs)=       1.02         1.25          1.017
01936>      RUNOFF VOLUME    (mm)=      46.46        12.47         39.660
01937>      TOTAL RAINFALL   (mm)=      47.26        47.26         47.258
01938>      RUNOFF COEFFICIENT   =        .98          .26           .839
01939>
01940>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
01941>            CN* =  50.0    Ia = Dep. Storage  (Above)
01942>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
01943>            THAN THE STORAGE COEFFICIENT.
01944>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01945>
01946> ----------------------------------------------------------------------------
01947> 005:0008----------------------------------------------------------------------
01948> *#-----------------|--------------------------------------------------------|
01949> *#
01950> *#    External agricultural area draining onsite and entering Rear Lot Ditch
01951> *#
01952> *#-----------------|--------------------------------------------------------|
01953> ----------------------
01954> | DESIGN NASHYD      |   Area    (ha)=     .73   Curve Number   (CN)=70.00
01955> | 07:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
01956> ----------------------   U.H. Tp(hrs)=    .190
01957>
01958>      Unit Hyd Qpeak  (cms)=     .147
01959>
01960>      PEAK FLOW       (cms)=     .035 (i)
01961>      TIME TO PEAK    (hrs)=    1.250
01962>      RUNOFF VOLUME    (mm)=   13.542
01963>      TOTAL RAINFALL   (mm)=   47.258
01964>      RUNOFF COEFFICIENT   =     .287
01965>
01966>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
01967>
01968> ----------------------------------------------------------------------------
01969> 005:0009----------------------------------------------------------------------
01970> *#-----------------|--------------------------------------------------------|
01971> *#
01972> *#      Total area entering Rear Lot Ditch and entering SWMF at East inlet
01973> *#
01974> *#-----------------|--------------------------------------------------------|
01975> ----------------------
01976> | ADD HYD (RLswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
01977> ----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
01978>                      ID1 10:202           8.82     2.283    1.02  39.66    .000
01979>                     +ID2 07:104            .73      .035    1.25  13.54    .000
01980>                      ========================================================
01981>                      SUM 08:RLswl         9.55     2.294    1.02  37.66    .000
01982>
01983>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
01984>
01985> ----------------------------------------------------------------------------
01986> 005:0010----------------------------------------------------------------------
01987> *#-----------------|--------------------------------------------------------|
01988> *#
01989> *#   Proposed industrial lots draining to East Road Ditch within catchment,
01990> *#                          and new internal roadway
01991> *#
01992> *#-----------------|--------------------------------------------------------|
01993> ----------------------
01994> | DESIGN STANDHYD    |   Area    (ha)=    4.92
01995> | 01:204    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
01996> ----------------------
01997>                                IMPERVIOUS    PERVIOUS (i)
01998>      Surface Area     (ha)=       4.43          .49
01999>      Dep. Storage     (mm)=        .80         1.50
02000>      Average Slope     (%)=       2.00         2.00
02001>      Length            (m)=     181.11        40.00
02002>      Mannings n             =      .013         .250
02003>
02004>      Max.eff.Inten.(mm/hr)=     139.29        48.75
02005>                    over (min)       3.00        12.00
02006>      Storage Coeff.  (min)=       2.60 (ii)   12.00 (ii)
02007>      Unit Hyd. Tpeak (min)=       3.00        12.00
02008>      Unit Hyd. peak  (cms)=        .41          .09
02009>                                                        *TOTALS*
02010>      PEAK FLOW       (cms)=       1.31          .04         1.323 (iii)
02011>      TIME TO PEAK    (hrs)=       1.02         1.23          1.017
02012>      RUNOFF VOLUME    (mm)=      46.46        12.47         39.660
02013>      TOTAL RAINFALL   (mm)=      47.26        47.26         47.258
02014>      RUNOFF COEFFICIENT   =        .98          .26           .839
02015>
02016>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02017>            CN* =  50.0    Ia = Dep. Storage  (Above)
02018>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02019>            THAN THE STORAGE COEFFICIENT.
02020>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02021>
02022> ----------------------------------------------------------------------------
02023> 005:0011----------------------------------------------------------------------
02024> *#-----------------|--------------------------------------------------------|
02025> *#
02026> *#              Proposed SWM facility catchment (infiltration basin)
02027> *#
02028> *#-----------------|--------------------------------------------------------|
02029> ----------------------
02030> | DESIGN NASHYD      |   Area    (ha)=    1.63   Curve Number   (CN)=57.00
02031> | 09:205    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02032> ----------------------   U.H. Tp(hrs)=    .350
02033>
02034>      Unit Hyd Qpeak  (cms)=     .178
02035>
02036>      PEAK FLOW       (cms)=     .035 (i)
02037>      TIME TO PEAK    (hrs)=    1.483
02038>      RUNOFF VOLUME    (mm)=    8.820
02039>      TOTAL RAINFALL   (mm)=   47.258
02040>      RUNOFF COEFFICIENT   =     .187
02041>
02042>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02043>
02044> ----------------------------------------------------------------------------
02045> 005:0012----------------------------------------------------------------------
02046> *#-----------------|--------------------------------------------------------|
02047> *#
02048> *#                          All flows entering SWM facility
02049> *#
02050> *#-----------------|--------------------------------------------------------|
02051> ----------------------
02052> | ADD HYD (ToSWM     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02053> ----------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
02054>                      ID1 07:104            .73      .035    1.25  13.54    .000
02055>                     +ID2 09:205           1.63      .035    1.48   8.82    .000
02056>                     +ID3 10:202           8.82     2.283    1.02  39.66    .000
02057>                     +ID4 01:204           4.92     1.323    1.02  39.66    .000
02058>                      ========================================================
02059>                      SUM 06:ToSWM         16.10     3.621    1.02  35.35    .000
02060>
02061>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02062>
02063> ----------------------------------------------------------------------------
02064> 005:0013----------------------------------------------------------------------
02065> *#
02066> *#                       Infiltration Portion of SWM facility
02067> *#
02068> *#-----------------|--------------------------------------------------------|
02069> ----------------------
02070> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
02071> |  IN>06:(ToSWM )    |
02072> | OUT<07:(SWMinf)    |    =========  OUTLFOW STORAGE TABLE  =========
02073> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
02074>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
02075>                              .000  .0000E+00    |     .044  .6364E+00
02076>                              .044  .5530E-01    |     .000  .0000E+00
02077>
02078>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
02079>      ---------------------       (ha)     (cms)     (hrs)       (mm)
02080>      INFLOW >06: (ToSWM )      16.10     3.621     1.017     35.353
02081>      OUTFLOW<07: (SWMinf)      16.10      .044      .867     35.353
02082>     OVERFLOW<08: (OVF-I )        .00      .000      .000       .000
02083>
02084>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =         0
02085>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
02086>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
02087>
02088>
02089>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.215
02090>                     TIME SHIFT OF PEAK FLOW          (min)=    -9.00
02091>                     MAXIMUM  STORAGE   USED       (ha.m.)=.5286E+00
02092>
02093> ----------------------------------------------------------------------------
02094> 005:0014----------------------------------------------------------------------
02095> *#-----------------|--------------------------------------------------------|
02096> *#
02097> *#                        Active Storage Portion of SWM facility
02098> *#
02099> *#-----------------|--------------------------------------------------------|
02100> ----------------------
02101> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
02102> |  IN>08:(OVF-I )    |
02103> | OUT<01:(SWMout)    |    =========  OUTLFOW STORAGE TABLE  =========
02104> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
02105>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
02106>                              .000  .0000E+00    |    1.479  .3245E+00
02107>                              .202  .1059E+00    |    2.606  .4367E+00
02108>                              .689  .2141E+00    |    4.101  .5560E+00
02109>       *** WARNING: Inflow hydrograph is dry.
02110>
02111>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
02112>      ---------------------       (ha)     (cms)     (hrs)       (mm)
02113>      INFLOW >08: (OVF-I )         .00      .000      .000       .000
02114>      OUTFLOW<01: (SWMout)         .00      .000      .000       .000
02115>     OVERFLOW<02: (OVF   )         .64      .000      .000       .000
02116>
02117>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =         0
02118>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
02119>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
02120>
02121>
02122> *** WARNING: Inflow and ouflow hydrographs are dry.
02123>
02124> ----------------------------------------------------------------------------
02125> 005:0015----------------------------------------------------------------------
02126> *#-----------------|--------------------------------------------------------|
02127> *#
02128> *#    West Road Ditch, conveying external drainage from the west around the
02129> *#                      proposed SWM facility to Outlet Channel
02130> *#
02131> *#-----------------|--------------------------------------------------------|
02132> ----------------------
02133> | DESIGN NASHYD      |   Area    (ha)=    1.22   Curve Number   (CN)=50.00
02134> | 02:206    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02135> ----------------------   U.H. Tp(hrs)=    .810
02136>
02137>      Unit Hyd Qpeak  (cms)=     .058
02138>
02139>      PEAK FLOW       (cms)=     .012 (i)
02140>      TIME TO PEAK    (hrs)=    2.083
02141>      RUNOFF VOLUME    (mm)=    6.984
02142>      TOTAL RAINFALL   (mm)=   47.258
02143>      RUNOFF COEFFICIENT   =     .148
02144>
02145>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02146>
02147> ----------------------------------------------------------------------------
02148> 005:0016----------------------------------------------------------------------
02149> *#-----------------|--------------------------------------------------------|
02150> *#
02151> *#        Grassed area south of SWM facility draining offsite to the south
02152> *#
02153> *#-----------------|--------------------------------------------------------|
02154> ----------------------
02155> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
02156> | 10:207    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02157> ----------------------   U.H. Tp(hrs)=    .070
02158>
02159>      Unit Hyd Qpeak  (cms)=     .076
02160>
```

```
02161>      PEAK FLOW       (cms)=     .005 (i)
02162>      TIME TO PEAK    (hrs)=    1.083
02163>      RUNOFF VOLUME    (mm)=    6.984
02164>      TOTAL RAINFALL   (mm)=   47.258
02165>      RUNOFF COEFFICIENT   =     .148
02166>
02167>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02168>
02169> ---------------------------------------------------------------------------
02170> 005:0017-----------------------------------------------------------------
02171> *#-----------------|-------------------------------------------------------|
02172> *#
02173> *#                 Total Flows to the east from internal catchments
02174> *#
02175> *#-----------------|-------------------------------------------------------|
02176> ----------------------
02177> | ADD HYD (IntE     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02178> ----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
02179>                       ID1 05:IntUcE        1.33     .155    1.00  20.23    .000
02180>                      +ID2 01:SWMout         .00     .000     .00    .00    .000
02181>                      +ID3 02:206           1.22     .012    2.08   6.98    .000
02182>                       ==========================================================
02183>                       SUM 07:IntE           2.55     .155    1.00  13.89    .000
02184>
02185>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02186>
02187> ---------------------------------------------------------------------------
02188> 005:0018-----------------------------------------------------------------
02189> *#-----------------|-------------------------------------------------------|
02190> *#=======================================================================
02191> *# Proposed Drainage Conditions (Including External Catchment Flows to Ditches)
02192> *#=======================================================================
02193> *#-----------------|-------------------------------------------------------|
02194> *#
02195> *# External industrial catchment and part of Hwy 401, draining south across
02196> *#                 Cedar Creek Road and entering BPSS
02197> *#
02198> *#-----------------|-------------------------------------------------------|
02199> ----------------------
02200> | CALIB STANDHYD     |   Area    (ha)=   55.94
02201> | 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
02202> ----------------------
02203>                              IMPERVIOUS    PERVIOUS (i)
02204>      Surface Area     (ha)=      44.75        11.19
02205>      Dep. Storage     (mm)=       2.00         5.00
02206>      Average Slope     (%)=       1.50         2.00
02207>      Length            (m)=    1750.00        30.00
02208>      Mannings n             =       .025         .250
02209>
02210>      Max.eff.Inten.(mm/hr)=      75.53       105.46
02211>                   over (min)       21.00        27.00
02212>      Storage Coeff.  (min)=      20.87 (ii)   26.68 (ii)
02213>      Unit Hyd. Tpeak (min)=      21.00        27.00
02214>      Unit Hyd. peak  (cms)=        .05          .04
02215>                                                          *TOTALS*
02216>      PEAK FLOW       (cms)=       1.47         1.93          3.252 (iii)
02217>      TIME TO PEAK    (hrs)=       1.33         1.50          1.433
02218>      RUNOFF VOLUME    (mm)=      45.25        19.33         24.515
02219>      TOTAL RAINFALL   (mm)=      47.26        47.26         47.258
02220>      RUNOFF COEFFICIENT   =        .96          .41           .519
02221>
02222>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02223>            CN* =  50.0    Ia = Dep. Storage  (Above)
02224>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02225>            THAN THE STORAGE COEFFICIENT.
02226>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02227>
02228> ---------------------------------------------------------------------------
02229> 005:0019-----------------------------------------------------------------
02230> *#-----------------|-------------------------------------------------------|
02231> *#
02232> *#  External catchment containing a portion of Cedar Creek Road, a portion
02233> *#  of industrial area, and a grassed area near Hwy 401 off-ramp, entering BPSS
02234> *#
02235> *#-----------------|-------------------------------------------------------|
02236> ----------------------
02237> | CALIB STANDHYD     |   Area    (ha)=   14.55
02238> | 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
02239> ----------------------
02240>                              IMPERVIOUS    PERVIOUS (i)
02241>      Surface Area     (ha)=       8.73         5.82
02242>      Dep. Storage     (mm)=       2.00         5.00
02243>      Average Slope     (%)=       2.30         2.00
02244>      Length            (m)=    1050.00        30.00
02245>      Mannings n             =       .025         .250
02246>
02247>      Max.eff.Inten.(mm/hr)=      97.91        39.83
02248>                   over (min)       12.00        21.00
02249>      Storage Coeff.  (min)=      12.18 (ii)   20.76 (ii)
02250>      Unit Hyd. Tpeak (min)=      12.00        21.00
02251>      Unit Hyd. peak  (cms)=        .09          .05
02252>                                                          *TOTALS*
02253>      PEAK FLOW       (cms)=        .39          .38           .675 (iii)
02254>      TIME TO PEAK    (hrs)=       1.18         1.42          1.317
02255>      RUNOFF VOLUME    (mm)=      45.26        12.26         17.212
02256>      TOTAL RAINFALL   (mm)=      47.26        47.26         47.258
02257>      RUNOFF COEFFICIENT   =        .96          .26           .364
02258>
02259>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02260>            CN* =  50.0    Ia = Dep. Storage  (Above)
02261>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02262>            THAN THE STORAGE COEFFICIENT.
02263>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02264>
02265> ---------------------------------------------------------------------------
02266> 005:0020-----------------------------------------------------------------
02267> *#-----------------|-------------------------------------------------------|
02268> *#
02269> *#     Total area draining offsite to east onto agricultural area to the east
02270> *#
02271> *#-----------------|-------------------------------------------------------|
02272> ----------------------
02273> | ADD HYD (UCtoE     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02274> ----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
02275>                       ID1 05:IntUcE        1.33     .155    1.00  20.23    .000
02276>                      +ID2 03:100          55.94    3.252    1.43  24.52    .000
02277>                      +ID3 07:101          14.55     .675    1.32  17.21    .000
02278>                       ==========================================================
02279>                       SUM 09:UCtoE         71.82    3.915    1.42  22.96    .000
02280>
02281>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02282>
02283> ---------------------------------------------------------------------------
02284> 005:0021-----------------------------------------------------------------
02285> *#-----------------|-------------------------------------------------------|
02286> *#
02287> *#  Large external catchment west of site containing industrial property,
02288> *#  draining into private SWM feature and then into West Road Ditch, routing
02289> *#              around SWM facility and entering Outlet Channel
02290> *#
02291> *#-----------------|-------------------------------------------------------|
02292> ----------------------
02293> | DESIGN STANDHYD    |   Area    (ha)=   12.64
02294> | 04:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
02295> ----------------------
02296>                              IMPERVIOUS    PERVIOUS (i)
02297>      Surface Area     (ha)=      10.11         2.53
02298>      Dep. Storage     (mm)=       .80         1.50
02299>      Average Slope     (%)=      3.10         3.10
02300>      Length            (m)=    290.29        40.00
02301>      Mannings n             =      .013         .250
02302>
02303>      Max.eff.Inten.(mm/hr)=     139.29        78.90
02304>                   over (min)       3.00        10.00
02305>      Storage Coeff.  (min)=       3.02 (ii)    9.82 (ii)
02306>      Unit Hyd. Tpeak (min)=       3.00        10.00
02307>      Unit Hyd. peak  (cms)=        .37          .11
02308>                                                          *TOTALS*
02309>      PEAK FLOW       (cms)=       2.04          .35          2.179 (iii)
02310>      TIME TO PEAK    (hrs)=       1.02         1.20          1.017
02311>      RUNOFF VOLUME    (mm)=      46.46        14.68         30.571
02312>      TOTAL RAINFALL   (mm)=      47.26        47.26         47.258
02313>      RUNOFF COEFFICIENT   =        .98          .31           .647
02314>
02315>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02316>            CN* =  50.0    Ia = Dep. Storage  (Above)
02317>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02318>            THAN THE STORAGE COEFFICIENT.
02319>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02320>
02321> ---------------------------------------------------------------------------
02322> 005:0022-----------------------------------------------------------------
02323> *#-----------------|-------------------------------------------------------|
02324> *#
02325> *#                      Infiltration in External SWM Feature
02326> *#
02327> *#-----------------|-------------------------------------------------------|
02328> --------------------
02329> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
02330> |  IN>04:(102   )   |
02331> | OUT<05:(xSWinf)   |    =========  OUTLFOW STORAGE TABLE  =========
02332> --------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
02333>                           (cms)     (ha.m.)   |    (cms)    (ha.m.)
02334>                           .000  .0000E+00   |     .018  .3759E+00
02335>                           .018  .4380E-01   |     .000  .0000E+00
02336>
02337>      ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
02338>      --------------------         (ha)     (cms)     (hrs)       (mm)
02339>      INFLOW >04: (102   )       12.64     2.179     1.017     30.571
02340>      OUTFLOW<05: (xSWinf)       12.64      .018      .917     30.570
02341>     OVERFLOW<06: (OVF-xI)         .00      .000      .000       .000
02342>
02343>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =         0
02344>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
02345>                     PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
02346>
02347>
02348>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=      .826
02349>                     TIME SHIFT OF PEAK FLOW          (min)=    -6.00
02350>                     MAXIMUM  STORAGE   USED       (ha.m.)=.3695E+00
02351>
02352> ---------------------------------------------------------------------------
02353> 005:0023-----------------------------------------------------------------
02354> *#-----------------|-------------------------------------------------------|
02355> *#
02356> *#    External catchment west of the site, containing a portion of existing
02357> *#  industrial property, draining east into West Road Ditch, routing around
02358> *#                    SWM facility and entering Outlet Channel
02359> *#
02360> *#-----------------|-------------------------------------------------------|
02361> ----------------------
02362> | DESIGN STANDHYD    |   Area    (ha)=    4.52
02363> | 07:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
02364> ----------------------
02365>                              IMPERVIOUS    PERVIOUS (i)
02366>      Surface Area     (ha)=       3.62          .90
02367>      Dep. Storage     (mm)=       .80         1.50
02368>      Average Slope     (%)=      5.30         5.30
02369>      Length            (m)=    173.59        40.00
02370>      Mannings n             =      .013         .250
02371>
02372>      Max.eff.Inten.(mm/hr)=     139.29        81.28
02373>                   over (min)       2.00         8.00
02374>      Storage Coeff.  (min)=       1.89 (ii)    7.61 (ii)
02375>      Unit Hyd. Tpeak (min)=       2.00         8.00
02376>      Unit Hyd. peak  (cms)=        .58          .15
02377>                                                          *TOTALS*
02378>      PEAK FLOW       (cms)=        .82          .14          .881 (iii)
02379>      TIME TO PEAK    (hrs)=       1.00         1.15         1.000
02380>      RUNOFF VOLUME    (mm)=      46.46        14.68         30.571
02381>      TOTAL RAINFALL   (mm)=      47.26        47.26         47.258
02382>      RUNOFF COEFFICIENT   =        .98          .31           .647
02383>
02384>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02385>            CN* =  50.0    Ia = Dep. Storage  (Above)
02386>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02387>            THAN THE STORAGE COEFFICIENT.
02388>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02389>
02390> ---------------------------------------------------------------------------
02391> 005:0024-----------------------------------------------------------------
02392> *#-----------------|-------------------------------------------------------|
02393> *#
02394> *#                       Total Flows through West Road Ditch
02395> *#
02396> *#-----------------|-------------------------------------------------------|
02397> ------------------------
02398> | ADD HYD (WRswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02399> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
02400>                        ID1 06:OVF-xI         .00      .000     .00    .00    .000
02401>                       +ID2 07:103           4.52      .881    1.00  30.57    .000
02402>                       +ID3 02:206           1.22      .012    2.08   6.98    .000
02403>                        ==========================================================
02404>                        SUM 08:WRswl          5.74      .881    1.00  25.56    .000
02405>
02406>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02407>
02408> ---------------------------------------------------------------------------
02409> 005:0025-----------------------------------------------------------------
02410> *#-----------------|-------------------------------------------------------|
02411> ----------------------
02412> | DESIGN NASHYD      |   Area    (ha)=    1.13   Curve Number   (CN)=50.00
02413> | 05:208    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02414> ----------------------   U.H. Tp(hrs)=    .850
02415>
02416>      Unit Hyd Qpeak  (cms)=     .051
02417>
02418>      PEAK FLOW       (cms)=     .011 (i)
02419>      TIME TO PEAK    (hrs)=    2.133
02420>      RUNOFF VOLUME    (mm)=    6.984
02421>      TOTAL RAINFALL   (mm)=   47.258
02422>      RUNOFF COEFFICIENT   =     .148
02423>
02424>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02425>
02426> ---------------------------------------------------------------------------
02427> 005:0026-----------------------------------------------------------------
02428> *#-----------------|-------------------------------------------------------|
02429> *#
02430> *#                       Total Flows through Outlet Channel
```

```
02431> *#
02432> *#------------------|-------------------------------------------------------------------|
02433> ----------------------
02434> | ADD HYD (OutChan   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02435> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
02436>                       ID1 01:SWMout         .00      .000     .00    .00    .000
02437>                      +ID2 08:WRswl         5.74      .881    1.00  25.56    .000
02438>                      +ID3 05:208           1.13      .011    2.13   6.98    .000
02439>                       ========================================================
02440>                       SUM 03:OutChan       6.87      .881    1.00  22.50    .000
02441>
02442>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02443>
02444> ------------------------------------------------------------------------------------
02445> 005:0027-----------------------------------------------------------------------------
02446> *#------------------|-------------------------------------------------------------------|
02447> *#
02448> *#               Total Flows to the east (eventually to Cedar Creek)
02449> *#
02450> *#------------------|-------------------------------------------------------------------|
02451> ----------------------
02452> | ADD HYD (TotE      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02453> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
02454>                       ID1 01:SWMout         .00      .000     .00    .00    .000
02455>                      +ID2 08:WRswl         5.74      .881    1.00  25.56    .000
02456>                      +ID3 09:UCtoE        71.82     3.915    1.42  22.96    .000
02457>                       ========================================================
02458>                       SUM 04:TotE          77.56     4.105    1.42  23.15    .000
02459>
02460>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02461>
02462> ------------------------------------------------------------------------------------
02463> 005:0028-----------------------------------------------------------------------------
02464> *#------------------|-------------------------------------------------------------------|
02465> *#
02466> *#                           Total Flows from the Site
02467> *#
02468> *#------------------|-------------------------------------------------------------------|
02469> ----------------------
02470> | ADD HYD (AllFlo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02471> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
02472>                       ID1 04:TotE          77.56     4.105    1.42  23.15    .000
02473>                      +ID2 10:207           .14       .005    1.08   6.98    .000
02474>                       ========================================================
02475>                       SUM 06:AllFlo        77.70     4.106    1.42  23.12    .000
02476>
02477>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02478>
02479> ------------------------------------------------------------------------------------
02480> 005:0029-----------------------------------------------------------------------------
02481> *#
02482> *#   Catchments required for By-Pass Storm Sewer (BPSS) sizing - added again
02483> *#                           for ease of modelling
02484> *#
02485> *#------------------|-------------------------------------------------------------------|
02486> ----------------------
02487> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number    (CN)=50.00
02488> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02489> ----------------------   U.H. Tp(hrs)=    .260
02490>
02491>      Unit Hyd Qpeak  (cms)=     .021
02492>
02493>      PEAK FLOW       (cms)=     .003 (i)
02494>      TIME TO PEAK    (hrs)=    1.367
02495>      RUNOFF VOLUME    (mm)=    6.981
02496>      TOTAL RAINFALL   (mm)=   47.258
02497>      RUNOFF COEFFICIENT   =     .148
02498>
02499>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02500>
02501> ------------------------------------------------------------------------------------
02502> 005:0030-----------------------------------------------------------------------------
02503> *#------------------|-------------------------------------------------------------------|
02504> ----------------------
02505> | DESIGN STANDHYD    |   Area    (ha)=     .64
02506> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
02507> ----------------------
02508>                              IMPERVIOUS    PERVIOUS (i)
02509>      Surface Area     (ha)=       .58          .06
02510>      Dep. Storage     (mm)=       .80         1.50
02511>      Average Slope     (%)=      2.00         2.00
02512>      Length            (m)=     65.32        40.00
02513>      Mannings n             =     .013         .250
02514>
02515>      Max.eff.Inten.(mm/hr)=     139.29       286.71
02516>                  over (min)        1.00         6.00
02517>      Storage Coeff.  (min)=       1.41 (ii)    6.04 (ii)
02518>      Unit Hyd. Tpeak (min)=       1.00         6.00
02519>      Unit Hyd. peak  (cms)=        .86          .19
02520>                                                          *TOTALS*
02521>      PEAK FLOW       (cms)=        .12          .04          .143 (iii)
02522>      TIME TO PEAK    (hrs)=       1.00         1.08         1.000
02523>      RUNOFF VOLUME    (mm)=      46.46        22.56        34.507
02524>      TOTAL RAINFALL   (mm)=      47.26        47.26        47.258
02525>      RUNOFF COEFFICIENT   =        .98          .48          .730
02526>
02527>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02528>            CN* =  50.0    Ia = Dep. Storage  (Above)
02529>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02530>            THAN THE STORAGE COEFFICIENT.
02531>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02532>
02533> ------------------------------------------------------------------------------------
02534> 005:0031-----------------------------------------------------------------------------
02535> *#------------------|-------------------------------------------------------------------|
02536> ----------------------
02537> | CALIB STANDHYD     |   Area    (ha)=   55.94
02538> | 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
02539> ----------------------
02540>                              IMPERVIOUS    PERVIOUS (i)
02541>      Surface Area     (ha)=      44.75        11.19
02542>      Dep. Storage     (mm)=       2.00         5.00
02543>      Average Slope     (%)=       1.50         2.00
02544>      Length            (m)=    1750.00        30.00
02545>      Mannings n             =      .025         .250
02546>
02547>      Max.eff.Inten.(mm/hr)=      75.53       105.46
02548>                  over (min)       21.00        27.00
02549>      Storage Coeff.  (min)=       20.87 (ii)   26.68 (ii)
02550>      Unit Hyd. Tpeak (min)=       21.00        27.00
02551>      Unit Hyd. peak  (cms)=         .05          .04
02552>                                                          *TOTALS*
02553>      PEAK FLOW       (cms)=        1.47         1.93         3.252 (iii)
02554>      TIME TO PEAK    (hrs)=        1.33         1.50         1.433
02555>      RUNOFF VOLUME    (mm)=       45.25        19.33        24.515
02556>      TOTAL RAINFALL   (mm)=       47.26        47.26        47.258
02557>      RUNOFF COEFFICIENT   =         .96          .41          .519
02558>
02559>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02560>            CN* =  50.0    Ia = Dep. Storage  (Above)
02561>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02562>            THAN THE STORAGE COEFFICIENT.
02563>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02564>
02565> ------------------------------------------------------------------------------------
02566> 005:0032-----------------------------------------------------------------------------
02567> *#------------------|-------------------------------------------------------------------|
02568> ----------------------
02569> | CALIB STANDHYD     |   Area    (ha)=   14.55
02570> | 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
02571> ----------------------
02572>                              IMPERVIOUS    PERVIOUS (i)
02573>      Surface Area     (ha)=       8.73         5.82
02574>      Dep. Storage     (mm)=       2.00         5.00
02575>      Average Slope     (%)=       2.30         2.00
02576>      Length            (m)=    1050.00        30.00
02577>      Mannings n             =      .025         .250
02578>
02579>      Max.eff.Inten.(mm/hr)=      97.91        39.83
02580>                  over (min)       12.00        21.00
02581>      Storage Coeff.  (min)=       12.18 (ii)   20.76 (ii)
02582>      Unit Hyd. Tpeak (min)=       12.00        21.00
02583>      Unit Hyd. peak  (cms)=         .09          .05
02584>                                                          *TOTALS*
02585>      PEAK FLOW       (cms)=         .39          .38          .675 (iii)
02586>      TIME TO PEAK    (hrs)=        1.18         1.42         1.317
02587>      RUNOFF VOLUME    (mm)=       45.26        12.26        17.212
02588>      TOTAL RAINFALL   (mm)=       47.26        47.26        47.258
02589>      RUNOFF COEFFICIENT   =         .96          .26          .364
02590>
02591>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02592>            CN* =  50.0    Ia = Dep. Storage  (Above)
02593>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02594>            THAN THE STORAGE COEFFICIENT.
02595>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02596>
02597> ------------------------------------------------------------------------------------
02598> 005:0033-----------------------------------------------------------------------------
02599> *#------------------|-------------------------------------------------------------------|
02600> ----------------------
02601> | ADD HYD (BPSS      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02602> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
02603>                       ID1 01:200            .14       .003    1.37   6.98    .000
02604>                      +ID2 02:201            .64       .143    1.00  34.51    .000
02605>                      +ID3 03:100          55.94      3.252    1.43  24.52    .000
02606>                      +ID4 07:101          14.55       .675    1.32  17.21    .000
02607>                       ========================================================
02608>                       SUM 06:BPSS          71.27     3.907    1.42  23.08    .000
02609>
02610>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02611>
02612> ------------------------------------------------------------------------------------
02613> 005:0034-----------------------------------------------------------------------------
02614> ------------------------------------------------------------------------------------
02615> 005:0002-----------------------------------------------------------------------------
02616> ------------------------------------------------------------------------------------
02617> 005:0002-----------------------------------------------------------------------------
02618>   ** END OF RUN :   9
02619>
02620> ************************************************************************************
02621>
02622>
02623>
02624>
02625>
02626> --------------------
02627> | START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
02628> --------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
02629>     TZERO =   .00 hrs on        0
02630>     METOUT=   2 (output = METRIC)
02631>     NRUN  = 010
02632>     NSTORM=   1
02633>               #  1=Kit10yr.3hr
02634> ------------------------------------------------------------------------------------
02635> 010:0002-----------------------------------------------------------------------------
02636> *#**********************************************************************************
02637> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project #: [161414214]
02638> *#  Date        : 11/13/2024
02639> *#  Modeller    : [Amy Kyle]
02640> *#  Company     : Stantec Consulting Ltd. (Waterloo)
02641> *#  License #   : 4730904
02642> *#
02643> *#  This hydrologic analysis prepared to provide pond sizing
02644> *#  for the 2509 Cedar Creek Road SWM Facility
02645> *#  The storm events modelled are:
02646> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
02647> *#  and the Regional Event
02648> *#**********************************************************************************
02649> ------------------------------------------------------------------------------------
02650> 010:0002-----------------------------------------------------------------------------
02651> --------------------
02652> | READ STORM       |    Filename: 10-yr, 3hr Chicago Storm - Kitchener IDF
02653> | Ptotal=  56.28 mm|    Comments: 10-yr, 3hr Chicago Storm - Kitchener IDF
02654> --------------------
02655>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
02656>               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
02657>               .08   3.160 |    .83  29.808 |   1.58  12.832 |   2.33   4.548
02658>               .17   3.560 |    .92  70.748 |   1.67  10.862 |   2.42   4.218
02659>               .25   4.067 |   1.00 169.551 |   1.75   9.368 |   2.50   3.931
02660>               .33   4.729 |   1.08  89.762 |   1.83   8.203 |   2.58   3.678
02661>               .42   5.623 |   1.17  51.823 |   1.92   7.274 |   2.67   3.454
02662>               .50   6.884 |   1.25  34.566 |   2.00   6.519 |   2.75   3.255
02663>               .58   8.770 |   1.33  25.132 |   2.08   5.895 |   2.83   3.076
02664>               .67  11.826 |   1.42  19.351 |   2.17   5.372 |   2.92   2.915
02665>               .75  17.407 |   1.50  15.520 |   2.25   4.928 |   3.00   2.770
02666>
02667> ------------------------------------------------------------------------------------
02668> 010:0003-----------------------------------------------------------------------------
02669> *#------------------|-------------------------------------------------------------------|
02670> *#==================================================================================
02671> *# Proposed Drainage Conditions (Internal Areas)
02672> *#==================================================================================
02673> *#------------------|-------------------------------------------------------------------|
02674> *#
02675> *#    Small portion of West Road Ditch draining offsite to the east through
02676> *#                           By-Pass Storm Sewer(BPSS)
02677> *#
02678> *#------------------|-------------------------------------------------------------------|
02679> ----------------------
02680> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number    (CN)=50.00
02681> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02682> ----------------------   U.H. Tp(hrs)=    .260
02683>
02684>      Unit Hyd Qpeak  (cms)=     .021
02685>
02686>      PEAK FLOW       (cms)=     .004 (i)
02687>      TIME TO PEAK    (hrs)=    1.367
02688>      RUNOFF VOLUME    (mm)=    9.715
02689>      TOTAL RAINFALL   (mm)=   56.282
02690>      RUNOFF COEFFICIENT   =     .173
02691>
02692>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02693>
02694> ------------------------------------------------------------------------------------
02695> 010:0004-----------------------------------------------------------------------------
02696> *#------------------|-------------------------------------------------------------------|
02697> *#
02698> *#  Proposed developed catchment draining offsite to the east through BPSS
02699> *#
02700> *#------------------|-------------------------------------------------------------------|
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02701> ----------------------
02702> | DESIGN STANDHYD    |   Area    (ha)=     .64
02703> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
02704> ----------------------
02705>                              IMPERVIOUS    PERVIOUS (i)
02706>      Surface Area     (ha)=        .58          .06
02707>      Dep. Storage     (mm)=        .80         1.50
02708>      Average Slope     (%)=       2.00         2.00
02709>      Length            (m)=      65.32        40.00
02710>      Mannings n             =       .013         .250
02711>
02712>      Max.eff.Inten.(mm/hr)=     169.55       414.94
02713>                 over (min)        1.00         5.00
02714>      Storage Coeff.  (min)=       1.30 (ii)    5.30 (ii)
02715>      Unit Hyd. Tpeak (min)=       1.00         5.00
02716>      Unit Hyd. peak  (cms)=        .91          .22
02717>                                                          *TOTALS*
02718>      PEAK FLOW       (cms)=        .15          .05          .184 (iii)
02719>      TIME TO PEAK    (hrs)=       1.00         1.07         1.000
02720>      RUNOFF VOLUME    (mm)=      55.48        29.35        42.416
02721>      TOTAL RAINFALL   (mm)=      56.28        56.28        56.282
02722>      RUNOFF COEFFICIENT   =        .99          .52          .754
02723>
02724>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02725>            CN* =  50.0    Ia = Dep. Storage  (Above)
02726>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02727>            THAN THE STORAGE COEFFICIENT.
02728>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02729>
02730> --------------------------------------------------------------------------------
02731> 010:0005----------------------------------------------------------------------
02732> *#-----------------|--------------------------------------------------------|
02733> *#
02734> *# Proposed internal grassed area and plunge pool draining offsite to the east
02735> *#
02736> *#-----------------|--------------------------------------------------------|
02737> ----------------------
02738> | DESIGN NASHYD      |   Area    (ha)=     .55   Curve Number   (CN)=50.00
02739> | 03:203    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02740> ----------------------  U.H. Tp(hrs)=    .080
02741>
02742>      Unit Hyd Qpeak  (cms)=     .263
02743>
02744>      PEAK FLOW       (cms)=     .028 (i)
02745>      TIME TO PEAK    (hrs)=    1.100
02746>      RUNOFF VOLUME    (mm)=    9.719
02747>      TOTAL RAINFALL   (mm)=   56.282
02748>      RUNOFF COEFFICIENT   =     .173
02749>
02750>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02751>
02752> --------------------------------------------------------------------------------
02753> 010:0006----------------------------------------------------------------------
02754> *#-----------------|--------------------------------------------------------|
02755> *#
02756> *#          Total internal area draining onto agricultural area to the east
02757> *#
02758> *#-----------------|--------------------------------------------------------|
02759> ------------------------
02760> | ADD HYD (IntUcE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02761> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
02762>                      ID1 01:200            .14     .004    1.37   9.72    .000
02763>                     +ID2 02:201            .64     .184    1.00  42.42    .000
02764>                     +ID3 03:203            .55     .028    1.10   9.72    .000
02765>                      ============================================================
02766>                      SUM 05:IntUcE         1.33     .202    1.00  25.45    .000
02767>
02768>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02769>
02770> --------------------------------------------------------------------------------
02771> 010:0007----------------------------------------------------------------------
02772> *#-----------------|--------------------------------------------------------|
02773> *#
02774> *#             Proposed industrial lots draining to Rear Lot Ditch
02775> *#
02776> *#-----------------|--------------------------------------------------------|
02777> ----------------------
02778> | DESIGN STANDHYD    |   Area    (ha)=    8.82
02779> | 10:202    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
02780> ----------------------
02781>                              IMPERVIOUS    PERVIOUS (i)
02782>      Surface Area     (ha)=       7.94         .88
02783>      Dep. Storage     (mm)=        .80        1.50
02784>      Average Slope     (%)=       2.00        2.00
02785>      Length            (m)=     242.49       40.00
02786>      Mannings n             =       .013         .250
02787>
02788>      Max.eff.Inten.(mm/hr)=     169.55       71.63
02789>                 over (min)        3.00       11.00
02790>      Storage Coeff.  (min)=       2.86 (ii)   10.92 (ii)
02791>      Unit Hyd. Tpeak (min)=       3.00       11.00
02792>      Unit Hyd. peak  (cms)=        .39         .10
02793>                                                          *TOTALS*
02794>      PEAK FLOW       (cms)=       2.81         .11         2.846 (iii)
02795>      TIME TO PEAK    (hrs)=       1.02        1.22         1.017
02796>      RUNOFF VOLUME    (mm)=      55.48       16.89        47.765
02797>      TOTAL RAINFALL   (mm)=      56.28       56.28        56.282
02798>      RUNOFF COEFFICIENT   =        .99         .30          .849
02799>
02800>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02801>            CN* =  50.0    Ia = Dep. Storage  (Above)
02802>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02803>            THAN THE STORAGE COEFFICIENT.
02804>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02805>
02806> --------------------------------------------------------------------------------
02807> 010:0008----------------------------------------------------------------------
02808> *#-----------------|--------------------------------------------------------|
02809> *#
02810> *#    External agricultural area draining onsite and entering Rear Lot Ditch
02811> *#
02812> *#-----------------|--------------------------------------------------------|
02813> ----------------------
02814> | DESIGN NASHYD      |   Area    (ha)=     .73   Curve Number   (CN)=70.00
02815> | 07:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02816> ----------------------  U.H. Tp(hrs)=    .190
02817>
02818>      Unit Hyd Qpeak  (cms)=     .147
02819>
02820>      PEAK FLOW       (cms)=     .050 (i)
02821>      TIME TO PEAK    (hrs)=    1.250
02822>      RUNOFF VOLUME    (mm)=   18.339
02823>      TOTAL RAINFALL   (mm)=   56.282
02824>      RUNOFF COEFFICIENT   =     .326
02825>
02826>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02827>
02828> --------------------------------------------------------------------------------
02829> 010:0009----------------------------------------------------------------------
02830> *#-----------------|--------------------------------------------------------|
02831> *#
02832> *#      Total area entering Rear Lot Ditch and entering SWMF at East inlet
02833> *#
02834> *#-----------------|--------------------------------------------------------|
02835> ------------------------
02836> | ADD HYD (RLswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02837> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
02838>                      ID1 10:202            8.82    2.846    1.02  47.76    .000
02839>                     +ID2 07:104             .73     .050    1.25  18.34    .000
02840>                      ============================================================
02841>                      SUM 08:RLswl          9.55    2.862    1.02  45.52    .000
02842>
02843>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02844>
02845> --------------------------------------------------------------------------------
02846> 010:0010----------------------------------------------------------------------
02847> *#-----------------|--------------------------------------------------------|
02848> *#
02849> *#   Proposed industrial lots draining to East Road Ditch within catchment,
02850> *#                              and new internal roadway
02851> *#
02852> *#-----------------|--------------------------------------------------------|
02853> ----------------------
02854> | DESIGN STANDHYD    |   Area    (ha)=    4.92
02855> | 01:204    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
02856> ----------------------
02857>                              IMPERVIOUS    PERVIOUS (i)
02858>      Surface Area     (ha)=       4.43         .49
02859>      Dep. Storage     (mm)=        .80        1.50
02860>      Average Slope     (%)=       2.00        2.00
02861>      Length            (m)=     181.11       40.00
02862>      Mannings n             =       .013         .250
02863>
02864>      Max.eff.Inten.(mm/hr)=     169.55       74.78
02865>                 over (min)        2.00       10.00
02866>      Storage Coeff.  (min)=       2.40 (ii)   10.33 (ii)
02867>      Unit Hyd. Tpeak (min)=       2.00       10.00
02868>      Unit Hyd. peak  (cms)=        .49         .11
02869>                                                          *TOTALS*
02870>      PEAK FLOW       (cms)=       1.67         .06        1.690 (iii)
02871>      TIME TO PEAK    (hrs)=       1.00        1.20        1.000
02872>      RUNOFF VOLUME    (mm)=      55.48       16.89       47.765
02873>      TOTAL RAINFALL   (mm)=      56.28       56.28       56.282
02874>      RUNOFF COEFFICIENT   =        .99         .30         .849
02875>
02876>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
02877>            CN* =  50.0    Ia = Dep. Storage  (Above)
02878>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
02879>            THAN THE STORAGE COEFFICIENT.
02880>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02881>
02882> --------------------------------------------------------------------------------
02883> 010:0011----------------------------------------------------------------------
02884> *#-----------------|--------------------------------------------------------|
02885> *#
02886> *#              Proposed SWM facility catchment (infiltration basin)
02887> *#
02888> *#-----------------|--------------------------------------------------------|
02889> ----------------------
02890> | DESIGN NASHYD      |   Area    (ha)=    1.63   Curve Number   (CN)=57.00
02891> | 09:205    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02892> ----------------------  U.H. Tp(hrs)=    .350
02893>
02894>      Unit Hyd Qpeak  (cms)=     .178
02895>
02896>      PEAK FLOW       (cms)=     .050 (i)
02897>      TIME TO PEAK    (hrs)=    1.483
02898>      RUNOFF VOLUME    (mm)=   12.180
02899>      TOTAL RAINFALL   (mm)=   56.282
02900>      RUNOFF COEFFICIENT   =     .216
02901>
02902>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
02903>
02904> --------------------------------------------------------------------------------
02905> 010:0012----------------------------------------------------------------------
02906> *#-----------------|--------------------------------------------------------|
02907> *#
02908> *#                          All flows entering SWM facility
02909> *#
02910> *#-----------------|--------------------------------------------------------|
02911> ----------------------
02912> | ADD HYD (ToSWM     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
02913> ------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
02914>                      ID1 07:104             .73     .050    1.25  18.34    .000
02915>                     +ID2 09:205            1.63     .050    1.48  12.18    .000
02916>                     +ID3 10:202            8.82    2.846    1.02  47.76    .000
02917>                     +ID4 01:204            4.92    1.690    1.00  47.76    .000
02918>                      ============================================================
02919>                      SUM 06:ToSWM          16.10    4.499    1.02  42.83    .000
02920>
02921>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
02922>
02923> --------------------------------------------------------------------------------
02924> 010:0013----------------------------------------------------------------------
02925> *#
02926> *#                       Infiltration Portion of SWM facility
02927> *#
02928> *#-----------------|--------------------------------------------------------|
02929> ----------------------
02930> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
02931> |  IN>06:(ToSWM )    |
02932> | OUT<07:(SWMinf)    |    =========  OUTLFOW STORAGE TABLE  =========
02933> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
02934>                              (cms)     (ha.m.)   |    (cms)    (ha.m.)
02935>                               .000  .0000E+00    |     .044  .6364E+00
02936>                               .044  .5530E-01    |     .000  .0000E+00
02937>
02938>      ROUTING RESULTS             AREA     QPEAK     TPEAK        R.V.
02939>      ---------------             (ha)     (cms)     (hrs)        (mm)
02940>      INFLOW >06: (ToSWM )       16.10    4.499     1.017      42.828
02941>      OUTFLOW<07: (SWMinf)       15.82     .044      .833      42.828
02942>     OVERFLOW<08: (OVF-I )         .28     .099     2.633      42.828
02943>
02944>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        1
02945>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      .43
02946>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      .51
02947>
02948>
02949>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .978
02950>                     TIME SHIFT OF PEAK FLOW          (min)=   -11.00
02951>                     MAXIMUM  STORAGE   USED        (ha.m.)=.6363E+00
02952>
02953> --------------------------------------------------------------------------------
02954> 010:0014----------------------------------------------------------------------
02955> *#-----------------|--------------------------------------------------------|
02956> *#
02957> *#                        Active Storage Portion of SWM facility
02958> *#
02959> *#-----------------|--------------------------------------------------------|
02960> ----------------------
02961> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
02962> |  IN>08:(OVF-I )    |
02963> | OUT<01:(SWMout)    |    =========  OUTLFOW STORAGE TABLE  =========
02964> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
02965>                              (cms)     (ha.m.)   |    (cms)    (ha.m.)
02966>                               .000  .0000E+00    |    1.479  .3245E+00
02967>                               .202  .1059E+00    |    2.606  .4367E+00
02968>                               .689  .2141E+00    |    4.101  .5560E+00
02969>
02970>      ROUTING RESULTS             AREA     QPEAK     TPEAK        R.V.
```

```
02971>      --------------------       (ha)      (cms)      (hrs)       (mm)
02972>      INFLOW >08: (OVF-I )        .28       .099     2.633      42.828
02973>      OUTFLOW<01: (SWMout)        .28       .020     3.050      42.828
02974>     OVERFLOW<02: (OVF   )        .00       .000      .000       .000
02975>
02976>                      TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
02977>                      CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
02978>                      PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
02979>
02980>
02981>                      PEAK   FLOW   REDUCTION [Qout/Qin](%)=   19.639
02982>                      TIME SHIFT OF PEAK FLOW         (min)=    25.00
02983>                      MAXIMUM  STORAGE   USED       (ha.m.)=.1027E-01
02984>
02985> ------------------------------------------------------------------------------
02986> 010:0015-----------------------------------------------------------------------
02987> *#-----------------|-----------------------------------------------------------|
02988> *#
02989> *#    West Road Ditch, conveying external drainage from the west around the
02990> *#                  proposed SWM facility to Outlet Channel
02991> *#
02992> *#-----------------|-----------------------------------------------------------|
02993> ---------------------
02994> | DESIGN NASHYD      |   Area    (ha)=    1.22   Curve Number    (CN)=50.00
02995> | 02:206    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
02996> ----------------------  U.H. Tp(hrs)=    .810
02997>
02998>      Unit Hyd Qpeak  (cms)=     .058
02999>
03000>      PEAK FLOW       (cms)=     .017 (i)
03001>      TIME TO PEAK    (hrs)=    2.067
03002>      RUNOFF VOLUME    (mm)=    9.719
03003>      TOTAL RAINFALL   (mm)=   56.282
03004>      RUNOFF COEFFICIENT   =     .173
03005>
03006>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03007>
03008> ------------------------------------------------------------------------------
03009> 010:0016-----------------------------------------------------------------------
03010> *#-----------------|-----------------------------------------------------------|
03011> *#
03012> *#        Grassed area south of SWM facility draining offsite to the south
03013> *#
03014> *#-----------------|-----------------------------------------------------------|
03015> ---------------------
03016> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number    (CN)=50.00
03017> | 10:207    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
03018> ----------------------  U.H. Tp(hrs)=    .070
03019>
03020>      Unit Hyd Qpeak  (cms)=     .076
03021>
03022>      PEAK FLOW       (cms)=     .007 (i)
03023>      TIME TO PEAK    (hrs)=    1.083
03024>      RUNOFF VOLUME    (mm)=    9.718
03025>      TOTAL RAINFALL   (mm)=   56.282
03026>      RUNOFF COEFFICIENT   =     .173
03027>
03028>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03029>
03030> ------------------------------------------------------------------------------
03031> 010:0017-----------------------------------------------------------------------
03032> *#-----------------|-----------------------------------------------------------|
03033> *#
03034> *#              Total Flows to the east from internal catchments
03035> *#
03036> *#-----------------|-----------------------------------------------------------|
03037> ------------------------
03038> | ADD HYD (IntE      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
03039> ------------------------ ----------      (ha)     (cms)   (hrs)    (mm)   (cms)
03040>                         ID1 05:IntUcE      1.33     .202    1.00  25.45    .000
03041>                        +ID2 01:SWMout      .28      .020    3.05  42.83    .000
03042>                        +ID3 02:206         1.22     .017    2.07   9.72    .000
03043>                         ==========================================================
03044>                         SUM 07:IntE        2.83     .202    1.00  20.40    .000
03045>
03046>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03047>
03048> ------------------------------------------------------------------------------
03049> 010:0018-----------------------------------------------------------------------
03050> *#-----------------|-----------------------------------------------------------|
03051> *#==========================================================================
03052> *# Proposed Drainage Conditions (Including External Catchment Flows to Ditches)
03053> *#==========================================================================
03054> *#-----------------|-----------------------------------------------------------|
03055> *#
03056> *# External industrial catchment and part of Hwy 401, draining south across
03057> *#                     Cedar Creek Road and entering BPSS
03058> *#
03059> *#-----------------|-----------------------------------------------------------|
03060> ----------------------
03061> | CALIB STANDHYD     |   Area    (ha)=   55.94
03062> | 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
03063> ----------------------
03064>                              IMPERVIOUS    PERVIOUS (i)
03065>      Surface Area     (ha)=     44.75        11.19
03066>      Dep. Storage     (mm)=      2.00         5.00
03067>      Average Slope     (%)=      1.50         2.00
03068>      Length            (m)=   1750.00        30.00
03069>      Mannings n            =      .025         .250
03070>
03071>      Max.eff.Inten.(mm/hr)=     97.77       154.91
03072>                  over (min)     19.00        24.00
03073>      Storage Coeff.  (min)=     18.82 (ii)   23.81 (ii)
03074>      Unit Hyd. Tpeak (min)=     19.00        24.00
03075>      Unit Hyd. peak  (cms)=       .06          .05
03076>                                                          *TOTALS*
03077>      PEAK FLOW       (cms)=      1.92         2.85         4.592 (iii)
03078>      TIME TO PEAK    (hrs)=      1.30         1.45         1.383
03079>      RUNOFF VOLUME    (mm)=     54.28        25.55        31.297
03080>      TOTAL RAINFALL   (mm)=     56.28        56.28        56.282
03081>      RUNOFF COEFFICIENT   =       .96          .45          .556
03082>
03083>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03084>            CN* =  50.0    Ia = Dep. Storage  (Above)
03085>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03086>            THAN THE STORAGE COEFFICIENT.
03087>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03088>
03089> ------------------------------------------------------------------------------
03090> 010:0019-----------------------------------------------------------------------
03091> *#-----------------|-----------------------------------------------------------|
03092> *#
03093> *#  External catchment containing a portion of Cedar Creek Road, a portion
03094> *#  of industrial area, and a grassed area near Hwy 401 off-ramp, entering BPSS
03095> *#
03096> *#-----------------|-----------------------------------------------------------|
03097> ----------------------
03098> | CALIB STANDHYD     |   Area    (ha)=   14.55
03099> | 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
03100> ----------------------
03101>                              IMPERVIOUS    PERVIOUS (i)
03102>      Surface Area     (ha)=      8.73         5.82
03103>      Dep. Storage     (mm)=      2.00         5.00
03104>      Average Slope     (%)=      2.30         2.00
03105>      Length            (m)=   1050.00        30.00
03106>      Mannings n            =      .025         .250
03107>
03108>      Max.eff.Inten.(mm/hr)=    124.30        61.34
03109>                  over (min)     11.00        18.00
03110>      Storage Coeff.  (min)=     11.07 (ii)   18.29 (ii)
03111>      Unit Hyd. Tpeak (min)=     11.00        18.00
03112>      Unit Hyd. peak  (cms)=       .10          .06
03113>                                                          *TOTALS*
03114>      PEAK FLOW       (cms)=       .51          .59          .980 (iii)
03115>      TIME TO PEAK    (hrs)=      1.17         1.35         1.267
03116>      RUNOFF VOLUME    (mm)=     54.28        16.77        22.394
03117>      TOTAL RAINFALL   (mm)=     56.28        56.28        56.282
03118>      RUNOFF COEFFICIENT   =       .96          .30          .398
03119>
03120>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03121>            CN* =  50.0    Ia = Dep. Storage  (Above)
03122>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03123>            THAN THE STORAGE COEFFICIENT.
03124>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03125>
03126> ------------------------------------------------------------------------------
03127> 010:0020-----------------------------------------------------------------------
03128> *#-----------------|-----------------------------------------------------------|
03129> *#
03130> *#     Total area draining offsite to east onto agricultural area to the east
03131> *#
03132> *#-----------------|-----------------------------------------------------------|
03133> ------------------------
03134> | ADD HYD (UCtoE     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
03135> ------------------------ ----------      (ha)     (cms)   (hrs)    (mm)   (cms)
03136>                         ID1 05:IntUcE      1.33     .202    1.00  25.45    .000
03137>                        +ID2 03:100         55.94    4.592   1.38  31.30    .000
03138>                        +ID3 07:101         14.55     .980   1.27  22.39    .000
03139>                         ==========================================================
03140>                         SUM 09:UCtoE       71.82    5.552   1.38  29.38    .000
03141>
03142>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
03143>
03144> ------------------------------------------------------------------------------
03145> 010:0021-----------------------------------------------------------------------
03146> *#-----------------|-----------------------------------------------------------|
03147> *#
03148> *#   Large external catchment west of site containing industrial property,
03149> *#  draining into private SWM feature and then into West Road Ditch, routing
03150> *#              around SWM facility and entering Outlet Channel
03151> *#
03152> *#-----------------|-----------------------------------------------------------|
03153> ----------------------
03154> | DESIGN STANDHYD    |   Area    (ha)=   12.64
03155> | 04:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
03156> ----------------------
03157>                              IMPERVIOUS    PERVIOUS (i)
03158>      Surface Area     (ha)=     10.11         2.53
03159>      Dep. Storage     (mm)=       .80         1.50
03160>      Average Slope     (%)=      3.10         3.10
03161>      Length            (m)=   290.29        40.00
03162>      Mannings n            =      .013         .250
03163>
03164>      Max.eff.Inten.(mm/hr)=    169.55       112.10
03165>                  over (min)      3.00         9.00
03166>      Storage Coeff.  (min)=      2.79 (ii)    8.70 (ii)
03167>      Unit Hyd. Tpeak (min)=      3.00         9.00
03168>      Unit Hyd. peak  (cms)=       .39          .13
03169>                                                          *TOTALS*
03170>      PEAK FLOW       (cms)=      2.53          .52         2.765 (iii)
03171>      TIME TO PEAK    (hrs)=      1.02         1.17         1.017
03172>      RUNOFF VOLUME    (mm)=     55.48        19.71        37.598
03173>      TOTAL RAINFALL   (mm)=     56.28        56.28        56.282
03174>      RUNOFF COEFFICIENT   =       .99          .35          .668
03175>
03176>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
03177>            CN* =  50.0    Ia = Dep. Storage  (Above)
03178>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
03179>            THAN THE STORAGE COEFFICIENT.
03180>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
03181>
03182> ------------------------------------------------------------------------------
03183> 010:0022-----------------------------------------------------------------------
03184> *#-----------------|-----------------------------------------------------------|
03185> *#
03186> *#                        Infiltration in External SWM Feature
03187> *#
03188> *#-----------------|-----------------------------------------------------------|
03189> --------------------
03190> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
03191> |  IN>04:(102    )   |
03192> | OUT<05:(xSWinf)    |    =========  OUTFLOW STORAGE TABLE  =========
03193> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
03194>                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
03195>                             .000  .0000E+00    |     .018  .3759E+00
03196>                             .018  .4380E-01    |     .000  .0000E+00
03197>
03198>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
03199>      --------------------        (ha)     (cms)     (hrs)       (mm)
03200>      INFLOW >04: (102    )      12.64     2.765     1.017     37.598
03201>      OUTFLOW<05: (xSWinf)       10.45      .018      .883     37.596
03202>     OVERFLOW<06: (OVF-xI)        2.19      .422     1.600     37.598
03203>
03204>                      TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
03205>                      CUMULATIVE TIME OF OVERFLOWS  (hours)=     1.57
03206>                      PERCENTAGE OF TIME OVERFLOWING    (%)=     1.15
03207>
03208>
03209>                      PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .651
03210>                      TIME SHIFT OF PEAK FLOW         (min)=    -8.00
03211>                      MAXIMUM  STORAGE   USED       (ha.m.)=.3759E+00
03212>
03213> ------------------------------------------------------------------------------
03214> 010:0023-----------------------------------------------------------------------
03215> *#-----------------|-----------------------------------------------------------|
03216> *#
03217> *#    External catchment west of the site, containing a portion of existing
03218> *#   industrial property, draining east into West Road Ditch, routing around
03219> *#                      SWM facility and entering Outlet Channel
03220> *#
03221> *#-----------------|-----------------------------------------------------------|
03222> ----------------------
03223> | DESIGN STANDHYD    |   Area    (ha)=    4.52
03224> | 07:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
03225> ----------------------
03226>                              IMPERVIOUS    PERVIOUS (i)
03227>      Surface Area     (ha)=      3.62          .90
03228>      Dep. Storage     (mm)=       .80         1.50
03229>      Average Slope     (%)=      5.30         5.30
03230>      Length            (m)=   173.59        40.00
03231>      Mannings n            =      .013         .250
03232>
03233>      Max.eff.Inten.(mm/hr)=    169.55       117.15
03234>                  over (min)      2.00         7.00
03235>      Storage Coeff.  (min)=      1.75 (ii)    6.69 (ii)
03236>      Unit Hyd. Tpeak (min)=      2.00         7.00
03237>      Unit Hyd. peak  (cms)=       .61          .17
03238>                                                          *TOTALS*
03239>      PEAK FLOW       (cms)=      1.01          .21         1.112 (iii)
03240>      TIME TO PEAK    (hrs)=      1.00         1.12         1.000
```

```
      RUNOFF VOLUME    (mm)=      55.48        19.71         37.598
      TOTAL RAINFALL   (mm)=      56.28        56.28         56.282
      RUNOFF COEFFICIENT   =        .99          .35           .668

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
010:0024------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
*#
*#                        Total Flows through West Road Ditch
*#
*#------------------|---------------------------------------------------------|
------------------------
| ADD HYD (WRswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 06:OVF-xI         2.19     .422    1.60  37.60    .000
                     +ID2 07:103            4.52    1.112    1.00  37.60    .000
                     +ID3 02:206            1.22     .017    2.07   9.72    .000
                      ========================================================
                      SUM 08:WRswl          7.93    1.112    1.00  33.31    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0025------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
------------------------
| DESIGN NASHYD      |   Area    (ha)=    1.13   Curve Number    (CN)=50.00
| 05:208     DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
------------------------   U.H. Tp(hrs)=    .850

      Unit Hyd Qpeak  (cms)=     .051

      PEAK FLOW       (cms)=     .015 (i)
      TIME TO PEAK    (hrs)=    2.117
      RUNOFF VOLUME    (mm)=    9.719
      TOTAL RAINFALL   (mm)=   56.282
      RUNOFF COEFFICIENT   =     .173

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

------------------------------------------------------------------------------
010:0026------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
*#
*#                        Total Flows through Outlet Channel
*#
*#------------------|---------------------------------------------------------|
------------------------
| ADD HYD (OutChan   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 01:SWMout          .28     .020    3.05  42.83    .000
                     +ID2 08:WRswl          7.93    1.112    1.00  33.31    .000
                     +ID3 05:208            1.13     .015    2.12   9.72    .000
                      ========================================================
                      SUM 03:OutChan        9.34    1.113    1.00  30.74    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0027------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
*#
*#              Total Flows to the east (eventually to Cedar Creek)
*#
*#------------------|---------------------------------------------------------|
------------------------
| ADD HYD (TotE      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 01:SWMout          .28     .020    3.05  42.83    .000
                     +ID2 08:WRswl          7.93    1.112    1.00  33.31    .000
                     +ID3 09:UCtoE         71.82    5.552    1.38  29.38    .000
                      ========================================================
                      SUM 04:TotE           80.03    5.815    1.37  29.82    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0028------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
*#
*#                           Total Flows from the Site
*#
*#------------------|---------------------------------------------------------|
------------------------
| ADD HYD (AllFlo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 04:TotE           80.03    5.815    1.37  29.82    .000
                     +ID2 10:207             .14     .007    1.08   9.72    .000
                      ========================================================
                      SUM 06:AllFlo         80.17    5.818    1.37  29.79    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0029------------------------------------------------------------------------
*#
*#   Catchments required for By-Pass Storm Sewer (BPSS) sizing - added again
*#                              for ease of modelling
*#
*#------------------|---------------------------------------------------------|
------------------------
| DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number    (CN)=50.00
| 01:200     DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
------------------------   U.H. Tp(hrs)=    .260

      Unit Hyd Qpeak  (cms)=     .021

      PEAK FLOW       (cms)=     .004 (i)
      TIME TO PEAK    (hrs)=    1.367
      RUNOFF VOLUME    (mm)=    9.715
      TOTAL RAINFALL   (mm)=   56.282
      RUNOFF COEFFICIENT   =     .173

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

------------------------------------------------------------------------------
010:0030------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
------------------------
| DESIGN STANDHYD    |   Area    (ha)=     .64
| 02:201     DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
------------------------

                                IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=         .58           .06
      Dep. Storage     (mm)=         .80          1.50
      Average Slope     (%)=        2.00          2.00
      Length            (m)=       65.32         40.00
      Mannings n            =        .013          .250

      Max.eff.Inten.(mm/hr)=     169.55       414.94
                over (min)        1.00         5.00
      Storage Coeff.  (min)=       1.30 (ii)    5.30 (ii)
      Unit Hyd. Tpeak (min)=       1.00         5.00
      Unit Hyd. peak  (cms)=        .91          .22
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .15          .05          .184 (iii)
      TIME TO PEAK    (hrs)=       1.00         1.07         1.000
      RUNOFF VOLUME    (mm)=      55.48        29.35        42.416
      TOTAL RAINFALL   (mm)=      56.28        56.28        56.282
      RUNOFF COEFFICIENT   =        .99          .52          .754

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
010:0031------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
------------------------
| CALIB STANDHYD     |   Area    (ha)=   55.94
| 03:100     DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
------------------------

                                IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=       44.75         11.19
      Dep. Storage     (mm)=        2.00          5.00
      Average Slope     (%)=        1.50          2.00
      Length            (m)=     1750.00         30.00
      Mannings n            =        .025          .250

      Max.eff.Inten.(mm/hr)=      97.77       154.91
                over (min)       19.00        24.00
      Storage Coeff.  (min)=       18.82 (ii)   23.81 (ii)
      Unit Hyd. Tpeak (min)=       19.00        24.00
      Unit Hyd. peak  (cms)=         .06          .05
                                                          *TOTALS*
      PEAK FLOW       (cms)=        1.92         2.85         4.592 (iii)
      TIME TO PEAK    (hrs)=        1.30         1.45         1.383
      RUNOFF VOLUME    (mm)=       54.28        25.55        31.297
      TOTAL RAINFALL   (mm)=       56.28        56.28        56.282
      RUNOFF COEFFICIENT   =         .96          .45          .556

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
010:0032------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
------------------------
| CALIB STANDHYD     |   Area    (ha)=   14.55
| 07:101     DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
------------------------

                                IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        8.73          5.82
      Dep. Storage     (mm)=        2.00          5.00
      Average Slope     (%)=        2.30          2.00
      Length            (m)=     1050.00         30.00
      Mannings n            =        .025          .250

      Max.eff.Inten.(mm/hr)=     124.30        61.34
                over (min)       11.00        18.00
      Storage Coeff.  (min)=       11.07 (ii)   18.29 (ii)
      Unit Hyd. Tpeak (min)=       11.00        18.00
      Unit Hyd. peak  (cms)=         .10          .06
                                                          *TOTALS*
      PEAK FLOW       (cms)=         .51          .59          .980 (iii)
      TIME TO PEAK    (hrs)=        1.17         1.35         1.267
      RUNOFF VOLUME    (mm)=       54.28        16.77        22.394
      TOTAL RAINFALL   (mm)=       56.28        56.28        56.282
      RUNOFF COEFFICIENT   =         .96          .30          .398

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
010:0033------------------------------------------------------------------------
*#------------------|---------------------------------------------------------|
------------------------
| ADD HYD (BPSS      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 01:200             .14     .004    1.37   9.72    .000
                     +ID2 02:201             .64     .184    1.00  42.42    .000
                     +ID3 03:100           55.94    4.592    1.38  31.30    .000
                     +ID4 07:101           14.55     .980    1.27  22.39    .000
                      ========================================================
                      SUM 06:BPSS           71.27    5.540    1.38  29.54    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0034------------------------------------------------------------------------
------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
------------------------------------------------------------------------------
010:0002------------------------------------------------------------------------
  ** END OF RUN :  24

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



--------------------
| START              |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18~1\
--------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18~1\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 025
    NSTORM=   1
           #  1=Kit25yr.3hr
------------------------------------------------------------------------------
025:0002------------------------------------------------------------------------
*#**************************************************************************
*#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project #: [161414214]
*#  Date        : 11/13/2024
*#  Modeller    : [Amy Kyle]
*#  Company     : Stantec Consulting Ltd. (Waterloo)
*#  License #   : 4730904
*#
*#  This hydrologic analysis prepared to provide pond sizing
*#  for the 2509 Cedar Creek Road SWM Facility
*#  The storm events modelled are:
*#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
*#  and the Regional Event
```

```
*#*************************************************************************
*#-------------------------------------------------------------------------
025:0002----------------------------------------------------------------------
--------------------
| READ STORM       |    Filename: 25-yr, 3hr Chicago Storm - Kitchener IDF
| Ptotal=  68.26 mm|    Comments: 25-yr, 3hr Chicago Storm - Kitchener IDF
--------------------
               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
                .08   3.567 |    .83  38.324 |   1.58  16.257 |   2.33   5.336
                .17   4.072 |    .92  87.426 |   1.67  13.647 |   2.42   4.912
                .25   4.719 |   1.00 191.557 |   1.75  11.668 |   2.50   4.544
                .33   5.571 |   1.08 109.318 |   1.83  10.127 |   2.58   4.222
                .42   6.733 |   1.17  65.637 |   1.92   8.900 |   2.67   3.938
                .50   8.387 |   1.25  44.391 |   2.00   7.906 |   2.75   3.686
                .58  10.876 |   1.33  32.362 |   2.08   7.088 |   2.83   3.461
                .67  14.925 |   1.42  24.846 |   2.17   6.405 |   2.92   3.260
                .75  22.291 |   1.50  19.811 |   2.25   5.829 |   3.00   3.079

*#-------------------------------------------------------------------------
025:0003----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------|
*#=========================================================================
*#-----------------|-------------------------------------------------------|
*# Proposed Drainage Conditions (Internal Areas)
*#=========================================================================
*#-----------------|-------------------------------------------------------|
*#
*#    Small portion of West Road Ditch draining offsite to the east through
*#                          By-Pass Storm Sewer(BPSS)
*#
*#-----------------|-------------------------------------------------------|
----------------------
| DESIGN NASHYD     |   Area    (ha)=     .14   Curve Number   (CN)=50.00
| 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .260

     Unit Hyd Qpeak  (cms)=     .021

     PEAK FLOW       (cms)=     .006 (i)
     TIME TO PEAK    (hrs)=    1.367
     RUNOFF VOLUME    (mm)=   13.890
     TOTAL RAINFALL   (mm)=   68.256
     RUNOFF COEFFICIENT   =     .203

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

----------------------------------------------------------------------------
025:0004----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------|
*#
*#  Proposed developed catchment draining offsite to the east through BPSS
*#
*#-----------------|-------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .64
| 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
----------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .58          .06
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      65.32        40.00
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=     191.56       521.87
                   over (min)       1.00         5.00
     Storage Coeff.  (min)=       1.24 (ii)    4.88 (ii)
     Unit Hyd. Tpeak (min)=       1.00         5.00
     Unit Hyd. peak  (cms)=        .94          .23
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .17          .07          .217 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.07         1.000
     RUNOFF VOLUME    (mm)=      67.46        38.89        53.172
     TOTAL RAINFALL   (mm)=      68.26        68.26        68.256
     RUNOFF COEFFICIENT   =        .99          .57          .779

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
025:0005----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------|
*#
*# Proposed internal grassed area and plunge pool draining offsite to the east
*#
*#-----------------|-------------------------------------------------------|
----------------------
| DESIGN NASHYD     |   Area    (ha)=     .55   Curve Number   (CN)=50.00
| 03:203    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .080

     Unit Hyd Qpeak  (cms)=     .263

     PEAK FLOW       (cms)=     .038 (i)
     TIME TO PEAK    (hrs)=    1.100
     RUNOFF VOLUME    (mm)=   13.893
     TOTAL RAINFALL   (mm)=   68.256
     RUNOFF COEFFICIENT   =     .204

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

----------------------------------------------------------------------------
025:0006----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------|
*#
*#          Total internal area draining onto agricultural area to the east
*#
*#-----------------|-------------------------------------------------------|
------------------------
| ADD HYD (IntUcE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 01:200            .14     .006    1.37  13.89    .000
                     +ID2 02:201            .64     .217    1.00  53.17    .000
                     +ID3 03:203            .55     .038    1.10  13.89    .000
                      ==========================================================
                      SUM 05:IntUcE         1.33    .242    1.00  32.79    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
025:0007----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------|
*#
*#             Proposed industrial lots draining to Rear Lot Ditch
*#
*#-----------------|-------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    8.82
| 10:202    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   80.00
----------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.94          .88
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     242.49        40.00
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=     191.56       100.24
                   over (min)       3.00        10.00
     Storage Coeff.  (min)=       2.72 (ii)    9.77 (ii)
     Unit Hyd. Tpeak (min)=       3.00        10.00
     Unit Hyd. peak  (cms)=        .40          .11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       3.24          .16         3.305 (iii)
     TIME TO PEAK    (hrs)=       1.02         1.20         1.017
     RUNOFF VOLUME    (mm)=      67.46        23.43        58.651
     TOTAL RAINFALL   (mm)=      68.26        68.26        68.256
     RUNOFF COEFFICIENT   =        .99          .34          .859

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
025:0008----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------|
*#
*#    External agricultural area draining onsite and entering Rear Lot Ditch
*#
*#-----------------|-------------------------------------------------------|
----------------------
| DESIGN NASHYD     |   Area    (ha)=     .73   Curve Number   (CN)=70.00
| 07:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .147

     PEAK FLOW       (cms)=     .068 (i)
     TIME TO PEAK    (hrs)=    1.250
     RUNOFF VOLUME    (mm)=   25.376
     TOTAL RAINFALL   (mm)=   68.256
     RUNOFF COEFFICIENT   =     .372

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

----------------------------------------------------------------------------
025:0009----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------|
*#
*#      Total area entering Rear Lot Ditch and entering SWMF at East inlet
*#
*#-----------------|-------------------------------------------------------|
------------------------
| ADD HYD (RLswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 10:202            8.82    3.305    1.02  58.65    .000
                     +ID2 07:104             .73     .068    1.25  25.38    .000
                      ==========================================================
                      SUM 08:RLswl          9.55    3.328    1.02  56.11    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

----------------------------------------------------------------------------
025:0010----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------|
*#
*#   Proposed industrial lots draining to East Road Ditch within catchment,
*#                          and new internal roadway
*#
*#-----------------|-------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    4.92
| 01:204    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
----------------------

                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.43          .49
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     181.11        40.00
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=     191.56       101.43
                   over (min)       2.00         9.00
     Storage Coeff.  (min)=       2.28 (ii)    9.30 (ii)
     Unit Hyd. Tpeak (min)=       2.00         9.00
     Unit Hyd. peak  (cms)=        .51          .12
                                                      *TOTALS*
     PEAK FLOW       (cms)=       1.92          .09         1.951 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.18         1.000
     RUNOFF VOLUME    (mm)=      67.46        23.43        58.651
     TOTAL RAINFALL   (mm)=      68.26        68.26        68.256
     RUNOFF COEFFICIENT   =        .99          .34          .859

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

----------------------------------------------------------------------------
025:0011----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------|
*#
*#              Proposed SWM facility catchment (infiltration basin)
*#
*#-----------------|-------------------------------------------------------|
----------------------
| DESIGN NASHYD     |   Area    (ha)=    1.63   Curve Number   (CN)=57.00
| 09:205    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .350

     Unit Hyd Qpeak  (cms)=     .178

     PEAK FLOW       (cms)=     .072 (i)
     TIME TO PEAK    (hrs)=    1.483
     RUNOFF VOLUME    (mm)=   17.248
     TOTAL RAINFALL   (mm)=   68.256
     RUNOFF COEFFICIENT   =     .253

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

----------------------------------------------------------------------------
025:0012----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------|
*#
*#                          All flows entering SWM facility
*#
*#-----------------|-------------------------------------------------------|
------------------------
| ADD HYD (ToSWM     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 07:104             .73     .068    1.25  25.38    .000
                     +ID2 09:205            1.63     .072    1.48  17.25    .000
                     +ID3 10:202            8.82    3.305    1.02  58.65    .000
                     +ID4 01:204            4.92    1.951    1.00  58.65    .000
```

```
                    ============================================================
                    SUM 06:ToSWM         16.10    5.225    1.00  52.95    .000
                    ============================================================

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0013--------------------------------------------------------------------------
*#
*#                      Infiltration Portion of SWM facility
*#
*#------------------|-------------------------------------------------------------|
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>06:(ToSWM )   |
| OUT<07:(SWMinf)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .044  .6364E+00
                           .044  .5530E-01   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (ToSWM )      16.10     5.225     1.000     52.951
     OUTFLOW<07: (SWMinf)      12.82      .044      .783     52.950
    OVERFLOW<08: (OVF-I )       3.28     1.010     1.450     52.951

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=     1.63
                    PERCENTAGE OF TIME OVERFLOWING    (%)=     1.91

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .842
                    TIME SHIFT OF PEAK FLOW         (min)=   -13.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.6364E+00

--------------------------------------------------------------------------------
025:0014--------------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#
*#                     Active Storage Portion of SWM facility
*#
*#------------------|-------------------------------------------------------------|
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>08:(OVF-I )   |
| OUT<01:(SWMout)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |    1.479  .3245E+00
                           .202  .1059E+00   |    2.606  .4367E+00
                           .689  .2141E+00   |    4.101  .5560E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >08: (OVF-I )       3.28     1.010     1.450     52.951
     OUTFLOW<01: (SWMout)       3.28      .186     2.333     52.950
    OVERFLOW<02: (OVF   )        .00      .000      .000      .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   18.420
                    TIME SHIFT OF PEAK FLOW         (min)=    53.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.9754E-01

--------------------------------------------------------------------------------
025:0015--------------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#
*#    West Road Ditch, conveying external drainage from the west around the
*#                  proposed SWM facility to Outlet Channel
*#
*#------------------|-------------------------------------------------------------|
----------------------
| DESIGN NASHYD     |   Area    (ha)=    1.22   Curve Number   (CN)=50.00
| 02:206    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .810

     Unit Hyd Qpeak  (cms)=     .058

     PEAK FLOW       (cms)=     .024 (i)
     TIME TO PEAK    (hrs)=    2.067
     RUNOFF VOLUME    (mm)=   13.893
     TOTAL RAINFALL   (mm)=   68.256
     RUNOFF COEFFICIENT   =     .204

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

--------------------------------------------------------------------------------
025:0016--------------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#
*#        Grassed area south of SWM facility draining offsite to the south
*#
*#------------------|-------------------------------------------------------------|
----------------------
| DESIGN NASHYD     |   Area    (ha)=     .14   Curve Number   (CN)=50.00
| 10:207    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------  U.H. Tp(hrs)=    .070

     Unit Hyd Qpeak  (cms)=     .076

     PEAK FLOW       (cms)=     .010 (i)
     TIME TO PEAK    (hrs)=    1.100
     RUNOFF VOLUME    (mm)=   13.892
     TOTAL RAINFALL   (mm)=   68.256
     RUNOFF COEFFICIENT   =     .204

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

--------------------------------------------------------------------------------
025:0017--------------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#
*#                Total Flows to the east from internal catchments
*#
*#------------------|-------------------------------------------------------------|
------------------------
| ADD HYD (IntE      ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 05:IntUcE         1.33     .242    1.00  32.79    .000
                      +ID2 01:SWMout         3.28     .186    2.33  52.95    .000
                      +ID3 02:206            1.22     .024    2.07  13.89    .000
                       ============================================================
                       SUM 07:IntE           5.83     .242    1.00  40.18    .000
                       ============================================================

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0018--------------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#==============================================================================
*# Proposed Drainage Conditions (Including External Catchment Flows to Ditches)
*#==============================================================================
*#------------------|-------------------------------------------------------------|
*#
*# External industrial catchment and part of Hwy 401, draining south across
*#                  Cedar Creek Road and entering BPSS
*#
*#------------------|-------------------------------------------------------------|
----------------------
| CALIB STANDHYD    |   Area    (ha)=   55.94
| 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
----------------------

                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          44.75         11.19
     Dep. Storage     (mm)=           2.00          5.00
     Average Slope     (%)=           1.50          2.00
     Length            (m)=        1750.00         30.00
     Mannings n            =           .025          .250

     Max.eff.Inten.(mm/hr)=         121.93        217.67
               over (min)           17.00         22.00
     Storage Coeff.  (min)=      17.23 (ii)    21.58 (ii)
     Unit Hyd. Tpeak (min)=         17.00         22.00
     Unit Hyd. peak  (cms)=           .07           .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=          2.42          4.08          6.269 (iii)
     TIME TO PEAK    (hrs)=          1.27          1.42          1.367
     RUNOFF VOLUME    (mm)=         66.25         34.40         40.774
     TOTAL RAINFALL   (mm)=         68.26         68.26         68.256
     RUNOFF COEFFICIENT   =           .97           .50           .597

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
025:0019--------------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#
*#  External catchment containing a portion of Cedar Creek Road, a portion
*#  of industrial area, and a grassed area near Hwy 401 off-ramp, entering BPSS
*#
*#------------------|-------------------------------------------------------------|
----------------------
| CALIB STANDHYD    |   Area    (ha)=   14.55
| 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
----------------------

                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=           8.73          5.82
     Dep. Storage     (mm)=           2.00          5.00
     Average Slope     (%)=           2.30          2.00
     Length            (m)=        1050.00         30.00
     Mannings n            =           .025          .250

     Max.eff.Inten.(mm/hr)=         150.44         86.79
               over (min)           10.00         17.00
     Storage Coeff.  (min)=      10.26 (ii)    16.54 (ii)
     Unit Hyd. Tpeak (min)=         10.00         17.00
     Unit Hyd. peak  (cms)=           .11           .07
                                                          *TOTALS*
     PEAK FLOW       (cms)=           .62           .86          1.343 (iii)
     TIME TO PEAK    (hrs)=          1.15          1.33          1.267
     RUNOFF VOLUME    (mm)=         66.25         23.42         29.847
     TOTAL RAINFALL   (mm)=         68.26         68.26         68.256
     RUNOFF COEFFICIENT   =           .97           .34           .437

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
025:0020--------------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#
*#     Total area draining offsite to east onto agricultural area to the east
*#
*#------------------|-------------------------------------------------------------|
----------
| ADD HYD (UCtoE     ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 05:IntUcE         1.33     .242    1.00  32.79    .000
                      +ID2 03:100           55.94    6.269    1.37  40.77    .000
                      +ID3 07:101           14.55    1.343    1.27  29.85    .000
                       ============================================================
                       SUM 09:UCtoE         71.82    7.626    1.35  38.41    .000
                       ============================================================

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0021--------------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#
*#   Large external catchment west of site containing industrial property,
*#  draining into private SWM feature and then into West Road Ditch, routing
*#             around SWM facility and entering Outlet Channel
*#
*#------------------|-------------------------------------------------------------|
----------------------
| DESIGN STANDHYD   |   Area    (ha)=   12.64
| 04:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------

                                  IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=          10.11          2.53
     Dep. Storage     (mm)=           .80          1.50
     Average Slope     (%)=          3.10          3.10
     Length            (m)=        290.29         40.00
     Mannings n            =           .013          .250

     Max.eff.Inten.(mm/hr)=         191.56        150.65
               over (min)           3.00          8.00
     Storage Coeff.  (min)=       2.66 (ii)     7.91 (ii)
     Unit Hyd. Tpeak (min)=          3.00          8.00
     Unit Hyd. peak  (cms)=           .41           .14
                                                          *TOTALS*
     PEAK FLOW       (cms)=          2.92           .73          3.301 (iii)
     TIME TO PEAK    (hrs)=          1.02          1.17          1.017
     RUNOFF VOLUME    (mm)=         67.46         27.04         47.250
     TOTAL RAINFALL   (mm)=         68.26         68.26         68.256
     RUNOFF COEFFICIENT   =           .99           .40           .692

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
        (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
       (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
025:0022--------------------------------------------------------------------------
*#------------------|-------------------------------------------------------------|
*#
*#                      Infiltration in External SWM Feature
*#
```

```
04051> *#------------------|---------------------------------------------------------------|
04052> ----------------------
04053> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
04054> |  IN>04:(102   )    |
04055> | OUT<05:(xSWinf)    |    =========  OUTLFOW STORAGE TABLE  =========
04056> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
04057>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
04058>                              .000  .0000E+00   |     .018  .3759E+00
04059>                              .018  .4380E-01   |     .000  .0000E+00
04060>
04061>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
04062>     -------------------        (ha)     (cms)     (hrs)       (mm)
04063>     INFLOW >04: (102   )      12.64     3.301     1.017     47.250
04064>     OUTFLOW<05: (xSWinf)       8.32      .018      .850     47.249
04065>    OVERFLOW<06: (OVF-xI)       4.32     1.421     1.283     47.250
04066>
04067>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        4
04068>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=     1.87
04069>                    PERCENTAGE OF TIME OVERFLOWING    (%)=     1.37
04070>
04071>
04072>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .545
04073>                    TIME SHIFT OF PEAK FLOW        (min)=   -10.00
04074>                    MAXIMUM  STORAGE   USED       (ha.m.)=.3759E+00
04075>
04076> ----------------------------------------------------------------------------------
04077> 025:0023-------------------------------------------------------------------------
04078> *#------------------|---------------------------------------------------------------|
04079> *#
04080> *#    External catchment west of the site, containing a portion of existing
04081> *#   industrial property, draining east into West Road Ditch, routing around
04082> *#                     SWM facility and entering Outlet Channel
04083> *#
04084> *#------------------|---------------------------------------------------------------|
04085> ----------------------
04086> | DESIGN STANDHYD    |   Area    (ha)=    4.52
04087> | 07:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
04088> ----------------------
04089>                              IMPERVIOUS    PERVIOUS (i)
04090>     Surface Area     (ha)=       3.62          .90
04091>     Dep. Storage     (mm)=        .80         1.50
04092>     Average Slope     (%)=       5.30         5.30
04093>     Length            (m)=     173.59        40.00
04094>     Mannings n           =       .013         .250
04095>
04096>     Max.eff.Inten.(mm/hr)=     191.56       159.27
04097>                 over (min)       2.00         6.00
04098>     Storage Coeff.  (min)=       1.66 (ii)    6.04 (ii)
04099>     Unit Hyd. Tpeak (min)=       2.00         6.00
04100>     Unit Hyd. peak  (cms)=        .63          .19
04101>                                                          *TOTALS*
04102>     PEAK FLOW       (cms)=       1.15          .29          1.319 (iii)
04103>     TIME TO PEAK    (hrs)=       1.00         1.12          1.000
04104>     RUNOFF VOLUME    (mm)=      67.46        27.04         47.250
04105>     TOTAL RAINFALL   (mm)=      68.26        68.26         68.256
04106>     RUNOFF COEFFICIENT   =        .99          .40           .692
04107>
04108>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04109>           CN* =  50.0    Ia = Dep. Storage  (Above)
04110>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04111>           THAN THE STORAGE COEFFICIENT.
04112>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04113>
04114> ----------------------------------------------------------------------------------
04115> 025:0024-------------------------------------------------------------------------
04116> *#------------------|---------------------------------------------------------------|
04117> *#
04118> *#                        Total Flows through West Road Ditch
04119> *#
04120> *#------------------|---------------------------------------------------------------|
04121> ----------------------
04122> | ADD HYD (WRswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
04123> ----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
04124>                      ID1 06:OVF-xI        4.32     1.421    1.28  47.25    .000
04125>                     +ID2 07:103           4.52     1.319    1.00  47.25    .000
04126>                     +ID3 02:206           1.22      .024    2.07  13.89    .000
04127>                      ================================================================
04128>                      SUM 08:WRswl         10.06     1.871    1.28  43.20    .000
04129>
04130>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04131>
04132> ----------------------------------------------------------------------------------
04133> 025:0025-------------------------------------------------------------------------
04134> *#------------------|---------------------------------------------------------------|
04135> ----------------------
04136> | DESIGN NASHYD      |   Area    (ha)=    1.13   Curve Number   (CN)=50.00
04137> | 05:208    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
04138> ----------------------   U.H. Tp(hrs)=    .850
04139>
04140>     Unit Hyd Qpeak  (cms)=     .051
04141>
04142>     PEAK FLOW       (cms)=     .022 (i)
04143>     TIME TO PEAK    (hrs)=    2.117
04144>     RUNOFF VOLUME    (mm)=   13.893
04145>     TOTAL RAINFALL   (mm)=   68.256
04146>     RUNOFF COEFFICIENT   =     .204
04147>
04148>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04149>
04150> ----------------------------------------------------------------------------------
04151> 025:0026-------------------------------------------------------------------------
04152> *#------------------|---------------------------------------------------------------|
04153> *#
04154> *#                        Total Flows through Outlet Channel
04155> *#
04156> *#------------------|---------------------------------------------------------------|
04157> ----------------------
04158> | ADD HYD (OutChan   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
04159> ----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
04160>                      ID1 01:SWMout         3.28      .186    2.33  52.95    .000
04161>                     +ID2 08:WRswl         10.06     1.871    1.28  43.20    .000
04162>                     +ID3 05:208            1.13      .022    2.12  13.89    .000
04163>                      ================================================================
04164>                      SUM 03:OutChan       14.47     1.877    1.28  43.13    .000
04165>
04166>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04167>
04168> ----------------------------------------------------------------------------------
04169> 025:0027-------------------------------------------------------------------------
04170> *#------------------|---------------------------------------------------------------|
04171> *#
04172> *#               Total Flows to the east (eventually to Cedar Creek)
04173> *#
04174> *#------------------|---------------------------------------------------------------|
04175> ----------------------
04176> | ADD HYD (TotE      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
04177> ----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
04178>                      ID1 01:SWMout         3.28      .186    2.33  52.95    .000
04179>                     +ID2 08:WRswl         10.06     1.871    1.28  43.20    .000
04180>                     +ID3 09:UCtoE         71.82     7.626    1.35  38.41    .000
04181>                      ================================================================
04182>                      SUM 04:TotE          85.16     9.212    1.30  39.54    .000
04183>
04184>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04185>
04186> ----------------------------------------------------------------------------------
04187> 025:0028-------------------------------------------------------------------------
04188> *#------------------|---------------------------------------------------------------|
04189> *#
04190> *#                        Total Flows from the Site
04191> *#
04192> *#------------------|---------------------------------------------------------------|
04193> ----------------------
04194> | ADD HYD (AllFlo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
04195> ----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
04196>                      ID1 04:TotE          85.16     9.212    1.30  39.54    .000
04197>                     +ID2 10:207            .14      .010    1.10  13.89    .000
04198>                      ================================================================
04199>                      SUM 06:AllFlo        85.30     9.217    1.30  39.50    .000
04200>
04201>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04202>
04203> ----------------------------------------------------------------------------------
04204> 025:0029-------------------------------------------------------------------------
04205> *#
04206> *#   Catchments required for By-Pass Storm Sewer (BPSS) sizing - added again
04207> *#                        for ease of modelling
04208> *#
04209> *#------------------|---------------------------------------------------------------|
04210> ----------------------
04211> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
04212> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
04213> ----------------------   U.H. Tp(hrs)=    .260
04214>
04215>     Unit Hyd Qpeak  (cms)=     .021
04216>
04217>     PEAK FLOW       (cms)=     .006 (i)
04218>     TIME TO PEAK    (hrs)=    1.367
04219>     RUNOFF VOLUME    (mm)=   13.890
04220>     TOTAL RAINFALL   (mm)=   68.256
04221>     RUNOFF COEFFICIENT   =     .203
04222>
04223>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04224>
04225> ----------------------------------------------------------------------------------
04226> 025:0030-------------------------------------------------------------------------
04227> *#------------------|---------------------------------------------------------------|
04228> ----------------------
04229> | DESIGN STANDHYD    |   Area    (ha)=     .64
04230> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
04231> ----------------------
04232>                              IMPERVIOUS    PERVIOUS (i)
04233>     Surface Area     (ha)=        .58          .06
04234>     Dep. Storage     (mm)=        .80         1.50
04235>     Average Slope     (%)=       2.00         2.00
04236>     Length            (m)=      65.32        40.00
04237>     Mannings n           =       .013         .250
04238>
04239>     Max.eff.Inten.(mm/hr)=     191.56       521.87
04240>                 over (min)       1.00         5.00
04241>     Storage Coeff.  (min)=       1.24 (ii)    4.88 (ii)
04242>     Unit Hyd. Tpeak (min)=       1.00         5.00
04243>     Unit Hyd. peak  (cms)=        .94          .23
04244>                                                          *TOTALS*
04245>     PEAK FLOW       (cms)=        .17          .07          .217 (iii)
04246>     TIME TO PEAK    (hrs)=       1.00         1.07         1.000
04247>     RUNOFF VOLUME    (mm)=      67.46        38.89         53.172
04248>     TOTAL RAINFALL   (mm)=      68.26        68.26         68.256
04249>     RUNOFF COEFFICIENT   =        .99          .57           .779
04250>
04251>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04252>           CN* =  50.0    Ia = Dep. Storage  (Above)
04253>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04254>           THAN THE STORAGE COEFFICIENT.
04255>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04256>
04257> ----------------------------------------------------------------------------------
04258> 025:0031-------------------------------------------------------------------------
04259> *#------------------|---------------------------------------------------------------|
04260> ----------------------
04261> | CALIB STANDHYD     |   Area    (ha)=   55.94
04262> | 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
04263> ----------------------
04264>                              IMPERVIOUS    PERVIOUS (i)
04265>     Surface Area     (ha)=      44.75        11.19
04266>     Dep. Storage     (mm)=       2.00         5.00
04267>     Average Slope     (%)=       1.50         2.00
04268>     Length            (m)=    1750.00        30.00
04269>     Mannings n           =       .025         .250
04270>
04271>     Max.eff.Inten.(mm/hr)=     121.93       217.67
04272>                 over (min)      17.00        22.00
04273>     Storage Coeff.  (min)=      17.23 (ii)   21.58 (ii)
04274>     Unit Hyd. Tpeak (min)=      17.00        22.00
04275>     Unit Hyd. peak  (cms)=        .07          .05
04276>                                                          *TOTALS*
04277>     PEAK FLOW       (cms)=       2.42         4.08         6.269 (iii)
04278>     TIME TO PEAK    (hrs)=       1.27         1.42         1.367
04279>     RUNOFF VOLUME    (mm)=      66.25        34.40        40.774
04280>     TOTAL RAINFALL   (mm)=      68.26        68.26        68.256
04281>     RUNOFF COEFFICIENT   =        .97          .50          .597
04282>
04283>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04284>           CN* =  50.0    Ia = Dep. Storage  (Above)
04285>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04286>           THAN THE STORAGE COEFFICIENT.
04287>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04288>
04289> ----------------------------------------------------------------------------------
04290> 025:0032-------------------------------------------------------------------------
04291> *#------------------|---------------------------------------------------------------|
04292> ----------------------
04293> | CALIB STANDHYD     |   Area    (ha)=   14.55
04294> | 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
04295> ----------------------
04296>                              IMPERVIOUS    PERVIOUS (i)
04297>     Surface Area     (ha)=       8.73         5.82
04298>     Dep. Storage     (mm)=       2.00         5.00
04299>     Average Slope     (%)=       2.30         2.00
04300>     Length            (m)=    1050.00        30.00
04301>     Mannings n           =       .025         .250
04302>
04303>     Max.eff.Inten.(mm/hr)=     150.44        86.79
04304>                 over (min)      10.00        17.00
04305>     Storage Coeff.  (min)=      10.26 (ii)   16.54 (ii)
04306>     Unit Hyd. Tpeak (min)=      10.00        17.00
04307>     Unit Hyd. peak  (cms)=        .11          .07
04308>                                                          *TOTALS*
04309>     PEAK FLOW       (cms)=        .62          .86          1.343 (iii)
04310>     TIME TO PEAK    (hrs)=       1.15         1.33          1.267
04311>     RUNOFF VOLUME    (mm)=      66.25        23.42         29.847
04312>     TOTAL RAINFALL   (mm)=      68.26        68.26         68.256
04313>     RUNOFF COEFFICIENT   =        .97          .34           .437
04314>
04315>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04316>           CN* =  50.0    Ia = Dep. Storage  (Above)
04317>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04318>           THAN THE STORAGE COEFFICIENT.
04319>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04320>
```

```
04321> ------------------------------------------------------------------------------
04322> 025:0033------------------------------------------------------------------------
04323> *#------------------|-----------------------------------------------------------|
04324> ---------------------
04325> | ADD HYD (BPSS      ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
04326> ---------------------                     (ha)     (cms)   (hrs)   (mm)   (cms)
04327>                      ID1 01:200            .14      .006    1.37  13.89    .000
04328>                     +ID2 02:201            .64      .217    1.00  53.17    .000
04329>                     +ID3 03:100          55.94     6.269    1.37  40.77    .000
04330>                     +ID4 07:101          14.55     1.343    1.27  29.85    .000
04331>                      ========================================================
04332>                      SUM 06:BPSS          71.27     7.607    1.35  38.60    .000
04333>
04334>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04335>
04336> ------------------------------------------------------------------------------
04337> 025:0034------------------------------------------------------------------------
04338> ------------------------------------------------------------------------------
04339> 025:0002------------------------------------------------------------------------
04340> ------------------------------------------------------------------------------
04341> 025:0002------------------------------------------------------------------------
04342> ------------------------------------------------------------------------------
04343> 025:0002------------------------------------------------------------------------
04344> ------------------------------------------------------------------------------
04345> 025:0002------------------------------------------------------------------------
04346>   ** END OF RUN :  49
04347>
04348> ****************************************************************************
04349>
04350>
04351>
04352>
04353>
04354> --------------------
04355> | START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
04356> ------------------   Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
04357>     TZERO =   .00 hrs on       0
04358>     METOUT=   2 (output = METRIC)
04359>     NRUN  = 050
04360>     NSTORM=   1
04361>           #  1=Kit50yr.3hr
04362> ------------------------------------------------------------------------------
04363> 050:0002------------------------------------------------------------------------
04364> *#****************************************************************************
04365> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project #: [161414214]
04366> *#  Date       : 11/13/2024
04367> *#  Modeller   : [Amy Kyle]
04368> *#  Company    : Stantec Consulting Ltd. (Waterloo)
04369> *#  License #  : 4730904
04370> *#
04371> *#  This hydrologic analysis prepared to provide pond sizing
04372> *#  for the 2509 Cedar Creek Road SWM Facility
04373> *#  The storm events modelled are:
04374> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
04375> *#  and the Regional Event
04376> *#****************************************************************************
04377> ------------------------------------------------------------------------------
04378> 050:0002------------------------------------------------------------------------
04379> --------------------
04380> | READ STORM       |    Filename: 50-yr, 3hr Chicago Storm - Kitchener IDF
04381> | Ptotal=  77.24 mm|    Comments: 50-yr, 3hr Chicago Storm - Kitchener IDF
04382> --------------------
04383>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
04384>                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
04385>                .08   3.816 |    .83  44.095 |   1.58  18.483 |   2.33   5.829
04386>                .17   4.387 |    .92  99.987 |   1.67  15.446 |   2.42   5.344
04387>                .25   5.123 |   1.00 214.691 |   1.75  13.144 |   2.50   4.924
04388>                .33   6.098 |   1.08 124.641 |   1.83  11.355 |   2.58   4.558
04389>                .42   7.433 |   1.17  75.450 |   1.92   9.934 |   2.67   4.235
04390>                .50   9.341 |   1.25  51.107 |   2.00   8.785 |   2.75   3.950
04391>                .58  12.226 |   1.33  37.204 |   2.08   7.841 |   2.83   3.697
04392>                .67  16.932 |   1.42  28.478 |   2.17   7.055 |   2.92   3.470
04393>                .75  25.505 |   1.50  22.619 |   2.25   6.393 |   3.00   3.267
04394>
04395> ------------------------------------------------------------------------------
04396> 050:0003------------------------------------------------------------------------
04397> *#------------------|-----------------------------------------------------------|
04398> *#==========================================================================
04399> *# Proposed Drainage Conditions (Internal Areas)
04400> *#==========================================================================
04401> *#------------------|-----------------------------------------------------------|
04402> *#
04403> *#    Small portion of West Road Ditch draining offsite to the east through
04404> *#                            By-Pass Storm Sewer(BPSS)
04405> *#
04406> *#------------------|-----------------------------------------------------------|
04407> ---------------------
04408> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
04409> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
04410> ---------------------   U.H. Tp(hrs)=    .260
04411>
04412>     Unit Hyd Qpeak  (cms)=     .021
04413>
04414>     PEAK FLOW       (cms)=     .007 (i)
04415>     TIME TO PEAK    (hrs)=    1.367
04416>     RUNOFF VOLUME    (mm)=   17.392
04417>     TOTAL RAINFALL   (mm)=   77.237
04418>     RUNOFF COEFFICIENT   =     .225
04419>
04420>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04421>
04422> ------------------------------------------------------------------------------
04423> 050:0004------------------------------------------------------------------------
04424> *#------------------|-----------------------------------------------------------|
04425> *#
04426> *#  Proposed developed catchment draining offsite to the east through BPSS
04427> *#
04428> *#------------------|-----------------------------------------------------------|
04429> ---------------------
04430> | DESIGN STANDHYD    |   Area    (ha)=     .64
04431> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
04432> ---------------------
04433>                           IMPERVIOUS    PERVIOUS (i)
04434>     Surface Area     (ha)=       .58         .06
04435>     Dep. Storage     (mm)=       .80        1.50
04436>     Average Slope     (%)=      2.00        2.00
04437>     Length            (m)=     65.32       40.00
04438>     Mannings n            =      .013        .250
04439>
04440>     Max.eff.Inten.(mm/hr)=     214.69      624.10
04441>                   over (min)      1.00        5.00
04442>     Storage Coeff.  (min)=      1.18 (ii)   4.58 (ii)
04443>     Unit Hyd. Tpeak (min)=      1.00        5.00
04444>     Unit Hyd. peak  (cms)=       .97         .24
04445>                                                        *TOTALS*
04446>     PEAK FLOW       (cms)=       .19         .08          .250 (iii)
04447>     TIME TO PEAK    (hrs)=      1.00        1.07         1.000
04448>     RUNOFF VOLUME    (mm)=     76.44       46.34        61.388
04449>     TOTAL RAINFALL   (mm)=     77.24       77.24        77.237
04450>     RUNOFF COEFFICIENT   =       .99         .60          .795
04451>
04452>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04453>           CN* =  50.0    Ia = Dep. Storage  (Above)
04454>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04455>           THAN THE STORAGE COEFFICIENT.
04456>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04457>
04458> ------------------------------------------------------------------------------
04459> 050:0005------------------------------------------------------------------------
04460> *#------------------|-----------------------------------------------------------|
04461> *#
04462> *# Proposed internal grassed area and plunge pool draining offsite to the east
04463> *#
04464> *#------------------|-----------------------------------------------------------|
04465> ---------------------
04466> | DESIGN NASHYD      |   Area    (ha)=     .55   Curve Number   (CN)=50.00
04467> | 03:203    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
04468> ---------------------   U.H. Tp(hrs)=    .080
04469>
04470>     Unit Hyd Qpeak  (cms)=     .263
04471>
04472>     PEAK FLOW       (cms)=     .048 (i)
04473>     TIME TO PEAK    (hrs)=    1.100
04474>     RUNOFF VOLUME    (mm)=   17.396
04475>     TOTAL RAINFALL   (mm)=   77.237
04476>     RUNOFF COEFFICIENT   =     .225
04477>
04478>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04479>
04480> ------------------------------------------------------------------------------
04481> 050:0006------------------------------------------------------------------------
04482> *#------------------|-----------------------------------------------------------|
04483> *#
04484> *#          Total internal area draining onto agricultural area to the east
04485> *#
04486> *#------------------|-----------------------------------------------------------|
04487> ------------------------
04488> | ADD HYD (IntUcE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
04489> ------------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
04490>                       ID1 01:200          .14      .007    1.37  17.39    .000
04491>                      +ID2 02:201          .64      .250    1.00  61.39    .000
04492>                      +ID3 03:203          .55      .048    1.10  17.40    .000
04493>                       ========================================================
04494>                       SUM 05:IntUcE       1.33     .281    1.00  38.56    .000
04495>
04496>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04497>
04498> ------------------------------------------------------------------------------
04499> 050:0007------------------------------------------------------------------------
04500> *#------------------|-----------------------------------------------------------|
04501> *#
04502> *#             Proposed industrial lots draining to Rear Lot Ditch
04503> *#
04504> *#------------------|-----------------------------------------------------------|
04505> ---------------------
04506> | DESIGN STANDHYD    |   Area    (ha)=    8.82
04507> | 10:202    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
04508> ---------------------
04509>                           IMPERVIOUS    PERVIOUS (i)
04510>     Surface Area     (ha)=       7.94         .88
04511>     Dep. Storage     (mm)=       .80        1.50
04512>     Average Slope     (%)=      2.00        2.00
04513>     Length            (m)=    242.49       40.00
04514>     Mannings n            =      .013        .250
04515>
04516>     Max.eff.Inten.(mm/hr)=     214.69      125.13
04517>                   over (min)      3.00        9.00
04518>     Storage Coeff.  (min)=      2.60 (ii)   9.05 (ii)
04519>     Unit Hyd. Tpeak (min)=      3.00        9.00
04520>     Unit Hyd. peak  (cms)=       .41         .13
04521>                                                        *TOTALS*
04522>     PEAK FLOW       (cms)=      3.67         .21         3.766 (iii)
04523>     TIME TO PEAK    (hrs)=      1.02        1.18         1.017
04524>     RUNOFF VOLUME    (mm)=     76.44       28.75        66.900
04525>     TOTAL RAINFALL   (mm)=     77.24       77.24        77.237
04526>     RUNOFF COEFFICIENT   =       .99         .37          .866
04527>
04528>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04529>           CN* =  50.0    Ia = Dep. Storage  (Above)
04530>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04531>           THAN THE STORAGE COEFFICIENT.
04532>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04533>
04534> ------------------------------------------------------------------------------
04535> 050:0008------------------------------------------------------------------------
04536> *#------------------|-----------------------------------------------------------|
04537> *#
04538> *#    External agricultural area draining onsite and entering Rear Lot Ditch
04539> *#
04540> *#------------------|-----------------------------------------------------------|
04541> ---------------------
04542> | DESIGN NASHYD      |   Area    (ha)=     .73   Curve Number   (CN)=70.00
04543> | 07:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
04544> ---------------------   U.H. Tp(hrs)=    .190
04545>
04546>     Unit Hyd Qpeak  (cms)=     .147
04547>
04548>     PEAK FLOW       (cms)=     .084 (i)
04549>     TIME TO PEAK    (hrs)=    1.250
04550>     RUNOFF VOLUME    (mm)=   31.074
04551>     TOTAL RAINFALL   (mm)=   77.237
04552>     RUNOFF COEFFICIENT   =     .402
04553>
04554>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04555>
04556> ------------------------------------------------------------------------------
04557> 050:0009------------------------------------------------------------------------
04558> *#------------------|-----------------------------------------------------------|
04559> *#
04560> *#      Total area entering Rear Lot Ditch and entering SWMF at East inlet
04561> *#
04562> *#------------------|-----------------------------------------------------------|
04563> ------------------------
04564> | ADD HYD (RLswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
04565> ------------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
04566>                       ID1 10:202          8.82     3.766    1.02  66.90    .000
04567>                      +ID2 07:104           .73      .084    1.25  31.07    .000
04568>                       ========================================================
04569>                       SUM 08:RLswl        9.55     3.795    1.02  64.16    .000
04570>
04571>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04572>
04573> ------------------------------------------------------------------------------
04574> 050:0010------------------------------------------------------------------------
04575> *#------------------|-----------------------------------------------------------|
04576> *#
04577> *#   Proposed industrial lots draining to East Road Ditch within catchment,
04578> *#                          and new internal roadway
04579> *#
04580> *#------------------|-----------------------------------------------------------|
04581> ---------------------
04582> | DESIGN STANDHYD    |   Area    (ha)=    4.92
04583> | 01:204    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
04584> ---------------------
04585>                           IMPERVIOUS    PERVIOUS (i)
04586>     Surface Area     (ha)=       4.43         .49
04587>     Dep. Storage     (mm)=       .80        1.50
04588>     Average Slope     (%)=      2.00        2.00
04589>     Length            (m)=    181.11       40.00
04590>     Mannings n            =      .013        .250
```

```
04591>
04592>     Max.eff.Inten.(mm/hr)=     214.69       125.13
04593>                  over (min)        2.00         9.00
04594>     Storage Coeff.  (min)=       2.18 (ii)    8.64 (ii)
04595>     Unit Hyd. Tpeak (min)=       2.00         9.00
04596>     Unit Hyd. peak  (cms)=        .53          .13
04597>                                                          *TOTALS*
04598>     PEAK FLOW       (cms)=       2.17          .12         2.213 (iii)
04599>     TIME TO PEAK    (hrs)=       1.00         1.18         1.000
04600>     RUNOFF VOLUME    (mm)=      76.44        28.75        66.900
04601>     TOTAL RAINFALL   (mm)=      77.24        77.24        77.237
04602>     RUNOFF COEFFICIENT   =         .99          .37          .866
04603>
04604>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04605>           CN* =  50.0    Ia = Dep. Storage  (Above)
04606>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04607>           THAN THE STORAGE COEFFICIENT.
04608>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04609>
04610> ---------------------------------------------------------------------------
04611> 050:0011-----------------------------------------------------------------
04612> *#-----------------|-------------------------------------------------------|
04613> *#
04614> *#              Proposed SWM facility catchment (infiltration basin)
04615> *#
04616> *#-----------------|-------------------------------------------------------|
04617> ----------------------
04618> | DESIGN NASHYD      |   Area    (ha)=    1.63   Curve Number   (CN)=57.00
04619> | 09:205    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
04620> ----------------------   U.H. Tp(hrs)=    .350
04621>
04622>     Unit Hyd Qpeak  (cms)=     .178
04623>
04624>     PEAK FLOW       (cms)=     .090 (i)
04625>     TIME TO PEAK    (hrs)=    1.483
04626>     RUNOFF VOLUME    (mm)=   21.455
04627>     TOTAL RAINFALL   (mm)=   77.237
04628>     RUNOFF COEFFICIENT   =     .278
04629>
04630>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04631>
04632> ---------------------------------------------------------------------------
04633> 050:0012-----------------------------------------------------------------
04634> *#-----------------|-------------------------------------------------------|
04635> *#
04636> *#                          All flows entering SWM facility
04637> *#
04638> *#-----------------|-------------------------------------------------------|
04639> ----------------------
04640> | ADD HYD (ToSWM     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
04641> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
04642>                        ID1 07:104           .73     .084   1.25  31.07    .000
04643>                       +ID2 09:205          1.63     .090   1.48  21.46    .000
04644>                       +ID3 10:202          8.82    3.766   1.02  66.90    .000
04645>                       +ID4 01:204          4.92    2.213   1.00  66.90    .000
04646>                        ==========================================================
04647>                        SUM 06:ToSWM        16.10    5.953   1.00  60.67    .000
04648>
04649>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04650>
04651> ---------------------------------------------------------------------------
04652> 050:0013-----------------------------------------------------------------
04653> *#
04654> *#                       Infiltration Portion of SWM facility
04655> *#
04656> *#-----------------|-------------------------------------------------------|
04657> ----------------------
04658> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
04659> |  IN>06:(ToSWM )    |
04660> | OUT<07:(SWMinf)    |    =========  OUTLFOW STORAGE TABLE  =========
04661> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
04662>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
04663>                              .000  .0000E+00   |     .044  .6364E+00
04664>                              .044  .5530E-01   |     .000  .0000E+00
04665>
04666>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
04667>     --------------------       (ha)     (cms)     (hrs)       (mm)
04668>     INFLOW >06: (ToSWM )      16.10    5.953     1.000     60.674
04669>     OUTFLOW<07: (SWMinf)      11.20     .044      .750     60.674
04670>    OVERFLOW<08: (OVF-I )       4.90    2.112     1.267     60.674
04671>
04672>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        3
04673>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=     1.80
04674>                    PERCENTAGE OF TIME OVERFLOWING    (%)=     2.11
04675>
04676>
04677>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .739
04678>                    TIME SHIFT OF PEAK FLOW         (min)=   -15.00
04679>                    MAXIMUM  STORAGE   USED       (ha.m.)=.6364E+00
04680>
04681> ---------------------------------------------------------------------------
04682> 050:0014-----------------------------------------------------------------
04683> *#-----------------|-------------------------------------------------------|
04684> *#
04685> *#                     Active Storage Portion of SWM facility
04686> *#
04687> *#-----------------|-------------------------------------------------------|
04688> ----------------------
04689> | ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
04690> |  IN>08:(OVF-I )    |
04691> | OUT<01:(SWMout)    |    =========  OUTLFOW STORAGE TABLE  =========
04692> ----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
04693>                             (cms)    (ha.m.)   |    (cms)    (ha.m.)
04694>                              .000  .0000E+00   |    1.479  .3245E+00
04695>                              .202  .1059E+00   |    2.606  .4367E+00
04696>                              .689  .2141E+00   |    4.101  .5560E+00
04697>
04698>     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
04699>     --------------------       (ha)     (cms)     (hrs)       (mm)
04700>     INFLOW >08: (OVF-I )       4.90    2.112     1.267     60.674
04701>     OUTFLOW<01: (SWMout)       4.90     .416     1.917     60.674
04702>    OVERFLOW<02: (OVF   )        .00     .000      .000      .000
04703>
04704>                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
04705>                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
04706>                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
04707>
04708>
04709>                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   19.722
04710>                    TIME SHIFT OF PEAK FLOW         (min)=    39.00
04711>                    MAXIMUM  STORAGE   USED       (ha.m.)=.1536E+00
04712>
04713> ---------------------------------------------------------------------------
04714> 050:0015-----------------------------------------------------------------
04715> *#-----------------|-------------------------------------------------------|
04716> *#
04717> *#    West Road Ditch, conveying external drainage from the west around the
04718> *#                    proposed SWM facility to Outlet Channel
04719> *#
04720> *#-----------------|-------------------------------------------------------|
04721> ----------------------
04722> | DESIGN NASHYD      |   Area    (ha)=    1.22   Curve Number   (CN)=50.00
04723> | 02:206    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
04724> ----------------------   U.H. Tp(hrs)=    .810
04725>
04726>     Unit Hyd Qpeak  (cms)=     .058
04727>
04728>     PEAK FLOW       (cms)=     .031 (i)
04729>     TIME TO PEAK    (hrs)=    2.067
04730>     RUNOFF VOLUME    (mm)=   17.396
04731>     TOTAL RAINFALL   (mm)=   77.237
04732>     RUNOFF COEFFICIENT   =     .225
04733>
04734>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04735>
04736> ---------------------------------------------------------------------------
04737> 050:0016-----------------------------------------------------------------
04738> *#-----------------|-------------------------------------------------------|
04739> *#
04740> *#        Grassed area south of SWM facility draining offsite to the south
04741> *#
04742> *#-----------------|-------------------------------------------------------|
04743> ----------------------
04744> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
04745> | 10:207    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
04746> ----------------------   U.H. Tp(hrs)=    .070
04747>
04748>     Unit Hyd Qpeak  (cms)=     .076
04749>
04750>     PEAK FLOW       (cms)=     .013 (i)
04751>     TIME TO PEAK    (hrs)=    1.100
04752>     RUNOFF VOLUME    (mm)=   17.395
04753>     TOTAL RAINFALL   (mm)=   77.237
04754>     RUNOFF COEFFICIENT   =     .225
04755>
04756>     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04757>
04758> ---------------------------------------------------------------------------
04759> 050:0017-----------------------------------------------------------------
04760> *#-----------------|-------------------------------------------------------|
04761> *#
04762> *#               Total Flows to the east from internal catchments
04763> *#
04764> *#-----------------|-------------------------------------------------------|
04765> ----------------------
04766> | ADD HYD (IntE      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
04767> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
04768>                        ID1 05:IntUcE        1.33     .281   1.00  38.56    .000
04769>                       +ID2 01:SWMout        4.90     .416   1.92  60.67    .000
04770>                       +ID3 02:206           1.22     .031   2.07  17.40    .000
04771>                        ==========================================================
04772>                        SUM 07:IntE          7.45     .473   1.90  49.65    .000
04773>
04774>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04775>
04776> ---------------------------------------------------------------------------
04777> 050:0018-----------------------------------------------------------------
04778> *#-----------------|-------------------------------------------------------|
04779> *#=========================================================================
04780> *# Proposed Drainage Conditions (Including External Catchment Flows to Ditches)
04781> *#=========================================================================
04782> *#-----------------|-------------------------------------------------------|
04783> *#
04784> *# External industrial catchment and part of Hwy 401, draining south across
04785> *#                 Cedar Creek Road and entering BPSS
04786> *#
04787> *#-----------------|-------------------------------------------------------|
04788> ----------------------
04789> | CALIB STANDHYD     |   Area    (ha)=   55.94
04790> | 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
04791> ----------------------
04792>                                IMPERVIOUS    PERVIOUS (i)
04793>     Surface Area      (ha)=       44.75         11.19
04794>     Dep. Storage      (mm)=        2.00          5.00
04795>     Average Slope      (%)=        1.50          2.00
04796>     Length             (m)=    1750.00         30.00
04797>     Mannings n             =        .025          .250
04798>
04799>     Max.eff.Inten.(mm/hr)=     142.00        275.95
04800>                  over (min)       16.00         20.00
04801>     Storage Coeff.  (min)=       16.21 (ii)   20.17 (ii)
04802>     Unit Hyd. Tpeak (min)=       16.00         20.00
04803>     Unit Hyd. peak  (cms)=         .07           .06
04804>                                                          *TOTALS*
04805>     PEAK FLOW       (cms)=        2.84          5.18         7.793 (iii)
04806>     TIME TO PEAK    (hrs)=        1.25          1.38         1.333
04807>     RUNOFF VOLUME    (mm)=       75.23         41.39        48.163
04808>     TOTAL RAINFALL   (mm)=       77.24         77.24        77.237
04809>     RUNOFF COEFFICIENT   =         .97           .54          .624
04810>
04811>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04812>           CN* =  50.0    Ia = Dep. Storage  (Above)
04813>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04814>           THAN THE STORAGE COEFFICIENT.
04815>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04816>
04817> ---------------------------------------------------------------------------
04818> 050:0019-----------------------------------------------------------------
04819> *#-----------------|-------------------------------------------------------|
04820> *#
04821> *#  External catchment containing a portion of Cedar Creek Road, a portion
04822> *#  of industrial area, and a grassed area near Hwy 401 off-ramp, entering BPSS
04823> *#
04824> *#-----------------|-------------------------------------------------------|
04825> ----------------------
04826> | CALIB STANDHYD     |   Area    (ha)=   14.55
04827> | 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
04828> ----------------------
04829>                                IMPERVIOUS    PERVIOUS (i)
04830>     Surface Area      (ha)=        8.73          5.82
04831>     Dep. Storage      (mm)=        2.00          5.00
04832>     Average Slope      (%)=        2.30          2.00
04833>     Length             (m)=    1050.00         30.00
04834>     Mannings n             =        .025          .250
04835>
04836>     Max.eff.Inten.(mm/hr)=     169.67        114.64
04837>                  over (min)       10.00         15.00
04838>     Storage Coeff.  (min)=        9.77 (ii)    15.40 (ii)
04839>     Unit Hyd. Tpeak (min)=       10.00         15.00
04840>     Unit Hyd. peak  (cms)=         .11           .07
04841>                                                          *TOTALS*
04842>     PEAK FLOW       (cms)=         .72          1.12         1.707 (iii)
04843>     TIME TO PEAK    (hrs)=        1.15          1.30         1.233
04844>     RUNOFF VOLUME    (mm)=       75.23         28.84        35.803
04845>     TOTAL RAINFALL   (mm)=       77.24         77.24        77.237
04846>     RUNOFF COEFFICIENT   =         .97           .37          .464
04847>
04848>       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04849>           CN* =  50.0    Ia = Dep. Storage  (Above)
04850>      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04851>           THAN THE STORAGE COEFFICIENT.
04852>     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04853>
04854> ---------------------------------------------------------------------------
04855> 050:0020-----------------------------------------------------------------
04856> *#-----------------|-------------------------------------------------------|
04857> *#
04858> *#     Total area draining offsite to east onto agricultural area to the east
04859> *#
04860> *#-----------------|-------------------------------------------------------|
```

```
04861> ------------------------
04862> | ADD HYD (UCtoE     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
04863> ------------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
04864>                       ID1 05:IntUcE        1.33     .281   1.00  38.56    .000
04865>                      +ID2 03:100          55.94    7.793   1.33  48.16    .000
04866>                      +ID3 07:101          14.55    1.707   1.23  35.80    .000
04867>                       ========================================================
04868>                       SUM 09:UCtoE         71.82    9.522   1.32  45.48    .000
04869>
04870>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04871>
04872> ---------------------------------------------------------------------------
04873> 050:0021-----------------------------------------------------------------
04874> *#-----------------|-------------------------------------------------------|
04875> *#
04876> *#   Large external catchment west of site containing industrial property,
04877> *#  draining into private SWM feature and then into West Road Ditch, routing
04878> *#             around SWM facility and entering Outlet Channel
04879> *#
04880> *#-----------------|-------------------------------------------------------|
04881> ------------------------
04882> | DESIGN STANDHYD    |   Area    (ha)=   12.64
04883> | 04:102     DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
04884> ------------------------
04885>                                IMPERVIOUS    PERVIOUS (i)
04886>      Surface Area     (ha)=      10.11         2.53
04887>      Dep. Storage     (mm)=        .80         1.50
04888>      Average Slope     (%)=       3.10         3.10
04889>      Length            (m)=     290.29        40.00
04890>      Mannings n             =       .013         .250
04891>
04892>      Max.eff.Inten.(mm/hr)=     214.69       188.85
04893>                 over (min)        3.00         7.00
04894>      Storage Coeff.  (min)=       2.54 (ii)    7.34 (ii)
04895>      Unit Hyd. Tpeak (min)=       3.00         7.00
04896>      Unit Hyd. peak  (cms)=        .42          .16
04897>                                                          *TOTALS*
04898>      PEAK FLOW       (cms)=       3.30          .93          3.858 (iii)
04899>      TIME TO PEAK    (hrs)=       1.02         1.13          1.017
04900>      RUNOFF VOLUME    (mm)=      76.44        32.95         54.694
04901>      TOTAL RAINFALL   (mm)=      77.24        77.24         77.237
04902>      RUNOFF COEFFICIENT   =        .99          .43           .708
04903>
04904>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04905>            CN* =  50.0    Ia = Dep. Storage  (Above)
04906>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04907>            THAN THE STORAGE COEFFICIENT.
04908>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04909>
04910> ---------------------------------------------------------------------------
04911> 050:0022-----------------------------------------------------------------
04912> *#-----------------|-------------------------------------------------------|
04913> *#
04914> *#                      Infiltration in External SWM Feature
04915> *#
04916> *#-----------------|-------------------------------------------------------|
04917> ---------------------
04918> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
04919> |  IN>04:(102   )   |
04920> | OUT<05:(xSWinf)   |    =========  OUTLFOW STORAGE TABLE  =========
04921> ---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
04922>                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
04923>                             .000  .0000E+00    |     .018  .3759E+00
04924>                             .018  .4380E-01    |     .000  .0000E+00
04925>
04926>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
04927>      ---------------           (ha)     (cms)     (hrs)       (mm)
04928>     INFLOW >04: (102   )      12.64    3.858     1.017     54.694
04929>     OUTFLOW<05: (xSWinf)       7.19     .018      .817     54.693
04930>    OVERFLOW<06: (OVF-xI)       5.45    2.263     1.200     54.694
04931>
04932>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
04933>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=     1.97
04934>                     PERCENTAGE OF TIME OVERFLOWING    (%)=     1.44
04935>
04936>
04937>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .467
04938>                     TIME SHIFT OF PEAK FLOW          (min)=   -12.00
04939>                     MAXIMUM  STORAGE   USED       (ha.m.)=.3759E+00
04940>
04941> ---------------------------------------------------------------------------
04942> 050:0023-----------------------------------------------------------------
04943> *#-----------------|-------------------------------------------------------|
04944> *#
04945> *#    External catchment west of the site, containing a portion of existing
04946> *#   industrial property, draining east into West Road Ditch, routing around
04947> *#                     SWM facility and entering Outlet Channel
04948> *#
04949> *#-----------------|-------------------------------------------------------|
04950> ------------------------
04951> | DESIGN STANDHYD    |   Area    (ha)=    4.52
04952> | 07:103     DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
04953> ------------------------
04954>                                IMPERVIOUS    PERVIOUS (i)
04955>      Surface Area     (ha)=       3.62          .90
04956>      Dep. Storage     (mm)=        .80         1.50
04957>      Average Slope     (%)=       5.30         5.30
04958>      Length            (m)=     173.59        40.00
04959>      Mannings n             =       .013         .250
04960>
04961>      Max.eff.Inten.(mm/hr)=     214.69       195.13
04962>                 over (min)        2.00         6.00
04963>      Storage Coeff.  (min)=       1.59 (ii)    5.62 (ii)
04964>      Unit Hyd. Tpeak (min)=       2.00         6.00
04965>      Unit Hyd. peak  (cms)=        .64          .20
04966>                                                          *TOTALS*
04967>      PEAK FLOW       (cms)=       1.30          .36          1.513 (iii)
04968>      TIME TO PEAK    (hrs)=       1.00         1.10          1.000
04969>      RUNOFF VOLUME    (mm)=      76.44        32.95         54.694
04970>      TOTAL RAINFALL   (mm)=      77.24        77.24         77.237
04971>      RUNOFF COEFFICIENT   =        .99          .43           .708
04972>
04973>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
04974>            CN* =  50.0    Ia = Dep. Storage  (Above)
04975>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
04976>            THAN THE STORAGE COEFFICIENT.
04977>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
04978>
04979> ---------------------------------------------------------------------------
04980> 050:0024-----------------------------------------------------------------
04981> *#-----------------|-------------------------------------------------------|
04982> *#
04983> *#                      Total Flows through West Road Ditch
04984> *#
04985> *#-----------------|-------------------------------------------------------|
04986> ------------------------
04987> | ADD HYD (WRswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
04988> ------------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
04989>                       ID1 06:OVF-xI        5.45    2.263   1.20  54.69    .000
04990>                      +ID2 07:103           4.52    1.513   1.00  54.69    .000
04991>                      +ID3 02:206           1.22     .031   2.07  17.40    .000
04992>                       ========================================================
04993>                       SUM 08:WRswl         11.19    2.977   1.20  50.63    .000
04994>
04995>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
04996>
04997> ---------------------------------------------------------------------------
04998> 050:0025-----------------------------------------------------------------
04999> *#-----------------|-------------------------------------------------------|
05000> ------------------------
05001> | DESIGN NASHYD      |   Area    (ha)=    1.13   Curve Number   (CN)=50.00
05002> | 05:208     DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
05003> ------------------------   U.H. Tp(hrs)=    .850
05004>
05005>      Unit Hyd Qpeak  (cms)=     .051
05006>
05007>      PEAK FLOW       (cms)=     .027 (i)
05008>      TIME TO PEAK    (hrs)=    2.117
05009>      RUNOFF VOLUME    (mm)=   17.396
05010>      TOTAL RAINFALL   (mm)=   77.237
05011>      RUNOFF COEFFICIENT   =     .225
05012>
05013>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05014>
05015> ---------------------------------------------------------------------------
05016> 050:0026-----------------------------------------------------------------
05017> *#-----------------|-------------------------------------------------------|
05018> *#
05019> *#                      Total Flows through Outlet Channel
05020> *#
05021> *#-----------------|-------------------------------------------------------|
05022> ------------------------
05023> | ADD HYD (OutChan   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
05024> ------------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
05025>                       ID1 01:SWMout         4.90     .416   1.92  60.67    .000
05026>                      +ID2 08:WRswl         11.19    2.977   1.20  50.63    .000
05027>                      +ID3 05:208            1.13     .027   2.12  17.40    .000
05028>                       ========================================================
05029>                       SUM 03:OutChan       17.22    2.982   1.20  51.31    .000
05030>
05031>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
05032>
05033> ---------------------------------------------------------------------------
05034> 050:0027-----------------------------------------------------------------
05035> *#-----------------|-------------------------------------------------------|
05036> *#
05037> *#              Total Flows to the east (eventually to Cedar Creek)
05038> *#
05039> *#-----------------|-------------------------------------------------------|
05040> ------------------------
05041> | ADD HYD (TotE      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
05042> ------------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
05043>                       ID1 01:SWMout         4.90     .416   1.92  60.67    .000
05044>                      +ID2 08:WRswl         11.19    2.977   1.20  50.63    .000
05045>                      +ID3 09:UCtoE         71.82    9.522   1.32  45.48    .000
05046>                       ========================================================
05047>                       SUM 04:TotE           87.91   11.599   1.28  46.98    .000
05048>
05049>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
05050>
05051> ---------------------------------------------------------------------------
05052> 050:0028-----------------------------------------------------------------
05053> *#-----------------|-------------------------------------------------------|
05054> *#
05055> *#                          Total Flows from the Site
05056> *#
05057> *#-----------------|-------------------------------------------------------|
05058> ------------------------
05059> | ADD HYD (AllFlo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
05060> ------------------------                 (ha)     (cms)   (hrs)   (mm)   (cms)
05061>                       ID1 04:TotE           87.91   11.599   1.28  46.98    .000
05062>                      +ID2 10:207              .14     .013   1.10  17.40    .000
05063>                       ========================================================
05064>                       SUM 06:AllFlo         88.05   11.606   1.28  46.94    .000
05065>
05066>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
05067>
05068> ---------------------------------------------------------------------------
05069> 050:0029-----------------------------------------------------------------
05070> *#
05071> *#   Catchments required for By-Pass Storm Sewer (BPSS) sizing - added again
05072> *#                            for ease of modelling
05073> *#
05074> *#-----------------|-------------------------------------------------------|
05075> ------------------------
05076> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
05077> | 01:200     DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
05078> ------------------------   U.H. Tp(hrs)=    .260
05079>
05080>      Unit Hyd Qpeak  (cms)=     .021
05081>
05082>      PEAK FLOW       (cms)=     .007 (i)
05083>      TIME TO PEAK    (hrs)=    1.367
05084>      RUNOFF VOLUME    (mm)=   17.392
05085>      TOTAL RAINFALL   (mm)=   77.237
05086>      RUNOFF COEFFICIENT   =     .225
05087>
05088>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05089>
05090> ---------------------------------------------------------------------------
05091> 050:0030-----------------------------------------------------------------
05092> *#-----------------|-------------------------------------------------------|
05093> ------------------------
05094> | DESIGN STANDHYD    |   Area    (ha)=     .64
05095> | 02:201     DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
05096> ------------------------
05097>                                IMPERVIOUS    PERVIOUS (i)
05098>      Surface Area     (ha)=        .58          .06
05099>      Dep. Storage     (mm)=        .80         1.50
05100>      Average Slope     (%)=       2.00         2.00
05101>      Length            (m)=      65.32        40.00
05102>      Mannings n             =       .013         .250
05103>
05104>      Max.eff.Inten.(mm/hr)=     214.69       624.10
05105>                 over (min)        1.00         5.00
05106>      Storage Coeff.  (min)=       1.18 (ii)    4.58 (ii)
05107>      Unit Hyd. Tpeak (min)=       1.00         5.00
05108>      Unit Hyd. peak  (cms)=        .97          .24
05109>                                                          *TOTALS*
05110>      PEAK FLOW       (cms)=        .19          .08          .250 (iii)
05111>      TIME TO PEAK    (hrs)=       1.00         1.07         1.000
05112>      RUNOFF VOLUME    (mm)=      76.44        46.34        61.388
05113>      TOTAL RAINFALL   (mm)=      77.24        77.24        77.237
05114>      RUNOFF COEFFICIENT   =        .99          .60          .795
05115>
05116>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
05117>            CN* =  50.0    Ia = Dep. Storage  (Above)
05118>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
05119>            THAN THE STORAGE COEFFICIENT.
05120>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05121>
05122> ---------------------------------------------------------------------------
05123> 050:0031-----------------------------------------------------------------
05124> *#-----------------|-------------------------------------------------------|
05125> ------------------------
05126> | CALIB STANDHYD     |   Area    (ha)=   55.94
05127> | 03:100     DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
05128> ------------------------
05129>                                IMPERVIOUS    PERVIOUS (i)
05130>      Surface Area     (ha)=      44.75        11.19
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05131>      Dep. Storage     (mm)=       2.00         5.00
05132>      Average Slope     (%)=       1.50         2.00
05133>      Length            (m)=    1750.00        30.00
05134>      Mannings n             =       .025         .250
05135>
05136>      Max.eff.Inten.(mm/hr)=     142.00       275.95
05137>                   over (min)       16.00        20.00
05138>      Storage Coeff.  (min)=      16.21 (ii)   20.17 (ii)
05139>      Unit Hyd. Tpeak (min)=      16.00        20.00
05140>      Unit Hyd. peak  (cms)=        .07          .06
05141>                                                          *TOTALS*
05142>      PEAK FLOW       (cms)=       2.84         5.18          7.793 (iii)
05143>      TIME TO PEAK    (hrs)=       1.25         1.38          1.333
05144>      RUNOFF VOLUME    (mm)=      75.23        41.39         48.163
05145>      TOTAL RAINFALL   (mm)=      77.24        77.24         77.237
05146>      RUNOFF COEFFICIENT   =        .97          .54           .624
05147>
05148>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
05149>            CN* =  50.0    Ia = Dep. Storage  (Above)
05150>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
05151>            THAN THE STORAGE COEFFICIENT.
05152>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05153>
05154> ------------------------------------------------------------------------------
05155> 050:0032----------------------------------------------------------------------
05156> *#-----------------|----------------------------------------------------------|
05157> ----------------------
05158> | CALIB STANDHYD     |   Area    (ha)=   14.55
05159> | 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
05160> ----------------------
05161>                              IMPERVIOUS    PERVIOUS (i)
05162>      Surface Area     (ha)=       8.73         5.82
05163>      Dep. Storage     (mm)=       2.00         5.00
05164>      Average Slope     (%)=       2.30         2.00
05165>      Length            (m)=    1050.00        30.00
05166>      Mannings n             =       .025         .250
05167>
05168>      Max.eff.Inten.(mm/hr)=     169.67       114.64
05169>                   over (min)       10.00        15.00
05170>      Storage Coeff.  (min)=       9.77 (ii)   15.40 (ii)
05171>      Unit Hyd. Tpeak (min)=      10.00        15.00
05172>      Unit Hyd. peak  (cms)=        .11          .07
05173>                                                          *TOTALS*
05174>      PEAK FLOW       (cms)=        .72         1.12          1.707 (iii)
05175>      TIME TO PEAK    (hrs)=       1.15         1.30          1.233
05176>      RUNOFF VOLUME    (mm)=      75.23        28.84         35.803
05177>      TOTAL RAINFALL   (mm)=      77.24        77.24         77.237
05178>      RUNOFF COEFFICIENT   =        .97          .37           .464
05179>
05180>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
05181>            CN* =  50.0    Ia = Dep. Storage  (Above)
05182>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
05183>            THAN THE STORAGE COEFFICIENT.
05184>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05185>
05186> ------------------------------------------------------------------------------
05187> 050:0033----------------------------------------------------------------------
05188> *#-----------------|----------------------------------------------------------|
05189> ------------------------
05190> | ADD HYD (BPSS      ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
05191> ------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
05192>                      ID1 01:200             .14     .007    1.37  17.39    .000
05193>                     +ID2 02:201             .64     .250    1.00  61.39    .000
05194>                     +ID3 03:100           55.94    7.793    1.33  48.16    .000
05195>                     +ID4 07:101           14.55    1.707    1.23  35.80    .000
05196>                      ============================================================
05197>                      SUM 06:BPSS           71.27    9.495    1.32  45.70    .000
05198>
05199>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
05200>
05201> ------------------------------------------------------------------------------
05202> 050:0034----------------------------------------------------------------------
05203> ------------------------------------------------------------------------------
05204> 050:0002----------------------------------------------------------------------
05205> ------------------------------------------------------------------------------
05206> 050:0002----------------------------------------------------------------------
05207> ------------------------------------------------------------------------------
05208> 050:0002----------------------------------------------------------------------
05209> ------------------------------------------------------------------------------
05210> 050:0002----------------------------------------------------------------------
05211> ------------------------------------------------------------------------------
05212> 050:0002----------------------------------------------------------------------
05213>   ** END OF RUN :  99
05214>
05215> ********************************************************************************
05216>
05217>
05218>
05219>
05220>
05221> --------------------
05222> | START              |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18~~1\
05223> ---------- Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18~~1\
05224>     TZERO =   .00 hrs on      0
05225>     METOUT=   2 (output = METRIC)
05226>     NRUN  = 100
05227>     NSTORM=   1
05228>           #  1=Kit100yr.3hr
05229> ------------------------------------------------------------------------------
05230> 100:0002----------------------------------------------------------------------
05231> *#*****************************************************************************
05232> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project #: [161414214]
05233> *#  Date        : 11/13/2024
05234> *#  Modeller    : [Amy Kyle]
05235> *#  Company     : Stantec Consulting Ltd. (Waterloo)
05236> *#  License #   : 4730904
05237> *#
05238> *#  This hydrologic analysis prepared to provide pond sizing
05239> *#  for the 2509 Cedar Creek Road SWM Facility
05240> *#  The storm events modelled are:
05241> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
05242> *#  and the Regional Event
05243> *#*****************************************************************************
05244> ------------------------------------------------------------------------------
05245> 100:0002----------------------------------------------------------------------
05246> --------------------
05247> | READ STORM       |    Filename: 100-yr, 3hr Chicago Storm - Kitchener ID
05248> | Ptotal=  87.07 mm|    Comments: 100-yr, 3hr Chicago Storm - Kitchener ID
05249> --------------------
05250>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
05251>               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
05252>               .08   4.087 |    .83  50.502 |   1.58  20.973 |   2.33   6.373
05253>               .17   4.733 |    .92 113.675 |   1.67  17.458 |   2.42   5.820
05254>               .25   5.569 |   1.00 239.354 |   1.75  14.796 |   2.50   5.342
05255>               .33   6.681 |   1.08 141.249 |   1.83  12.729 |   2.58   4.926
05256>               .42   8.210 |   1.17  86.233 |   1.92  11.089 |   2.67   4.561
05257>               .50  10.405 |   1.25  58.548 |   2.00   9.765 |   2.75   4.239
05258>               .58  13.734 |   1.33  42.595 |   2.08   8.679 |   2.83   3.953
05259>               .67  19.179 |   1.42  32.533 |   2.17   7.777 |   2.92   3.698
05260>               .75  29.096 |   1.50  25.760 |   2.25   7.018 |   3.00   3.469
05261>
05262> ------------------------------------------------------------------------------
05263> 100:0003----------------------------------------------------------------------
05264> *#-----------------|----------------------------------------------------------|
05265> *#==============================================================================

05266> *# Proposed Drainage Conditions (Internal Areas)
05267> *#==============================================================================
05268> *#-----------------|----------------------------------------------------------|
05269> *#
05270> *#    Small portion of West Road Ditch draining offsite to the east through
05271> *#                          By-Pass Storm Sewer(BPSS)
05272> *#
05273> *#-----------------|----------------------------------------------------------|
05274> ----------------------
05275> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
05276> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
05277> ----------------------  U.H. Tp(hrs)=    .260
05278>
05279>      Unit Hyd Qpeak  (cms)=     .021
05280>
05281>      PEAK FLOW       (cms)=     .009 (i)
05282>      TIME TO PEAK    (hrs)=    1.367
05283>      RUNOFF VOLUME    (mm)=   21.559
05284>      TOTAL RAINFALL   (mm)=   87.067
05285>      RUNOFF COEFFICIENT   =     .248
05286>
05287>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05288>
05289> ------------------------------------------------------------------------------
05290> 100:0004----------------------------------------------------------------------
05291> *#-----------------|----------------------------------------------------------|
05292> *#
05293> *#  Proposed developed catchment draining offsite to the east through BPSS
05294> *#
05295> *#-----------------|----------------------------------------------------------|
05296> ----------------------
05297> | DESIGN STANDHYD    |   Area    (ha)=     .64
05298> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
05299> ----------------------
05300>                              IMPERVIOUS    PERVIOUS (i)
05301>      Surface Area     (ha)=        .58          .06
05302>      Dep. Storage     (mm)=        .80         1.50
05303>      Average Slope     (%)=       2.00         2.00
05304>      Length            (m)=      65.32        40.00
05305>      Mannings n             =       .013         .250
05306>
05307>      Max.eff.Inten.(mm/hr)=     239.35       761.63
05308>                   over (min)        1.00         4.00
05309>      Storage Coeff.  (min)=       1.13 (ii)    4.27 (ii)
05310>      Unit Hyd. Tpeak (min)=       1.00         4.00
05311>      Unit Hyd. peak  (cms)=       1.00          .27
05312>                                                          *TOTALS*
05313>      PEAK FLOW       (cms)=        .21          .10           .295 (iii)
05314>      TIME TO PEAK    (hrs)=       1.00         1.05          1.000
05315>      RUNOFF VOLUME    (mm)=      86.27        54.73         70.497
05316>      TOTAL RAINFALL   (mm)=      87.07        87.07         87.067
05317>      RUNOFF COEFFICIENT   =        .99          .63           .810
05318>
05319>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
05320>            CN* =  50.0    Ia = Dep. Storage  (Above)
05321>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
05322>            THAN THE STORAGE COEFFICIENT.
05323>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05324>
05325> ------------------------------------------------------------------------------
05326> 100:0005----------------------------------------------------------------------
05327> *#-----------------|----------------------------------------------------------|
05328> *#
05329> *# Proposed internal grassed area and plunge pool draining offsite to the east
05330> *#
05331> *#-----------------|----------------------------------------------------------|
05332> ----------------------
05333> | DESIGN NASHYD      |   Area    (ha)=     .55   Curve Number   (CN)=50.00
05334> | 03:203    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
05335> ----------------------  U.H. Tp(hrs)=    .080
05336>
05337>      Unit Hyd Qpeak  (cms)=     .263
05338>
05339>      PEAK FLOW       (cms)=     .060 (i)
05340>      TIME TO PEAK    (hrs)=    1.100
05341>      RUNOFF VOLUME    (mm)=   21.562
05342>      TOTAL RAINFALL   (mm)=   87.067
05343>      RUNOFF COEFFICIENT   =     .248
05344>
05345>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05346>
05347> ------------------------------------------------------------------------------
05348> 100:0006----------------------------------------------------------------------
05349> *#-----------------|----------------------------------------------------------|
05350> *#
05351> *#          Total internal area draining onto agricultural area to the east
05352> *#
05353> *#-----------------|----------------------------------------------------------|
05354> ------------------------
05355> | ADD HYD (IntUcE    ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
05356> ------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
05357>                      ID1 01:200             .14     .009    1.37  21.56    .000
05358>                     +ID2 02:201             .64     .295    1.00  70.50    .000
05359>                     +ID3 03:203             .55     .060    1.10  21.56    .000
05360>                      ============================================================
05361>                      SUM 05:IntUcE          1.33     .334    1.00  45.11    .000
05362>
05363>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
05364>
05365> ------------------------------------------------------------------------------
05366> 100:0007----------------------------------------------------------------------
05367> *#-----------------|----------------------------------------------------------|
05368> *#
05369> *#          Proposed industrial lots draining to Rear Lot Ditch
05370> *#
05371> *#-----------------|----------------------------------------------------------|
05372> ----------------------
05373> | DESIGN STANDHYD    |   Area    (ha)=    8.82
05374> | 10:202    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
05375> ----------------------
05376>                              IMPERVIOUS    PERVIOUS (i)
05377>      Surface Area     (ha)=       7.94          .88
05378>      Dep. Storage     (mm)=        .80         1.50
05379>      Average Slope     (%)=       2.00         2.00
05380>      Length            (m)=     242.49        40.00
05381>      Mannings n             =       .013         .250
05382>
05383>      Max.eff.Inten.(mm/hr)=     239.35       154.12
05384>                   over (min)        2.00         8.00
05385>      Storage Coeff.  (min)=       2.49 (ii)    8.43 (ii)
05386>      Unit Hyd. Tpeak (min)=       2.00         8.00
05387>      Unit Hyd. peak  (cms)=        .48          .14
05388>                                                          *TOTALS*
05389>      PEAK FLOW       (cms)=       4.24          .26          4.348 (iii)
05390>      TIME TO PEAK    (hrs)=       1.00         1.17          1.000
05391>      RUNOFF VOLUME    (mm)=      86.27        34.93         75.999
05392>      TOTAL RAINFALL   (mm)=      87.07        87.07         87.067
05393>      RUNOFF COEFFICIENT   =        .99          .40           .873
05394>
05395>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
05396>            CN* =  50.0    Ia = Dep. Storage  (Above)
05397>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
05398>            THAN THE STORAGE COEFFICIENT.
05399>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05400>
```

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05401> ------------------------------------------------------------------------------
05402> 100:0008------------------------------------------------------------------------
05403> *#-----------------|----------------------------------------------------------|
05404> *#
05405> *#    External agricultural area draining onsite and entering Rear Lot Ditch
05406> *#
05407> *#-----------------|----------------------------------------------------------|
05408> ----------------------
05409> | DESIGN NASHYD     |   Area    (ha)=     .73   Curve Number   (CN)=70.00
05410> | 07:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
05411> ----------------------  U.H. Tp(hrs)=    .190
05412>
05413>      Unit Hyd Qpeak  (cms)=     .147
05414>
05415>      PEAK FLOW       (cms)=     .103 (i)
05416>      TIME TO PEAK    (hrs)=    1.250
05417>      RUNOFF VOLUME    (mm)=   37.658
05418>      TOTAL RAINFALL   (mm)=   87.067
05419>      RUNOFF COEFFICIENT   =     .433
05420>
05421>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05422>
05423> ------------------------------------------------------------------------------
05424> 100:0009------------------------------------------------------------------------
05425> *#-----------------|----------------------------------------------------------|
05426> *#
05427> *#      Total area entering Rear Lot Ditch and entering SWMF at East inlet
05428> *#
05429> *#-----------------|----------------------------------------------------------|
05430> ----------------------
05431> | ADD HYD (RLswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
05432> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
05433>                       ID1 10:202          8.82    4.348    1.00  76.00    .000
05434>                      +ID2 07:104           .73     .103    1.25  37.66    .000
05435>                       ========================================================
05436>                       SUM 08:RLswl         9.55    4.377    1.00  73.07    .000
05437>
05438>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
05439>
05440> ------------------------------------------------------------------------------
05441> 100:0010------------------------------------------------------------------------
05442> *#-----------------|----------------------------------------------------------|
05443> *#
05444> *#   Proposed industrial lots draining to East Road Ditch within catchment,
05445> *#                          and new internal roadway
05446> *#
05447> *#-----------------|----------------------------------------------------------|
05448> ----------------------
05449> | DESIGN STANDHYD    |   Area    (ha)=    4.92
05450> | 01:204    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
05451> ----------------------
05452>                              IMPERVIOUS    PERVIOUS (i)
05453>      Surface Area     (ha)=       4.43         .49
05454>      Dep. Storage     (mm)=        .80        1.50
05455>      Average Slope     (%)=       2.00        2.00
05456>      Length            (m)=     181.11       40.00
05457>      Mannings n             =       .013        .250
05458>
05459>      Max.eff.Inten.(mm/hr)=     239.35      154.12
05460>                  over (min)        2.00        8.00
05461>      Storage Coeff.  (min)=       2.09 (ii)    8.03 (ii)
05462>      Unit Hyd. Tpeak (min)=       2.00        8.00
05463>      Unit Hyd. peak  (cms)=        .54         .14
05464>                                                          *TOTALS*
05465>      PEAK FLOW       (cms)=       2.44         .15         2.502 (iii)
05466>      TIME TO PEAK    (hrs)=       1.00        1.17         1.000
05467>      RUNOFF VOLUME    (mm)=      86.27       34.93        75.999
05468>      TOTAL RAINFALL   (mm)=      87.07       87.07        87.067
05469>      RUNOFF COEFFICIENT   =        .99         .40          .873
05470>
05471>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
05472>            CN* =  50.0    Ia = Dep. Storage  (Above)
05473>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
05474>            THAN THE STORAGE COEFFICIENT.
05475>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05476>
05477> ------------------------------------------------------------------------------
05478> 100:0011------------------------------------------------------------------------
05479> *#-----------------|----------------------------------------------------------|
05480> *#
05481> *#              Proposed SWM facility catchment (infiltration basin)
05482> *#
05483> *#-----------------|----------------------------------------------------------|
05484> ----------------------
05485> | DESIGN NASHYD      |   Area    (ha)=    1.63   Curve Number   (CN)=57.00
05486> | 09:205    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
05487> ----------------------  U.H. Tp(hrs)=    .350
05488>
05489>      Unit Hyd Qpeak  (cms)=     .178
05490>
05491>      PEAK FLOW       (cms)=     .112 (i)
05492>      TIME TO PEAK    (hrs)=    1.483
05493>      RUNOFF VOLUME    (mm)=   26.415
05494>      TOTAL RAINFALL   (mm)=   87.067
05495>      RUNOFF COEFFICIENT   =     .303
05496>
05497>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05498>
05499> ------------------------------------------------------------------------------
05500> 100:0012------------------------------------------------------------------------
05501> *#-----------------|----------------------------------------------------------|
05502> *#
05503> *#                          All flows entering SWM facility
05504> *#
05505> *#-----------------|----------------------------------------------------------|
05506> ----------------------
05507> | ADD HYD (ToSWM     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
05508> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
05509>                       ID1 07:104           .73     .103    1.25  37.66    .000
05510>                      +ID2 09:205          1.63     .112    1.48  26.41    .000
05511>                      +ID3 10:202          8.82    4.348    1.00  76.00    .000
05512>                      +ID4 01:204          4.92    2.502    1.00  76.00    .000
05513>                       ========================================================
05514>                       SUM 06:ToSWM        16.10    6.892    1.00  69.24    .000
05515>
05516>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
05517>
05518> ------------------------------------------------------------------------------
05519> 100:0013------------------------------------------------------------------------
05520> *#
05521> *#                      Infiltration Portion of SWM facility
05522> *#
05523> *#-----------------|----------------------------------------------------------|
05524> ----------------------
05525> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
05526> |  IN>06:(ToSWM )   |
05527> | OUT<07:(SWMinf)   |    =========  OUTLFOW STORAGE TABLE  =========
05528> ----------------------   OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
05529>                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
05530>                             .000  .0000E+00   |     .044  .6364E+00
05531>                             .044  .5530E-01   |     .000  .0000E+00
05532>
05533>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
05534>      --------------------        (ha)     (cms)     (hrs)       (mm)
05535>      INFLOW >06: (ToSWM )       16.10    6.892     1.000     69.241
05536>      OUTFLOW<07: (SWMinf)        9.82     .044      .717     69.241
05537>     OVERFLOW<08: (OVF-I )        6.28    3.343     1.183     69.241
05538>
05539>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =         3
05540>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=      1.90
05541>                     PERCENTAGE OF TIME OVERFLOWING    (%)=      2.23
05542>
05543>
05544>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=      .638
05545>                     TIME SHIFT OF PEAK FLOW          (min)=   -17.00
05546>                     MAXIMUM  STORAGE   USED        (ha.m.)=.6364E+00
05547>
05548> ------------------------------------------------------------------------------
05549> 100:0014------------------------------------------------------------------------
05550> *#-----------------|----------------------------------------------------------|
05551> *#
05552> *#                       Active Storage Portion of SWM facility
05553> *#
05554> *#-----------------|----------------------------------------------------------|
05555> ----------------------
05556> | ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
05557> |  IN>08:(OVF-I )   |
05558> | OUT<01:(SWMout)   |    =========  OUTLFOW STORAGE TABLE  =========
05559> ----------------------   OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
05560>                            (cms)    (ha.m.)   |    (cms)    (ha.m.)
05561>                             .000  .0000E+00   |    1.479  .3245E+00
05562>                             .202  .1059E+00   |    2.606  .4367E+00
05563>                             .689  .2141E+00   |    4.101  .5560E+00
05564>
05565>      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
05566>      --------------------        (ha)     (cms)     (hrs)       (mm)
05567>      INFLOW >08: (OVF-I )       6.28    3.343     1.183     69.241
05568>      OUTFLOW<01: (SWMout)       6.28     .695     1.733     69.241
05569>     OVERFLOW<02: (OVF   )        .00     .000      .000      .000
05570>
05571>                     TOTAL NUMBER OF SIMULATED OVERFLOWS  =         0
05572>                     CUMULATIVE TIME OF OVERFLOWS  (hours)=       .00
05573>                     PERCENTAGE OF TIME OVERFLOWING    (%)=       .00
05574>
05575>
05576>                     PEAK   FLOW   REDUCTION [Qout/Qin](%)=    20.780
05577>                     TIME SHIFT OF PEAK FLOW          (min)=    33.00
05578>                     MAXIMUM  STORAGE   USED        (ha.m.)=.2149E+00
05579>
05580> ------------------------------------------------------------------------------
05581> 100:0015------------------------------------------------------------------------
05582> *#-----------------|----------------------------------------------------------|
05583> *#
05584> *#    West Road Ditch, conveying external drainage from the west around the
05585> *#                  proposed SWM facility to Outlet Channel
05586> *#
05587> *#-----------------|----------------------------------------------------------|
05588> ----------------------
05589> | DESIGN NASHYD      |   Area    (ha)=    1.22   Curve Number   (CN)=50.00
05590> | 02:206    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
05591> ----------------------  U.H. Tp(hrs)=    .810
05592>
05593>      Unit Hyd Qpeak  (cms)=     .058
05594>
05595>      PEAK FLOW       (cms)=     .038 (i)
05596>      TIME TO PEAK    (hrs)=    2.067
05597>      RUNOFF VOLUME    (mm)=   21.562
05598>      TOTAL RAINFALL   (mm)=   87.067
05599>      RUNOFF COEFFICIENT   =     .248
05600>
05601>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05602>
05603> ------------------------------------------------------------------------------
05604> 100:0016------------------------------------------------------------------------
05605> *#-----------------|----------------------------------------------------------|
05606> *#
05607> *#        Grassed area south of SWM facility draining offsite to the south
05608> *#
05609> *#-----------------|----------------------------------------------------------|
05610> ----------------------
05611> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
05612> | 10:207    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
05613> ----------------------  U.H. Tp(hrs)=    .070
05614>
05615>      Unit Hyd Qpeak  (cms)=     .076
05616>
05617>      PEAK FLOW       (cms)=     .016 (i)
05618>      TIME TO PEAK    (hrs)=    1.100
05619>      RUNOFF VOLUME    (mm)=   21.561
05620>      TOTAL RAINFALL   (mm)=   87.067
05621>      RUNOFF COEFFICIENT   =     .248
05622>
05623>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05624>
05625> ------------------------------------------------------------------------------
05626> 100:0017------------------------------------------------------------------------
05627> *#-----------------|----------------------------------------------------------|
05628> *#
05629> *#                Total Flows to the east from internal catchments
05630> *#
05631> *#-----------------|----------------------------------------------------------|
05632> ----------------------
05633> | ADD HYD (IntE      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
05634> ----------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
05635>                       ID1 05:IntUcE        1.33     .334    1.00  45.11    .000
05636>                      +ID2 01:SWMout        6.28     .695    1.73  69.24    .000
05637>                      +ID3 02:206           1.22     .038    2.07  21.56    .000
05638>                       ========================================================
05639>                       SUM 07:IntE          8.83     .772    1.72  59.02    .000
05640>
05641>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
05642>
05643> ------------------------------------------------------------------------------
05644> 100:0018------------------------------------------------------------------------
05645> *#-----------------|----------------------------------------------------------|
05646> *#=============================================================================
05647> *# Proposed Drainage Conditions (Including External Catchment Flows to Ditches)
05648> *#=============================================================================
05649> *#-----------------|----------------------------------------------------------|
05650> *#
05651> *# External industrial catchment and part of Hwy 401, draining south across
05652> *#                 Cedar Creek Road and entering BPSS
05653> *#
05654> *#-----------------|----------------------------------------------------------|
05655> ----------------------
05656> | CALIB STANDHYD     |   Area    (ha)=   55.94
05657> | 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
05658> ----------------------
05659>                              IMPERVIOUS    PERVIOUS (i)
05660>      Surface Area     (ha)=      44.75        11.19
05661>      Dep. Storage     (mm)=       2.00         5.00
05662>      Average Slope     (%)=       1.50         2.00
05663>      Length            (m)=    1750.00        30.00
05664>      Mannings n             =       .025         .250
05665>
05666>      Max.eff.Inten.(mm/hr)=     164.76       338.74
05667>                  over (min)       15.00        19.00
05668>      Storage Coeff.  (min)=       15.28 (ii)   18.92 (ii)
05669>      Unit Hyd. Tpeak (min)=       15.00        19.00
05670>      Unit Hyd. peak  (cms)=         .07          .06
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                                                                *TOTALS*
     PEAK FLOW       (cms)=       3.31         6.46           9.501 (iii)
     TIME TO PEAK    (hrs)=       1.23         1.37           1.317
     RUNOFF VOLUME    (mm)=      85.06        49.32          56.471
     TOTAL RAINFALL   (mm)=      87.07        87.07          87.067
     RUNOFF COEFFICIENT   =        .98          .57            .649

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
100:0019-----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------------|
*#
*#  External catchment containing a portion of Cedar Creek Road, a portion
*#  of industrial area, and a grassed area near Hwy 401 off-ramp, entering BPSS
*#
*#-----------------|-------------------------------------------------------------|
----------------------
| CALIB STANDHYD     |   Area    (ha)=   14.55
| 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.73         5.82
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.30         2.00
     Length            (m)=    1050.00        30.00
     Mannings n           =       .025         .250

     Max.eff.Inten.(mm/hr)=     195.75       143.31
                  over (min)       9.00        14.00
     Storage Coeff.  (min)=       9.23 (ii)   14.37 (ii)
     Unit Hyd. Tpeak (min)=       9.00        14.00
     Unit Hyd. peak  (cms)=        .12          .08
                                                *TOTALS*
     PEAK FLOW       (cms)=        .83         1.43           2.103 (iii)
     TIME TO PEAK    (hrs)=       1.13         1.28           1.217
     RUNOFF VOLUME    (mm)=      85.06        35.14          42.627
     TOTAL RAINFALL   (mm)=      87.07        87.07          87.067
     RUNOFF COEFFICIENT   =        .98          .40            .490

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
100:0020-----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------------|
*#
*#     Total area draining offsite to east onto agricultural area to the east
*#
*#-----------------|-------------------------------------------------------------|
----------------------
| ADD HYD (UCtoE     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 05:IntUcE        1.33     .334    1.00  45.11    .000
                     +ID2 03:100          55.94    9.501    1.32  56.47    .000
                     +ID3 07:101          14.55    2.103    1.22  42.63    .000
                      ======================================================
                      SUM 09:UCtoE        71.82   11.635    1.30  53.46    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0021-----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------------|
*#
*#   Large external catchment west of site containing industrial property,
*#  draining into private SWM feature and then into West Road Ditch, routing
*#             around SWM facility and entering Outlet Channel
*#
*#-----------------|-------------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=   12.64
| 04:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.11         2.53
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       3.10         3.10
     Length            (m)=     290.29        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     239.35       228.73
                  over (min)       2.00         7.00
     Storage Coeff.  (min)=       2.43 (ii)    6.88 (ii)
     Unit Hyd. Tpeak (min)=       2.00         7.00
     Unit Hyd. peak  (cms)=        .49          .16
                                                *TOTALS*
     PEAK FLOW       (cms)=       3.81         1.15           4.403 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.13           1.017
     RUNOFF VOLUME    (mm)=      86.27        39.75          63.011
     TOTAL RAINFALL   (mm)=      87.07        87.07          87.067
     RUNOFF COEFFICIENT   =        .99          .46            .724

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
100:0022-----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------------|
*#
*#                      Infiltration in External SWM Feature
*#
*#-----------------|-------------------------------------------------------------|
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>04:(102    )   |
| OUT<05:(xSWinf)    |    =========  OUTLFOW STORAGE TABLE  =========
----------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
                             .000  .0000E+00    |     .018  .3759E+00
                             .018  .4380E-01    |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (102    )     12.64     4.403     1.017     63.011
     OUTFLOW<05: (xSWinf)       6.24      .018      .783     63.010
    OVERFLOW<06: (OVF-xI)       6.40     3.189     1.133     63.011

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=     2.02
                    PERCENTAGE OF TIME OVERFLOWING    (%)=     1.48


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=     .409
                    TIME SHIFT OF PEAK FLOW         (min)=   -14.00

                 MAXIMUM  STORAGE   USED       (ha.m.)=.3759E+00

--------------------------------------------------------------------------------
100:0023-----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------------|
*#
*#    External catchment west of the site, containing a portion of existing
*#   industrial property, draining east into West Road Ditch, routing around
*#                     SWM facility and entering Outlet Channel
*#
*#-----------------|-------------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    4.52
| 07:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.62          .90
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       5.30         5.30
     Length            (m)=     173.59        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     239.35       247.90
                  over (min)       2.00         5.00
     Storage Coeff.  (min)=       1.52 (ii)    5.19 (ii)
     Unit Hyd. Tpeak (min)=       2.00         5.00
     Unit Hyd. peak  (cms)=        .66          .22
                                                *TOTALS*
     PEAK FLOW       (cms)=       1.46          .46           1.767 (iii)
     TIME TO PEAK    (hrs)=       1.00         1.08           1.000
     RUNOFF VOLUME    (mm)=      86.27        39.75          63.011
     TOTAL RAINFALL   (mm)=      87.07        87.07          87.067
     RUNOFF COEFFICIENT   =        .99          .46            .724

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
100:0024-----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------------|
*#
*#                        Total Flows through West Road Ditch
*#
*#-----------------|-------------------------------------------------------------|
------------------------
| ADD HYD (WRswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 06:OVF-xI        6.40    3.189    1.13  63.01    .000
                      +ID2 07:103           4.52    1.767    1.00  63.01    .000
                      +ID3 02:206           1.22     .038    2.07  21.56    .000
                       ======================================================
                       SUM 08:WRswl        12.14    4.256    1.13  58.84    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0025-----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------------|
*#
----------------------
| DESIGN NASHYD      |   Area    (ha)=    1.13   Curve Number   (CN)=50.00
| 05:208    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .850

     Unit Hyd Qpeak  (cms)=     .051

     PEAK FLOW       (cms)=     .034 (i)
     TIME TO PEAK    (hrs)=    2.117
     RUNOFF VOLUME    (mm)=   21.562
     TOTAL RAINFALL   (mm)=   87.067
     RUNOFF COEFFICIENT   =     .248

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

--------------------------------------------------------------------------------
100:0026-----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------------|
*#
*#                        Total Flows through Outlet Channel
*#
*#-----------------|-------------------------------------------------------------|
------------------------
| ADD HYD (OutChan   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:SWMout        6.28     .695    1.73  69.24    .000
                      +ID2 08:WRswl        12.14    4.256    1.13  58.84    .000
                      +ID3 05:208           1.13     .034    2.12  21.56    .000
                       ======================================================
                       SUM 03:OutChan      19.54    4.260    1.13  60.03    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0027-----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------------|
*#
*#              Total Flows to the east (eventually to Cedar Creek)
*#
*#-----------------|-------------------------------------------------------------|
------------------------
| ADD HYD (TotE      ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 01:SWMout        6.28     .695    1.73  69.24    .000
                      +ID2 08:WRswl        12.14    4.256    1.13  58.84    .000
                      +ID3 09:UCtoE        71.82   11.635    1.30  53.46    .000
                       ======================================================
                       SUM 04:TotE         90.23   14.324    1.27  55.28    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0028-----------------------------------------------------------------------
*#-----------------|-------------------------------------------------------------|
*#
*#                           Total Flows from the Site
*#
*#-----------------|-------------------------------------------------------------|
------------------------
| ADD HYD (AllFlo    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 04:TotE         90.23   14.324    1.27  55.28    .000
                      +ID2 10:207           .14     .016    1.10  21.56    .000
                       ======================================================
                       SUM 06:AllFlo       90.37   14.334    1.27  55.23    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
100:0029-----------------------------------------------------------------------
*#
*#   Catchments required for By-Pass Storm Sewer (BPSS) sizing - added again
*#                              for ease of modelling
*#
```

```
05941> *#-----------------|-------------------------------------------------------------------|
05942> ---------------------
05943> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
05944> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
05945> ----------------------  U.H. Tp(hrs)=    .260
05946>
05947>      Unit Hyd Qpeak  (cms)=     .021
05948>
05949>      PEAK FLOW       (cms)=     .009 (i)
05950>      TIME TO PEAK    (hrs)=    1.367
05951>      RUNOFF VOLUME    (mm)=   21.559
05952>      TOTAL RAINFALL   (mm)=   87.067
05953>      RUNOFF COEFFICIENT   =     .248
05954>
05955>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05956>
05957> -------------------------------------------------------------------------------
05958> 100:0030-------------------------------------------------------------------------
05959> *#-----------------|-------------------------------------------------------------------|
05960> ---------------------
05961> | DESIGN STANDHYD    |   Area    (ha)=     .64
05962> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
05963> ----------------------
05964>                              IMPERVIOUS    PERVIOUS (i)
05965>      Surface Area     (ha)=        .58          .06
05966>      Dep. Storage     (mm)=        .80         1.50
05967>      Average Slope     (%)=       2.00         2.00
05968>      Length            (m)=      65.32        40.00
05969>      Mannings n            =       .013         .250
05970>
05971>      Max.eff.Inten.(mm/hr)=     239.35       761.63
05972>                    over (min)        1.00         4.00
05973>      Storage Coeff.  (min)=       1.13 (ii)    4.27 (ii)
05974>      Unit Hyd. Tpeak (min)=       1.00         4.00
05975>      Unit Hyd. peak  (cms)=       1.00          .27
05976>                                                          *TOTALS*
05977>      PEAK FLOW       (cms)=        .21          .10          .295 (iii)
05978>      TIME TO PEAK    (hrs)=       1.00         1.05         1.000
05979>      RUNOFF VOLUME    (mm)=      86.27        54.73        70.497
05980>      TOTAL RAINFALL   (mm)=      87.07        87.07        87.067
05981>      RUNOFF COEFFICIENT   =        .99          .63          .810
05982>
05983>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
05984>            CN* = 50.0    Ia = Dep. Storage  (Above)
05985>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
05986>            THAN THE STORAGE COEFFICIENT.
05987>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
05988>
05989> -------------------------------------------------------------------------------
05990> 100:0031-------------------------------------------------------------------------
05991> *#-----------------|-------------------------------------------------------------------|
05992> ---------------------
05993> | CALIB STANDHYD     |   Area    (ha)=   55.94
05994> | 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
05995> ----------------------
05996>                              IMPERVIOUS    PERVIOUS (i)
05997>      Surface Area     (ha)=      44.75        11.19
05998>      Dep. Storage     (mm)=       2.00         5.00
05999>      Average Slope     (%)=       1.50         2.00
06000>      Length            (m)=    1750.00        30.00
06001>      Mannings n            =       .025         .250
06002>
06003>      Max.eff.Inten.(mm/hr)=     164.76       338.74
06004>                    over (min)       15.00        19.00
06005>      Storage Coeff.  (min)=      15.28 (ii)   18.92 (ii)
06006>      Unit Hyd. Tpeak (min)=      15.00        19.00
06007>      Unit Hyd. peak  (cms)=        .07          .06
06008>                                                          *TOTALS*
06009>      PEAK FLOW       (cms)=       3.31         6.46         9.501 (iii)
06010>      TIME TO PEAK    (hrs)=       1.23         1.37         1.317
06011>      RUNOFF VOLUME    (mm)=      85.06        49.32        56.471
06012>      TOTAL RAINFALL   (mm)=      87.07        87.07        87.067
06013>      RUNOFF COEFFICIENT   =        .98          .57          .649
06014>
06015>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
06016>            CN* =  50.0    Ia = Dep. Storage  (Above)
06017>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
06018>            THAN THE STORAGE COEFFICIENT.
06019>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
06020>
06021> -------------------------------------------------------------------------------
06022> 100:0032-------------------------------------------------------------------------
06023> *#-----------------|-------------------------------------------------------------------|
06024> ---------------------
06025> | CALIB STANDHYD     |   Area    (ha)=   14.55
06026> | 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
06027> ----------------------
06028>                              IMPERVIOUS    PERVIOUS (i)
06029>      Surface Area     (ha)=       8.73         5.82
06030>      Dep. Storage     (mm)=       2.00         5.00
06031>      Average Slope     (%)=       2.30         2.00
06032>      Length            (m)=    1050.00        30.00
06033>      Mannings n            =       .025         .250
06034>
06035>      Max.eff.Inten.(mm/hr)=     195.75       143.31
06036>                    over (min)        9.00        14.00
06037>      Storage Coeff.  (min)=       9.23 (ii)   14.37 (ii)
06038>      Unit Hyd. Tpeak (min)=       9.00        14.00
06039>      Unit Hyd. peak  (cms)=        .12          .08
06040>                                                          *TOTALS*
06041>      PEAK FLOW       (cms)=        .83         1.43         2.103 (iii)
06042>      TIME TO PEAK    (hrs)=       1.13         1.28         1.217
06043>      RUNOFF VOLUME    (mm)=      85.06        35.14        42.627
06044>      TOTAL RAINFALL   (mm)=      87.07        87.07        87.067
06045>      RUNOFF COEFFICIENT   =        .98          .40          .490
06046>
06047>        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
06048>            CN* =  50.0    Ia = Dep. Storage  (Above)
06049>       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
06050>            THAN THE STORAGE COEFFICIENT.
06051>      (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
06052>
06053> -------------------------------------------------------------------------------
06054> 100:0033-------------------------------------------------------------------------
06055> *#-----------------|-----------------------------------------------------------------|
06056> ---------------------
06057> | ADD HYD (BPSS      ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
06058> ----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
06059>                      ID1 01:200            .14      .009   1.37  21.56    .000
06060>                     +ID2 02:201            .64      .295   1.00  70.50    .000
06061>                     +ID3 03:100          55.94     9.501   1.32  56.47    .000
06062>                     +ID4 07:101          14.55     2.103   1.22  42.63    .000
06063>                      ==========================================================
06064>                      SUM 06:BPSS          71.27   11.599    1.30  53.70    .000
06065>
06066>    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
06067>
06068> -------------------------------------------------------------------------------
06069> 100:0034-------------------------------------------------------------------------
06070> -------------------------------------------------------------------------------
06071> 100:0002-------------------------------------------------------------------------
06072> -------------------------------------------------------------------------------
06073> 100:0002-------------------------------------------------------------------------
06074> -------------------------------------------------------------------------------
06075> 100:0002-------------------------------------------------------------------------
06076> -------------------------------------------------------------------------------
06077> 100:0002-------------------------------------------------------------------------
06078> -------------------------------------------------------------------------------
06079> 100:0002-------------------------------------------------------------------------
06080> -------------------------------------------------------------------------------
06081> 100:0002-------------------------------------------------------------------------
06082>   ** END OF RUN : 499
06083>
06084> ************************************************************************
06085>
06086>
06087>
06088>
06089>
06090> --------------------
06091> | START            |  Project  dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
06092> --------------------  Rainfall dir.: C:\SWMHYMO\CEDARC~1\11-18-~1\
06093>     TZERO =   .00 hrs on       0
06094>     METOUT=   2 (output = METRIC)
06095>     NRUN  = 500
06096>     NSTORM=  1
06097>              #  1=hurhaz48.stm
06098> -------------------------------------------------------------------------------
06099> 500:0002-------------------------------------------------------------------------
06100> *#*********************************************************************
06101> *#  Project Name: [2509 Cedar Creek Road SWM - Ayr, ON] Project #: [161414214]
06102> *#  Date        : 11/13/2024
06103> *#  Modeller    : [Amy Kyle]
06104> *#  Company     : Stantec Consulting Ltd. (Waterloo)
06105> *#  License #   : 4730904
06106> *#
06107> *#  This hydrologic analysis prepared to provide pond sizing
06108> *#  for the 2509 Cedar Creek Road SWM Facility
06109> *#  The storm events modelled are:
06110> *#  25mm, 2, 5, 25, 50, and 100-year Chicago storms (City of Kitchener IDF)
06111> *#  and the Regional Event
06112> *#*********************************************************************
06113> -------------------------------------------------------------------------------
06114> 500:0002-------------------------------------------------------------------------
06115> --------------------
06116> | READ STORM       |    Filename: REGIONAL STORM
06117> | Ptotal= 285.00 mm|    Comments: REGIONAL STORM
06118> --------------------
06119>               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
06120>               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
06121>               .25   2.000 |  12.25   2.000 |  24.25   2.000 |  36.25   6.000
06122>               .50   2.000 |  12.50   2.000 |  24.50   2.000 |  36.50   6.000
06123>               .75   2.000 |  12.75   2.000 |  24.75   2.000 |  36.75   6.000
06124>              1.00   2.000 |  13.00   2.000 |  25.00   2.000 |  37.00   6.000
06125>              1.25   2.000 |  13.25   2.000 |  25.25   2.000 |  37.25   4.000
06126>              1.50   2.000 |  13.50   2.000 |  25.50   2.000 |  37.50   4.000
06127>              1.75   2.000 |  13.75   2.000 |  25.75   2.000 |  37.75   4.000
06128>              2.00   2.000 |  14.00   2.000 |  26.00   2.000 |  38.00   4.000
06129>              2.25   2.000 |  14.25   2.000 |  26.25   2.000 |  38.25   6.000
06130>              2.50   2.000 |  14.50   2.000 |  26.50   2.000 |  38.50   6.000
06131>              2.75   2.000 |  14.75   2.000 |  26.75   2.000 |  38.75   6.000
06132>              3.00   2.000 |  15.00   2.000 |  27.00   2.000 |  39.00   6.000
06133>              3.25   2.000 |  15.25   2.000 |  27.25   2.000 |  39.25  13.000
06134>              3.50   2.000 |  15.50   2.000 |  27.50   2.000 |  39.50  13.000
06135>              3.75   2.000 |  15.75   2.000 |  27.75   2.000 |  39.75  13.000
06136>              4.00   2.000 |  16.00   2.000 |  28.00   2.000 |  40.00  13.000
06137>              4.25   2.000 |  16.25   2.000 |  28.25   2.000 |  40.25  17.000
06138>              4.50   2.000 |  16.50   2.000 |  28.50   2.000 |  40.50  17.000
06139>              4.75   2.000 |  16.75   2.000 |  28.75   2.000 |  40.75  17.000
06140>              5.00   2.000 |  17.00   2.000 |  29.00   2.000 |  41.00  17.000
06141>              5.25   2.000 |  17.25   2.000 |  29.25   2.000 |  41.25  13.000
06142>              5.50   2.000 |  17.50   2.000 |  29.50   2.000 |  41.50  13.000
06143>              5.75   2.000 |  17.75   2.000 |  29.75   2.000 |  41.75  13.000
06144>              6.00   2.000 |  18.00   2.000 |  30.00   2.000 |  42.00  13.000
06145>              6.25   2.000 |  18.25   2.000 |  30.25   2.000 |  42.25  23.000
06146>              6.50   2.000 |  18.50   2.000 |  30.50   2.000 |  42.50  23.000
06147>              6.75   2.000 |  18.75   2.000 |  30.75   2.000 |  42.75  23.000
06148>              7.00   2.000 |  19.00   2.000 |  31.00   2.000 |  43.00  23.000
06149>              7.25   2.000 |  19.25   2.000 |  31.25   2.000 |  43.25  13.000
06150>              7.50   2.000 |  19.50   2.000 |  31.50   2.000 |  43.50  13.000
06151>              7.75   2.000 |  19.75   2.000 |  31.75   2.000 |  43.75  13.000
06152>              8.00   2.000 |  20.00   2.000 |  32.00   2.000 |  44.00  13.000
06153>              8.25   2.000 |  20.25   2.000 |  32.25   2.000 |  44.25  13.000
06154>              8.50   2.000 |  20.50   2.000 |  32.50   2.000 |  44.50  13.000
06155>              8.75   2.000 |  20.75   2.000 |  32.75   2.000 |  44.75  13.000
06156>              9.00   2.000 |  21.00   2.000 |  33.00   2.000 |  45.00  13.000
06157>              9.25   2.000 |  21.25   2.000 |  33.25   2.000 |  45.25  53.000
06158>              9.50   2.000 |  21.50   2.000 |  33.50   2.000 |  45.50  53.000
06159>              9.75   2.000 |  21.75   2.000 |  33.75   2.000 |  45.75  53.000
06160>             10.00   2.000 |  22.00   2.000 |  34.00   2.000 |  46.00  53.000
06161>             10.25   2.000 |  22.25   2.000 |  34.25   2.000 |  46.25  38.000
06162>             10.50   2.000 |  22.50   2.000 |  34.50   2.000 |  46.50  38.000
06163>             10.75   2.000 |  22.75   2.000 |  34.75   2.000 |  46.75  38.000
06164>             11.00   2.000 |  23.00   2.000 |  35.00   2.000 |  47.00  38.000
06165>             11.25   2.000 |  23.25   2.000 |  35.25   3.000 |  47.25  13.000
06166>             11.50   2.000 |  23.50   2.000 |  35.50   3.000 |  47.50  13.000
06167>             11.75   2.000 |  23.75   2.000 |  35.75   3.000 |  47.75  13.000
06168>             12.00   2.000 |  24.00   2.000 |  36.00   3.000 |  48.00  13.000
06169>
06170> -------------------------------------------------------------------------------
06171> 500:0003-------------------------------------------------------------------------
06172> *#-----------------|-------------------------------------------------------------|
06173> *#=================================================================
06174> *# Proposed Drainage Conditions (Internal Areas)
06175> *#=================================================================
06176> *#-----------------|-------------------------------------------------------------|
06177> *#
06178> *#    Small portion of West Road Ditch draining offsite to the east through
06179> *#                              By-Pass Storm Sewer(BPSS)
06180> *#
06181> *#-----------------|-------------------------------------------------------------|
06182> ----------------------
06183> | DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
06184> | 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
06185> ----------------------  U.H. Tp(hrs)=    .260
06186>
06187>      Unit Hyd Qpeak  (cms)=     .021
06188>
06189>      PEAK FLOW       (cms)=     .014 (i)
06190>      TIME TO PEAK    (hrs)=   46.050
06191>      RUNOFF VOLUME    (mm)=  149.528
06192>      TOTAL RAINFALL   (mm)=  285.000
06193>      RUNOFF COEFFICIENT   =     .525
06194>
06195>      (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.
06196>
06197> -------------------------------------------------------------------------------
06198> 500:0004-------------------------------------------------------------------------
06199> *#-----------------|-------------------------------------------------------------|
06200> *#
06201> *#  Proposed developed catchment draining offsite to the east through BPSS
06202> *#
06203> *#-----------------|-------------------------------------------------------------|
06204> ----------------------
06205> | DESIGN STANDHYD    |   Area    (ha)=     .64
06206> | 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
06207> ----------------------
06208>                              IMPERVIOUS    PERVIOUS (i)
06209>      Surface Area     (ha)=        .58          .06
06210>      Dep. Storage     (mm)=        .80         1.50
```

```
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      65.32        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00       256.36
                   over (min)       2.00         7.00
     Storage Coeff.  (min)=       2.07 (ii)    6.91 (ii)
     Unit Hyd. Tpeak (min)=       2.00         7.00
     Unit Hyd. peak  (cms)=        .55          .16
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05          .05          .093 (iii)
     TIME TO PEAK    (hrs)=      45.50        46.00        46.000
     RUNOFF VOLUME    (mm)=     284.18       241.57       262.896
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =       1.00          .85          .922

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
500:0005-------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*# Proposed internal grassed area and plunge pool draining offsite to the east
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .55   Curve Number   (CN)=50.00
| 03:203    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .080

     Unit Hyd Qpeak  (cms)=     .263

     PEAK FLOW       (cms)=     .058 (i)
     TIME TO PEAK    (hrs)=   46.000
     RUNOFF VOLUME    (mm)=  149.530
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .525

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

--------------------------------------------------------------------------------
500:0006-------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#          Total internal area draining onto agricultural area to the east
*#
*#-----------------|------------------------------------------------------------|
-------------------------
| ADD HYD (IntUcE    ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 01:200             .14     .014   46.05 149.53    .000
                     +ID2 02:201             .64     .093   46.00 262.90    .000
                     +ID3 03:203             .55     .058   46.00 149.53    .000
                      ==========================================================
                      SUM 05:IntUcE         1.33     .165   46.00 204.08    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
500:0007-------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#             Proposed industrial lots draining to Rear Lot Ditch
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    8.82
| 10:202    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       7.94          .88
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     242.49        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        92.43
                   over (min)       5.00        12.00
     Storage Coeff.  (min)=       4.55 (ii)   11.83 (ii)
     Unit Hyd. Tpeak (min)=       5.00        12.00
     Unit Hyd. peak  (cms)=        .24          .10
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.04          .22         1.261 (iii)
     TIME TO PEAK    (hrs)=      46.00        46.02        46.000
     RUNOFF VOLUME    (mm)=     284.17       196.45       266.654
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =       1.00          .69          .936

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
500:0008-------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#    External agricultural area draining onsite and entering Rear Lot Ditch
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .73   Curve Number   (CN)=70.00
| 07:104    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .190

     Unit Hyd Qpeak  (cms)=     .147

     PEAK FLOW       (cms)=     .095 (i)
     TIME TO PEAK    (hrs)=   46.017
     RUNOFF VOLUME    (mm)=  204.845
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .719

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

--------------------------------------------------------------------------------
500:0009-------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#      Total area entering Rear Lot Ditch and entering SWMF at East inlet
*#
*#-----------------|------------------------------------------------------------|
----------------------
| ADD HYD (RLswl     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                     (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 10:202             8.82    1.261   46.00 266.65    .000
                     +ID2 07:104              .73     .095   46.02 204.85    .000
                      ==========================================================
                      SUM 08:RLswl           9.55    1.357   46.00 261.93    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
500:0010-------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#   Proposed industrial lots draining to East Road Ditch within catchment,
*#                            and new internal roadway
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    4.92
| 01:204    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   80.00
----------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       4.43          .49
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=     181.11        40.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00        92.46
                   over (min)       4.00        11.00
     Storage Coeff.  (min)=       3.82 (ii)   11.10 (ii)
     Unit Hyd. Tpeak (min)=       4.00        11.00
     Unit Hyd. peak  (cms)=        .29          .10
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .58          .12          .704 (iii)
     TIME TO PEAK    (hrs)=      45.98        46.00        46.000
     RUNOFF VOLUME    (mm)=     284.17       196.44       266.654
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =       1.00          .69          .936

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
500:0011-------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#              Proposed SWM facility catchment (infiltration basin)
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=    1.63   Curve Number   (CN)=57.00
| 09:205    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .350

     Unit Hyd Qpeak  (cms)=     .178

     PEAK FLOW       (cms)=     .178 (i)
     TIME TO PEAK    (hrs)=   46.117
     RUNOFF VOLUME    (mm)=  169.164
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .594

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

--------------------------------------------------------------------------------
500:0012-------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#                          All flows entering SWM facility
*#
*#-----------------|------------------------------------------------------------|
-------------------------
| ADD HYD (ToSWM     ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-------------------------                   (ha)     (cms)   (hrs)   (mm)    (cms)
                       ID1 07:104             .73     .095   46.02 204.85    .000
                      +ID2 09:205            1.63     .178   46.12 169.16    .000
                      +ID3 10:202            8.82    1.261   46.00 266.65    .000
                      +ID4 01:204            4.92     .704   46.00 266.65    .000
                       ==========================================================
                       SUM 06:ToSWM         16.10    2.235   46.00 253.98    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
500:0013-------------------------------------------------------------------------
*#
*#                      Infiltration Portion of SWM facility
*#
*#-----------------|------------------------------------------------------------|
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>06:(ToSWM )    |
| OUT<07:(SWMinf)    |    =========  OUTLFOW STORAGE TABLE  =========
----------------------    OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
                            (cms)      (ha.m.)    |    (cms)     (ha.m.)
                             .000   .0000E+00     |     .044   .6364E+00
                             .044   .5530E-01     |     .000   .0000E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >06: (ToSWM )       16.10     2.235    46.000     253.981
     OUTFLOW<07: (SWMinf)        5.40      .044     4.733     253.974
    OVERFLOW<08: (OVF-I )       10.70     2.190    46.000     253.981

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        2
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=     8.80
                    PERCENTAGE OF TIME OVERFLOWING    (%)=     6.73

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.968
                    TIME SHIFT OF PEAK FLOW         (min)= -2476.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.6364E+00

--------------------------------------------------------------------------------
500:0014-------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#                       Active Storage Portion of SWM facility
*#
*#-----------------|------------------------------------------------------------|
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>08:(OVF-I )    |
| OUT<01:(SWMout)    |    =========  OUTLFOW STORAGE TABLE  =========
----------------------    OUTFLOW     STORAGE    |  OUTFLOW     STORAGE
                            (cms)      (ha.m.)    |    (cms)     (ha.m.)
                             .000   .0000E+00     |    1.479   .3245E+00
                             .202   .1059E+00     |    2.606   .4367E+00
                             .689   .2141E+00     |    4.101   .5560E+00

     ROUTING RESULTS             AREA     QPEAK     TPEAK       R.V.
     ---------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >08: (OVF-I )       10.70     2.190    46.000     253.981
     OUTFLOW<01: (SWMout)       10.70     2.054    46.067     253.981
    OVERFLOW<02: (OVF   )        .00      .000      .000        .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
```

```
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00

                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   93.792
                    TIME SHIFT OF PEAK FLOW          (min)=     4.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3818E+00

--------------------------------------------------------------------------------
500:0015--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#    West Road Ditch, conveying external drainage from the west around the
*#                    proposed SWM facility to Outlet Channel
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=    1.22   Curve Number   (CN)=50.00
| 02:206    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .810

     Unit Hyd Qpeak  (cms)=     .058

     PEAK FLOW       (cms)=     .100 (i)
     TIME TO PEAK    (hrs)=   47.067
     RUNOFF VOLUME    (mm)=  149.530
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .525

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

--------------------------------------------------------------------------------
500:0016--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#        Grassed area south of SWM facility draining offsite to the south
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number   (CN)=50.00
| 10:207    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .070

     Unit Hyd Qpeak  (cms)=     .076

     PEAK FLOW       (cms)=     .015 (i)
     TIME TO PEAK    (hrs)=   46.000
     RUNOFF VOLUME    (mm)=  149.530
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .525

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

--------------------------------------------------------------------------------
500:0017--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#                 Total Flows to the east from internal catchments
*#
*#-----------------|------------------------------------------------------------|
----------------------
| ADD HYD (IntE      ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
----------------------                      (ha)     (cms)   (hrs)   (mm)    (cms)
                      ID1 05:IntUcE        1.33     .165   46.00 204.08    .000
                     +ID2 01:SWMout       10.70    2.054   46.07 253.98    .000
                     +ID3 02:206           1.22     .100   47.07 149.53    .000
                      ==========================================================
                      SUM 07:IntE         13.25    2.279   46.05 239.35    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
500:0018--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#=================================================================================
*# Proposed Drainage Conditions (Including External Catchment Flows to Ditches)
*#=================================================================================
*#-----------------|------------------------------------------------------------|
*#
*# External industrial catchment and part of Hwy 401, draining south across
*#                    Cedar Creek Road and entering BPSS
*#
*#-----------------|------------------------------------------------------------|
----------------------
| CALIB STANDHYD     |   Area    (ha)=   55.94
| 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
----------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      44.75        11.19
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=    1750.00        30.00
     Mannings n             =      .025         .250

     Max.eff.Inten.(mm/hr)=      53.00       201.34
                   over (min)       24.00        29.00
     Storage Coeff.  (min)=      24.04 (ii)   28.53 (ii)
     Unit Hyd. Tpeak (min)=      24.00        29.00
     Unit Hyd. peak  (cms)=        .05          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.50         5.46         6.944 (iii)
     TIME TO PEAK    (hrs)=      46.15        46.25        46.233
     RUNOFF VOLUME    (mm)=     282.86       231.78       242.090
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =        .99          .81          .849

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
500:0019--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#  External catchment containing a portion of Cedar Creek Road, a portion
*#  of industrial area, and a grassed area near Hwy 401 off-ramp, entering BPSS
*#
*#-----------------|------------------------------------------------------------|
----------------------
| CALIB STANDHYD     |   Area    (ha)=   14.55
| 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
----------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.73         5.82
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.30         2.00
     Length            (m)=    1050.00        30.00
     Mannings n             =      .025         .250

     Max.eff.Inten.(mm/hr)=      53.00        98.81
                   over (min)       16.00        22.00
     Storage Coeff.  (min)=      15.57 (ii)   21.53 (ii)
     Unit Hyd. Tpeak (min)=      16.00        22.00
     Unit Hyd. peak  (cms)=        .07          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .31         1.47         1.778 (iii)
     TIME TO PEAK    (hrs)=      46.03        46.13        46.100
     RUNOFF VOLUME    (mm)=     282.92       198.59       211.296
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =        .99          .70          .741

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
500:0020--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#     Total area draining offsite to east onto agricultural area to the east
*#
*#-----------------|------------------------------------------------------------|
------------------------
| ADD HYD (UCtoE     ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                    (ha)     (cms)   (hrs)   (mm)    (cms)
                        ID1 05:IntUcE        1.33     .165   46.00 204.08    .000
                       +ID2 03:100          55.94    6.944   46.23 242.09    .000
                       +ID3 07:101          14.55    1.778   46.10 211.30    .000
                        ==========================================================
                        SUM 09:UCtoE        71.82    8.828   46.18 235.15    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
500:0021--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#   Large external catchment west of site containing industrial property,
*#  draining into private SWM feature and then into West Road Ditch, routing
*#              around SWM facility and entering Outlet Channel
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=   12.64
| 04:102    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      10.11         2.53
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      3.10         3.10
     Length            (m)=    290.29        40.00
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=      53.00       119.98
                   over (min)       4.00        10.00
     Storage Coeff.  (min)=      4.45 (ii)   10.20 (ii)
     Unit Hyd. Tpeak (min)=      4.00        10.00
     Unit Hyd. peak  (cms)=       .26          .11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .93          .83         1.765 (iii)
     TIME TO PEAK    (hrs)=     46.00        46.00        46.000
     RUNOFF VOLUME    (mm)=    284.17       209.52       246.871
     TOTAL RAINFALL   (mm)=    285.00       285.00       285.000
     RUNOFF COEFFICIENT   =      1.00          .74          .866

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
500:0022--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#                      Infiltration in External SWM Feature
*#
*#-----------------|------------------------------------------------------------|
----------------------
| ROUTE RESERVOIR    |    Requested routing time step =  1.0 min.
|  IN>04:(102    )   |
| OUT<05:(xSWinf)    |    =========  OUTLFOW STORAGE TABLE  =========
----------------------    OUTFLOW     STORAGE   |  OUTFLOW    STORAGE
                            (cms)     (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00     |    .018  .3759E+00
                            .018  .4380E-01     |    .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     ---------------            (ha)     (cms)     (hrs)       (mm)
     INFLOW >04: (102   )      12.64     1.765    46.000    246.871
     OUTFLOW<05: (xSWinf)       2.73      .018     4.833    246.884
     OVERFLOW<06: (OVF-xI)      9.91     1.746    46.000    246.871

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =         2
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=    15.28
                    PERCENTAGE OF TIME OVERFLOWING    (%)=     8.41


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=    1.020
                    TIME SHIFT OF PEAK FLOW          (min)= -2470.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.3759E+00

--------------------------------------------------------------------------------
500:0023--------------------------------------------------------------------------
*#-----------------|------------------------------------------------------------|
*#
*#    External catchment west of the site, containing a portion of existing
*#   industrial property, draining east into West Road Ditch, routing around
*#                    SWM facility and entering Outlet Channel
*#
*#-----------------|------------------------------------------------------------|
----------------------
| DESIGN STANDHYD    |   Area    (ha)=    4.52
| 07:103    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   50.00
----------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       3.62          .90
     Dep. Storage     (mm)=       .80         1.50
     Average Slope     (%)=      5.30         5.30
     Length            (m)=    173.59        40.00
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=      53.00       120.05
                   over (min)       3.00         8.00
     Storage Coeff.  (min)=      2.78 (ii)    7.68 (ii)
     Unit Hyd. Tpeak (min)=      3.00         8.00
     Unit Hyd. peak  (cms)=       .39          .15
                                                          *TOTALS*
     PEAK FLOW       (cms)=       .33          .30          .633 (iii)
     TIME TO PEAK    (hrs)=     45.73        46.00        46.000
     RUNOFF VOLUME    (mm)=    284.18       209.52       246.871
     TOTAL RAINFALL   (mm)=    285.00       285.00       285.000
     RUNOFF COEFFICIENT   =      1.00          .74          .866

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  50.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
```

```
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
500:0024--------------------------------------------------------------------------
*#-----------------|----------------------------------------------------------|
*#
*#                        Total Flows through West Road Ditch
*#
*#-----------------|----------------------------------------------------------|
 ------------------------
| ADD HYD (WRswl     ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
 ------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 06:OVF-xI         9.91    1.746   46.00 246.87    .000
                      +ID2 07:103            4.52     .633   46.00 246.87    .000
                      +ID3 02:206            1.22     .100   47.07 149.53    .000
                       ============================================================
                       SUM 08:WRswl          15.65    2.451   46.00 239.28    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
500:0025--------------------------------------------------------------------------
*#-----------------|----------------------------------------------------------|
 ----------------------
| DESIGN NASHYD      |   Area    (ha)=    1.13   Curve Number    (CN)=50.00
| 05:208    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
 ----------------------  U.H. Tp(hrs)=    .850

     Unit Hyd Qpeak  (cms)=     .051

     PEAK FLOW       (cms)=     .092 (i)
     TIME TO PEAK    (hrs)=   47.100
     RUNOFF VOLUME    (mm)=  149.530
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .525

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

------------------------------------------------------------------------------
500:0026--------------------------------------------------------------------------
*#-----------------|----------------------------------------------------------|
*#
*#                        Total Flows through Outlet Channel
*#
*#-----------------|----------------------------------------------------------|
 ------------------------
| ADD HYD (OutChan   ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
 ------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:SWMout        10.70    2.054   46.07 253.98    .000
                      +ID2 08:WRswl         15.65    2.451   46.00 239.28    .000
                      +ID3 05:208            1.13     .092   47.10 149.53    .000
                       ============================================================
                       SUM 03:OutChan       27.47    4.544   46.00 241.31    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
500:0027--------------------------------------------------------------------------
*#-----------------|----------------------------------------------------------|
*#
*#               Total Flows to the east (eventually to Cedar Creek)
*#
*#-----------------|----------------------------------------------------------|
 ------------------------
| ADD HYD (TotE      ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
 ------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:SWMout        10.70    2.054   46.07 253.98    .000
                      +ID2 08:WRswl         15.65    2.451   46.00 239.28    .000
                      +ID3 09:UCtoE         71.82    8.828   46.18 235.15    .000
                       ============================================================
                       SUM 04:TotE          98.16   13.108   46.03 237.86    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
500:0028--------------------------------------------------------------------------
*#-----------------|----------------------------------------------------------|
*#
*#                           Total Flows from the Site
*#
*#-----------------|----------------------------------------------------------|
 ------------------------
| ADD HYD (AllFlo    ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
 ------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 04:TotE          98.16   13.108   46.03 237.86    .000
                      +ID2 10:207            .14     .015   46.00 149.53    .000
                       ============================================================
                       SUM 06:AllFlo        98.30   13.123   46.03 237.73    .000

    NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
500:0029--------------------------------------------------------------------------
*#
*#   Catchments required for By-Pass Storm Sewer (BPSS) sizing - added again
*#                            for ease of modelling
*#
*#-----------------|----------------------------------------------------------|
 ----------------------
| DESIGN NASHYD      |   Area    (ha)=     .14   Curve Number    (CN)=50.00
| 01:200    DT= 1.00 |   Ia      (mm)=   1.500   # of Linear Res.(N)= 3.00
 ----------------------  U.H. Tp(hrs)=    .260

     Unit Hyd Qpeak  (cms)=     .021

     PEAK FLOW       (cms)=     .014 (i)
     TIME TO PEAK    (hrs)=   46.050
     RUNOFF VOLUME    (mm)=  149.528
     TOTAL RAINFALL   (mm)=  285.000
     RUNOFF COEFFICIENT   =     .525

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

------------------------------------------------------------------------------
500:0030--------------------------------------------------------------------------
*#-----------------|----------------------------------------------------------|
 ----------------------
| DESIGN STANDHYD    |   Area    (ha)=     .64
| 02:201    DT= 1.00 |   Total Imp(%)=   90.00   Dir. Conn.(%)=   50.00
 ----------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .58          .06
     Dep. Storage     (mm)=        .80         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      65.32        40.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      53.00       256.36
                   over (min)       2.00         7.00
     Storage Coeff.  (min)=       2.07 (ii)    6.91 (ii)
     Unit Hyd. Tpeak (min)=       2.00         7.00
     Unit Hyd. peak  (cms)=        .55          .16
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .05          .05          .093 (iii)
     TIME TO PEAK    (hrs)=      45.50        46.00        46.000
     RUNOFF VOLUME    (mm)=     284.18       241.57       262.896
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =       1.00          .85          .922

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
500:0031--------------------------------------------------------------------------
*#-----------------|----------------------------------------------------------|
 ----------------------
| CALIB STANDHYD     |   Area    (ha)=   55.94
| 03:100    DT= 1.00 |   Total Imp(%)=   80.00   Dir. Conn.(%)=   20.00
 ----------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=      44.75        11.19
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       1.50         2.00
     Length            (m)=    1750.00        30.00
     Mannings n           =       .025         .250

     Max.eff.Inten.(mm/hr)=      53.00       201.34
                   over (min)      24.00        29.00
     Storage Coeff.  (min)=      24.04 (ii)   28.53 (ii)
     Unit Hyd. Tpeak (min)=      24.00        29.00
     Unit Hyd. peak  (cms)=        .05          .04
                                                          *TOTALS*
     PEAK FLOW       (cms)=       1.50         5.46         6.944 (iii)
     TIME TO PEAK    (hrs)=      46.15        46.25        46.233
     RUNOFF VOLUME    (mm)=     282.86       231.78       242.090
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =        .99          .81          .849

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
500:0032--------------------------------------------------------------------------
*#-----------------|----------------------------------------------------------|
 ----------------------
| CALIB STANDHYD     |   Area    (ha)=   14.55
| 07:101    DT= 1.00 |   Total Imp(%)=   60.00   Dir. Conn.(%)=   15.00
 ----------------------

                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       8.73         5.82
     Dep. Storage     (mm)=       2.00         5.00
     Average Slope     (%)=       2.30         2.00
     Length            (m)=    1050.00        30.00
     Mannings n           =       .025         .250

     Max.eff.Inten.(mm/hr)=      53.00        98.81
                   over (min)      16.00        22.00
     Storage Coeff.  (min)=      15.57 (ii)   21.53 (ii)
     Unit Hyd. Tpeak (min)=      16.00        22.00
     Unit Hyd. peak  (cms)=        .07          .05
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .31         1.47         1.778 (iii)
     TIME TO PEAK    (hrs)=      46.03        46.13        46.100
     RUNOFF VOLUME    (mm)=     282.92       198.59       211.296
     TOTAL RAINFALL   (mm)=     285.00       285.00       285.000
     RUNOFF COEFFICIENT   =        .99          .70          .741

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  50.0    Ia = Dep. Storage  (Above)
       (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
            THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
500:0033--------------------------------------------------------------------------
*#-----------------|----------------------------------------------------------|
 ------------------------
| ADD HYD (BPSS      ) | ID: NHYD          AREA     QPEAK   TPEAK   R.V.    DWF
 ------------------------                    (ha)     (cms)   (hrs)   (mm)   (cms)
                       ID1 01:200            .14     .014   46.05 149.53    .000
                      +ID2 02:201            .64     .093   46.00 262.90    .000
                      +ID3 03:100          55.94    6.944   46.23 242.09    .000
                      +ID4 07:101          14.55    1.778   46.10 211.30    .000
                       ============================================================
                       SUM 06:BPSS          71.27    8.784   46.20 235.81    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
500:0034--------------------------------------------------------------------------
------------------------------------------------------------------------------
500:0002--------------------------------------------------------------------------
------------------------------------------------------------------------------
500:0002--------------------------------------------------------------------------
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500:0002--------------------------------------------------------------------------
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500:0002--------------------------------------------------------------------------
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500:0002--------------------------------------------------------------------------
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500:0002--------------------------------------------------------------------------
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500:0002--------------------------------------------------------------------------
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500:0002--------------------------------------------------------------------------
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500:0002--------------------------------------------------------------------------
------------------------------------------------------------------------------
     FINISH
------------------------------------------------------------------------------
*******************************************************************************
     WARNINGS / ERRORS / NOTES
     -------------------------
 001:0014 ROUTE RESERVOIR
       *** WARNING: Inflow hydrograph is dry.
       *** WARNING: Inflow hydrograph is dry.
       *** WARNING: Inflow hydrograph is dry.
   Simulation ended on 2024-11-18     at 10:47:26
===============================================================================
```

Manning's Equation Calculations for Flow in a Channel

2509 Cedar Creek Road

Section: West Road Ditch

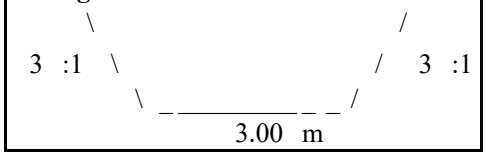
Input Data:

100-yr Flow =	4.256	m^3/s [1, 2]
Manning's 'n' =	0.025	
Channel Slope =	1.0%	
Side Slope =	3	m/m [3 means 3:1]
Side Slope =	3	m/m [3 means 3:1]
Bottom Width =	3	m [0 = triangular, +ve = trapezoidal]

Calculated Values:

Velocity =	2.00	m/s
Area=	2.130	m^2
Wetted Perimeter =	6.035	m
Hydraulic Radius (R) =	0.353	m

Configuration:



Depth Estimate:

Estimated Flow Depth = **0.480 m** lhs-rhs = -0.00038

Note: Calculations are correct when lhs-rhs = 0

Section: West Road Ditch (South of SWMF)

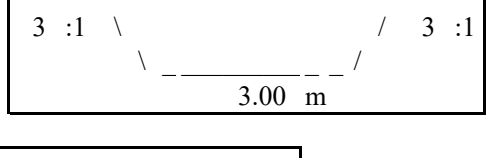
Input Data:

100-yr Flow =	4.256	m^3/s [1, 2]
Manning's 'n' =	0.025	
Channel Slope =	0.5%	
Side Slope =	3	m/m [3 means 3:1]
Side Slope =	3	m/m [3 means 3:1]
Bottom Width =	3	m [0 = triangular, +ve = trapezoidal]

Calculated Values:

Velocity =	1.56	m/s
Area=	2.726	m^2
Wetted Perimeter =	6.645	m
Hydraulic Radius (R) =	0.410	m

Configuration:



Depth Estimate:

Estimated Flow Depth = **0.576 m** lhs-rhs = 3.8E-06

Note: Calculations are correct when lhs-rhs = 0

Notes: 1. 100-yr storm event peak flow rate used for sizing since it is greater than Regional peak flow rate in this ditch.

2. Flow rate taken from SWMHYMO model, with contributing catchments 102, 103, and 206.

Manning's Equation Calculations for Flow in a Channel

2509 Cedar Creek Road

Section: Rear Lot Ditch

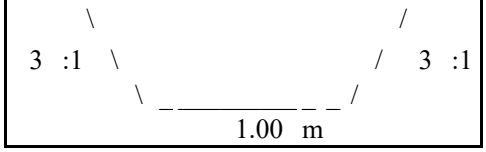
Input Data:

100-yr Flow =	4.377	m^3/s	[1, 2]
Manning's 'n' =	0.025		
Channel Slope =	1.0%		
Side Slope =	3	m/m	[3 means 3:1]
Side Slope =	3	m/m	[3 means 3:1]
Bottom Width =	1	m	[0 = triangular, +ve = trapezoidal]

Calculated Values:

Velocity =	2.13	m/s
Area=	2.054	m^2
Wetted Perimeter =	5.285	m
Hydraulic Radius (R) =	0.389	m

Configuration:



Depth Estimate:

Estimated Flow Depth = **0.677 m** lhs-rhs = 0.00018

Note: Calculations are correct when lhs-rhs = 0

Notes: 1. 100-yr storm event peak flow rate used for sizing since it is greater than Regional peak flow rate in this ditch.
2. Flow rate taken from SWMHYMO model, with contributing catchments 104 and 202.

Section: East Road Ditch

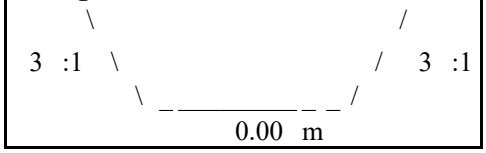
Input Data:

100-yr Flow =	2.502	m^3/s	[1, 2]
Manning's 'n' =	0.025		
Channel Slope =	1.2%		
Side Slope =	3	m/m	[3 means 3:1]
Side Slope =	3	m/m	[3 means 3:1]
Bottom Width =	0	m	[0 = triangular, +ve = trapezoidal]

Calculated Values:

Velocity =	1.99	m/s
Area=	1.255	m^2
Wetted Perimeter =	4.091	m
Hydraulic Radius (R) =	0.307	m

Configuration:



Depth Estimate:

Estimated Flow Depth = **0.647 m** lhs-rhs = 0.00031

Note: Calculations are correct when lhs-rhs = 0

Notes: 1. 100-yr storm event peak flow rate used for sizing since it is greater than Regional peak flow rate in this ditch.
2. Flow rate taken from SWMHYMO model, with contributing catchment 204.

Manning's Equation Calculations for Flow in a Channel

2509 Cedar Creek Road

Section: Outlet Channel

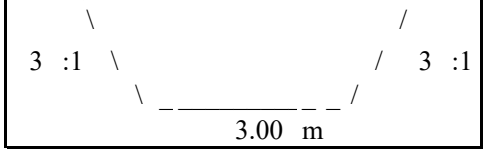
Input Data:

Regional Flow =	4.54	m^3/s	[1, 2]
Manning's 'n' =	0.025		
Channel Slope =	0.5%		
Side Slope =	3	m/m	[3 means 3:1]
Side Slope =	3	m/m	[3 means 3:1]
Bottom Width =	3	m	[0 = triangular, +ve = trapezoidal]

Calculated Values:

Velocity =	1.59	m/s
Area=	2.855	m^2
Wetted Perimeter =	6.770	m
Hydraulic Radius (R) =	0.422	m

Configuration:



Depth Estimate:

Estimated Flow Depth = **0.596 m** lhs-rhs = -0.00014

Note: Calculations are correct when lhs-rhs = 0

Section: Outlet Channel

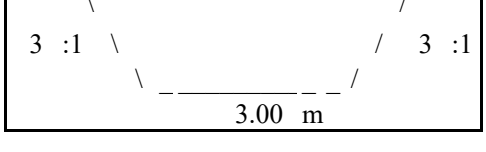
Input Data:

100-yr Flow =	4.26	m^3/s	[1, 2]
Manning's 'n' =	0.025		
Channel Slope =	0.5%		
Side Slope =	3	m/m	[3 means 3:1]
Side Slope =	3	m/m	[3 means 3:1]
Bottom Width =	3	m	[0 = triangular, +ve = trapezoidal]

Calculated Values:

Velocity =	1.56	m/s
Area=	2.728	m^2
Wetted Perimeter =	6.647	m
Hydraulic Radius (R) =	0.410	m

Configuration:



Depth Estimate:

Estimated Flow Depth = **0.577 m** lhs-rhs = -0.00013

Note: Calculations are correct when lhs-rhs = 0

Notes: 1. Regional event peak flow rate used to size outlet channel, 100-yr flow rate used for reference/inclusion on drawings.

2. Flow rate taken from SWMHYMO model, with flows contributing from SWM facility (catchments 104, 202, 204, 205), west road ditch (102, 103, 206), and catchment 208.

Stantec

Royal Lepage Commercial
2509 Cedar Creek Road

DATE: January 9, 2025
DESIGNED BY: BWM
CHECKED BY: KRB

STORM SEWER DESIGN SHEET

FILE NUMBER: 161414214

DESIGN PARAMETERS

DESIGN STORM 1 IN 100 Years

I = a / ((tc + b) ^c)

a=	4688.00	MANNING'S n =	0.013	
b=	17.00	MINIMUM COVER:	1.500	m
c=	0.9624	TIME OF ENTRY	10	min

LOCATION			DRAINAGE AREA								PIPE SELECTION							
Street	U/S	D/S	Area ID	5-Year Area Design (ha)	Runoff Coeff. Design	A x R	Accum. A x R	U/S T_C (min)	Rainfall Intensity (mm/hr)	Total Flow (m^3/s)	Length Design (m)	Design Size (mm)	Slope Design (%)	Full Capacity (m^3/s)	Full Velocity (m/s)	Actual Velocity (m/s)	Time of Flow (min)	5-Year Q_A/Q_C (%)
Site			200	0.14	0.30	0.04												
External - West			101	14.55	0.75	10.91		Note: Time of Concetration for the Total Flow Rate received from SWM Analysis is 38.8min.										
Culvert	77	78	-	14.69	0.75	10.95	10.95	38.80	51.35	1.562	25.97	750	3.00	1.928	4.36	4.89	0.09	81.0%
External - North			100	55.94	0.72	40.28		0.00										
Site			201	0.64	0.90	0.58	51.81											
								Note: Flow Rate received from SWM Analysis as Peak 100Yr InFlow from all contributing areas being 11.599 cu.m/s.										
								Note: Time of Concetration for the Total Flow Rate received from SWM Analysis is 50.8min.										
Site	69	72	-	0.00	0.65	0.00	51.81	50.80	81.02	11.599	78.75	2100	0.60	13.431	3.88	4.40	0.30	86.4%
	72	70	-	0.00	0.65	0.00	51.81	51.10	80.68	11.611	80.29	2100	0.60	13.431	3.88	4.40	0.30	86.5%
	70	73	-	0.00	0.65	0.00	51.81	51.40	80.34	11.561	90.00	2100	0.60	13.431	3.88	4.40	0.34	86.1%
	73	75	-	0.00	0.65	0.00	51.81	51.74	79.95	11.506	90.00	2100	0.60	13.431	3.88	4.38	0.34	85.7%
	75	71	-	0.00	0.65	0.00	51.81	52.09	79.57	11.451	54.76	2100	1.40	20.516	5.92	6.04	0.15	55.8%
	71		-	0.00	0.65	0.00	51.81	52.24										

2509 Cedar Creek Road (161414214)
BPSS DICB Sizing Calculations

Ditch Inlet Capacity Calculation (OPSD Type 705.040, Type A = Double 600x1200, OPSD Type 705.030 = single 600x 600)
MTO Design Chart 4.20

Ditch Inlet Widt 1.2 m 5 :1 grate slope

Head/Flow Depth	Actual Inlet Flow m^3/s					Capacity (m^3/s) per meter width				
	2:1	3:1	4:1	5:1	6:1	2:1	3:1	4:1	5:1	6:1
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.05	0.029	0.028	0.027	0.026	0.025	0.024	0.023	0.022	0.021	0.021
0.1	0.078	0.101	0.134	0.160	0.168	0.065	0.084	0.112	0.133	0.140
0.15	0.132	0.177	0.245	0.295	0.312	0.110	0.148	0.204	0.246	0.260
0.2	0.240	0.303	0.398	0.468	0.492	0.200	0.253	0.331	0.390	0.410
0.25	0.360	0.450	0.585	0.686	0.720	0.300	0.375	0.488	0.572	0.600
0.3	0.504	0.636	0.834	0.983	1.032	0.420	0.530	0.695	0.819	0.860
0.35	0.660	0.810	1.035	1.204	1.260	0.550	0.675	0.863	1.003	1.050
0.4	0.840	1.080	1.440	1.710	1.800	0.700	0.900	1.200	1.425	1.500
0.45	1.080	1.380	1.830	2.168	2.280	0.900	1.150	1.525	1.806	1.900
0.5	1.260	1.575	2.048	2.402	2.520	1.050	1.313	1.706	2.002	2.100
0.55	1.320	1.740	2.370	2.843	3.000	1.100	1.450	1.975	2.369	2.500
0.6	1.556	1.944	2.526	2.962	3.108	1.296	1.620	2.105	2.469	2.590
0.65	1.703	2.136	2.786	3.273	3.435	1.419	1.780	2.321	2.727	2.863
0.7	1.851	2.329	3.045	3.583	3.762	1.543	1.941	2.538	2.986	3.135
0.75	1.999	2.525	3.314	3.906	4.103	1.666	2.104	2.762	3.255	3.419
0.8	2.147	2.721	3.583	4.229	4.445	1.789	2.268	2.986	3.524	3.704
0.85	2.294	2.914	3.845	4.542	4.775	1.912	2.429	3.204	3.785	3.979
0.9	2.442	3.108	4.107	4.856	5.106	2.035	2.590	3.422	4.047	4.255
0.95	2.590	3.300	4.364	5.163	5.429	2.158	2.750	3.637	4.302	4.524
1	2.738	3.491	4.622	5.469	5.752	2.281	2.909	3.851	4.558	4.793
1.05	2.885	3.673	4.854	5.741	6.036	2.404	3.061	4.045	4.784	5.030

Calculation:

	Value	Units
100-yr peak flow to By-Pass Storm Sewer (BPSS):	11.60	m3/s
Capacity of 1200 mm culvert (crossing Cedar Creek Rd):	4.32	m3/s
Total inlet capacity required:	7.28	m3/s
Assumed flow depth:	1	m
Assumed grate slope:	5:1	
Inlet flow rate from chart:	5.74	m3/s
Inlet flow assuming 50% capacity for one double catchbasin:	2.87	m3/s
Number of 1.2 m x 0.6 m catch basin units required:	3	

To determine # of 1.2 m x 0.6 m ditch inlet catchbasins required:

#CB = Q1 / Q2

where:
Q1 = total flow rate to BPSS from ditch
Q2 = Inlet flow rate for one double catchbasin, assuming 50% blockage

Therefore,
#CB = 7.65 m3/s / 2.87 m3/s
#CB = 2.67 ~ 3

Three 1.2 m x 0.6m catchbasin inlets are required to ensure 100-year capture of the external areas into the By-Pass Storm Sewer can be achieved, assuming 50% blockage.

Culvert Design Report
1200 mm Cedar Creek Rd Culvert to BPSS

Peak Discharge Method: User-Specified			
Design Discharge	4.3200 m³/s	Check Discharge	0.0000 m³/s

Grades Model: Inverts			
Invert Upstream	310.80 m	Invert Downstream	293.30 m
Length	35.00 m	Slope	0.500000 m/m
Drop	17.50 m		

Headwater Model: Maximum Allowable HW	
Headwater Elevation	314.20 m

Tailwater Conditions: Constant Tailwater	
Tailwater Elevation	311.52 m

Name	Description	Discharge	HW Elev.	Velocity
x Trial-1	1-1200 mm Circular	4.3200 m³/s	314.19 m	3.70 m/s

Culvert Design Report
1200 mm Cedar Creek Rd Culvert to BPSS

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	314.20	m	Storm Event	Design	
Computed Headwater Elevation	314.19	m	Discharge	4.3200	m³/s
Headwater Depth/Height	2.78		Tailwater Elevation	311.52	m
Inlet Control HW Elev.	313.64	m	Control Type	Outlet Control	
Outlet Control HW Elev.	314.19	m			

Grades					
Upstream Invert	310.80	m	Downstream Invert	293.30	m
Length	35.00	m	Constructed Slope	0.500000	m/m

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	18.22	m
Slope Type	N/A		Normal Depth	0.44	m
Flow Regime	N/A		Critical Depth	1.10	m
Velocity Downstream	3.70	m/s	Critical Slope	0.033736	m/m

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	1.22	m
Section Size	1200 mm		Rise	1.22	m
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	314.19	m	Upstream Velocity Head	0.70	m
Ke	0.90		Entrance Loss	0.63	m

Inlet Control Properties					
Inlet Control HW Elev.	313.64	m	Flow Control	N/A	
Inlet Type	Projecting		Area Full	1.2	m²
K	0.03400		HDS 5 Chart	2	
M	1.50000		HDS 5 Scale	3	
C	0.05530		Equation Form	1	
Y	0.54000				

APPENDIX E

Utility Correspondence

Nicholas, Pacifique

From: Nicholas, Pacifique
Sent: Thursday, August 3, 2023 3:14 PM
To: Steffler, Daniel
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Hi Dan,

Thank you very much for providing this information.
Our understating is that Bell sees no concern with supporting the proposed development given the surrounding existing infrastructure. Could you please confirm this?

Thank you,

Pacifique Nicholas, P.Eng., M.Eng., PMP®.
Project Coordinator - Community Development
Direct: 519 585-7484
Mobile: 226 581-2805
Fax: 519 579-6733
Pacifique.nicholas@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

Stantec

From: Steffler, Daniel <daniel.steffler@bell.ca>
Sent: Wednesday, August 2, 2023 6:00 PM
To: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

See attached. The black line is existing duct to our fibre pedestal. The red is our proposed new to get fibre to your development.

thanks

Bell

Dan Steffler
Specialist – Network Provisioning
F2-20 Water Street North
Kitchener, Ontario
N2H 5A5
Phone: 519-568-5785
Cell: 519-577-2531
daniel.steffler@bell.ca

From: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Sent: July-27-23 1:49 PM
To: Steffler, Daniel <daniel.steffler@bell.ca>
Subject: [EXT]RE: 161414214- 2509 Cedar Creek Road - Utility

Hi Dan,

Could you please reattach the drawing? I could not find the attachment as addressed in your email.

Thanks,

Pacifique Nicholas, P.Eng., M.Eng., PMP®.
Project Coordinator - Community Development
Direct: 519 585-7484
Mobile: 226 581-2805
Fax: 519 579-6733
Pacifique.nicholas@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

From: Nicholas, Pacifique
Sent: Wednesday, July 26, 2023 8:45 AM
To: Steffler, Daniel <daniel.steffler@bell.ca>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Hi Dan,

I do not see the attachment in this email. Could you please verify if it was attached properly?
We have not stated the construction yet. We are still in the process of Draft Plan approval.

Thanks,

Pacifique Nicholas, P.Eng., M.Eng., PMP®.
Project Coordinator - Community Development
Direct: 519 585-7484
Mobile: 226 581-2805
Fax: 519 579-6733
Pacifique.nicholas@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

From: Steffler, Daniel <daniel.steffler@bell.ca>
Sent: Tuesday, July 25, 2023 6:18 PM
To: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Hello,

See attached, we have a fibre ped on opposite side of Earl Thompson with conduit crossing and goes down Earl Thompson. We will use that duct and trench down Cedar Creek to your development. Have any lots started construction? thanks

Bell

Dan Steffler
Specialist – Network Provisioning
F2-20 Water Street North
Kitchener, Ontario
N2H 5A5
Phone: 519-568-5785
Cell: 519-577-2531
daniel.steffler@bell.ca

From: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Sent: July-17-23 11:15 AM
To: Steffler, Daniel <daniel.steffler@bell.ca>
Subject: [EXT]161414214- 2509 Cedar Creek Road - Utility

Hi Dan,

We are currently working towards completing the preliminary engineering for the above noted development in support of draft plan approval which will follow with detail design.
Please find attached Conceptual Draft Plan for your review.

From: Giuseppe Decicco - EXT
To: Nicholas, Pacifique; Ahleam Halbouni
Cc: Brousseau, Kevin; Cheryl Jacob
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility
Date: Wednesday, September 20, 2023 10:05:53 AM
Attachments: image001.jpg
image002.png
image003.jpg
Roadmap Presentation .pptx

Hi Pacifique,

I appreciate that. The area is serviceable.
I always like to get the ball rolling administrative in our Salesforce, to save any time in the process. Our process involves specialists and planning engineers, which consumes quite a few business days in the flow.
This way the quote is cued up and on standby for your approval, whether the project is in 2023 or into 2024.

There would be some build and trenching involved to run the cable. As an FYI, we would require a minimum of 70 business days to build and run the service to the project sites.
(Note: City building permits may delay the service even longer in some municipalities)

As a reference, I have attached a reference guide of all the services I can support you with.

Please reach out to me with any questions you may have or other projects you would like me to manage.

Thank you

Giuseppe Decicco
ROGERS Corporate Accounts

Phone: 905-670-1980 x220
Mobile: 416-418-1009

Email: giuseppe.decicco@rci.rogers.ca

100 Hanlan Rd, Unit 8
Vaughan, ON
L4L 4V8

From: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Sent: Wednesday, September 20, 2023 9:40 AM
To: Giuseppe Decicco - EXT <Giuseppe.Decicco@rci.rogers.com>; Ahleam Halbouni <Ahleam.Halbouni@rci.rogers.com>
Cc: Brousseau, Kevin <kevin.brousseau@stantec.com>; Cheryl Jacob <Cheryl.Jacob@rci.rogers.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Hi Giuseppe,

Following up on my email.

Note that we are still at the preliminary stage and at this point we just want you to confirm that you can service this development.

Thanks,

Pacifique Nicholas, P.Eng., M.Eng., PMP®.
Project Coordinator - Community Development
Direct: 519 585-7484
Mobile: 226 581-2805
Fax: 519 579-6733
Pacifique.nicholas@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

From: Nicholas, Pacifique
Sent: Wednesday, September 20, 2023 9:29 AM
To: Giuseppe Decicco - EXT <Giuseppe.Decicco@rci.rogers.com>; Ahleam Halbouni <Ahleam.Halbouni@rci.rogers.com>
Cc: Brousseau, Kevin <kevin.brousseau@stantec.com>; Cheryl Jacob <Cheryl.Jacob@rci.rogers.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Hi Giuseppe,

See the Concept Draft Plan attached.

We are proposing industrial lots along Street A as shown on the concept Draft Plan. We would be looking to service Lot 2 to Lot 8.

Please let me know if you need more information to process our request.

Thanks,

Pacifique Nicholas, P.Eng., M.Eng., PMP®.
Project Coordinator - Community Development
Direct: 519 585-7484
Mobile: 226 581-2805
Fax: 519 579-6733
Pacifique.nicholas@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

From: Giuseppe Decicco - EXT <Giuseppe.Decicco@rci.rogers.com>
Sent: Wednesday, September 20, 2023 9:20 AM
To: Ahleam Halbouni <Ahleam.Halbouni@rci.rogers.com>; Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Cc: Brousseau, Kevin <kevin.brousseau@stantec.com>; Cheryl Jacob <Cheryl.Jacob@rci.rogers.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Hi Pacifique,

I have reviewed the area of Earl Thompson Road, and there is fibre internet available in that block. I will start the process in our system to pre-qualify the service.

Is there a specific address/lot # we can use as a termination point on Earl Thompson?

Thank You

Giuseppe Decicco
ROGERS Corporate Accounts

Phone: 905-670-1980 x220
Mobile: 416-418-1009

Email: giuseppe.decicco@rci.rogers.ca

100 Hanlan Rd, Unit 8
Vaughan, ON
L4L 4V8

From: Ahleam Halbouni <Ahleam.Halbouni@rci.rogers.com>
Sent: Tuesday, September 19, 2023 1:14 PM
To: 'Nicholas, Pacifique' <Pacifique.Nicholas@stantec.com>; Giuseppe Decicco - EXT <Giuseppe.Decicco@rci.rogers.com>
Cc: Brousseau, Kevin <kevin.brousseau@stantec.com>; Cheryl Jacob <Cheryl.Jacob@rci.rogers.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

+Giuseppe

Hi Giuseppe,

Can you please review and action this request.

Thank You,

Ahleam Halbouni (pronouns: she/her)
SWO Manager, Network Regional Planning & Implementation
Rogers Communications



From: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Sent: September 19, 2023 1:12 PM
To: Ahleam Halbouni <Ahleam.Halbouni@rci.rogers.com>
Cc: Brousseau, Kevin <kevin.brousseau@stantec.com>; Cheryl Jacob <Cheryl.Jacob@rci.rogers.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Hi Ahleam,

Thank you for the information, Cheryl.

Ahleam – Please confirm if Rogers can service this development.

Thanks,

Pacifique Nicholas, P.Eng., M.Eng., PMP®.
Project Coordinator - Community Development
Direct: 519 585-7484
Mobile: 226 581-2805
Fax: 519 579-6733
Pacifique.nicholas@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4



From: Cheryl Jacob <Cheryl.Jacob@rci.rogers.com>
Sent: Tuesday, September 19, 2023 12:58 PM
To: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Cc: Ahleam Halbouni <Ahleam.Halbouni@rci.rogers.com>

Subject: FW: 161414214- 2509 Cedar Creek Road - Utility

Hello Pacifique,

Rogers has aerial fiber along Earl Thompson Rd as well as having aerial fiber on the South side of HWY 97/Cedar Creek Rd.

As this is an industrial/commercial area, I have include Ahleam on this email who will be able to assist for further question/information.

Thanks
Cheryl

From: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Sent: July 17, 2023 11:10 AM
To: Cheryl Jacob <Cheryl.Jacob@rci.rogers.com>
Cc: Brousseau, Kevin <kevin.brousseau@stantec.com>
Subject: 161414214- 2509 Cedar Creek Road - Utility

Hi Cheryl,

We are currently working towards completing the preliminary engineering for the above noted development in support of draft plan approval which will follow with detail design.
Please find attached Conceptual Draft Plan for your review.

Please provide utility information for the surrounding area that Rogers may have and confirm if you are able to service this development or if any external works would need to be upgraded or extended to the property.

If you have any questions, please let me know.

Thank you,

Pacifique Nicholas, P.Eng., M.Eng., PMP®.
Project Coordinator - Community Development
Direct: 519 585-7484
Mobile: 226 581-2805
Fax: 519 579-6733
Pacifique.nicholas@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

Nicholas, Pacifique

From: Nicholas, Pacifique
Sent: Tuesday, August 15, 2023 4:57 PM
To: Sahil Singh Sidhu
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

We can have this information late this Fall.

Thanks,

Pacifique Nicholas, P.Eng., M.Eng., PMP®.
Project Coordinator - Community Development
Direct: 519 585-7484
Mobile: 226 581-2805
Fax: 519 579-6733
Pacifique.nicholas@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

From: Sahil Singh Sidhu <sahilsingh.sidhu@enbridge.com>
Sent: Tuesday, August 15, 2023 4:30 PM
To: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Hi Nicholas,

I will need that info for me to see if the load Gas main can support it. When do you think you can provide me with this info.

Thanks

Sahil Singh Sidhu
Sr Analyst New Business Projects
Construction Brantford

CELL: (519) 209-8538 | sahilsingh.sidhu@enbridge.com
101 Carter St, Brantford, ON N3S 0K6
enbridge.com
Safety. Integrity. Respect. Inclusion

Customer Care Centre 1-877-362-7434
Customer Attachment Builder & HVAC Support 1-866-772-1045
Smell Gas? 1-866-763-5427
Service Abandonments 1-877-362-7434
Natural Gas Inquiries - Inquiry Form
Customer Attachment - Residential enbridgegas.com/connect-to-gas
Customer Attachment - Developers enbridgegas.com/connect-to-gas/developers
Customer Attachment - Builders & HVAC's enbridgegas.com/connect-to-gas/builders-hvacs

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From: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Sent: Tuesday, August 15, 2023 4:25 PM
To: Sahil Singh Sidhu <sahilsingh.sidhu@enbridge.com>
Subject: [External] RE: 161414214- 2509 Cedar Creek Road - Utility

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Were you expecting this email? TAKE A CLOSER LOOK. Is the sender legitimate?
DO NOT click links or open attachments unless you are 100% sure that the email is safe.

Hi Sahil,

We do not have this information yet.

Once we advance to detailed design, we can then provide you with more information.

Thanks,

Pacifique Nicholas, P.Eng., M.Eng., PMP®.
Project Coordinator - Community Development
Direct: 519 585-7484
Mobile: 226 581-2805
Fax: 519 579-6733
Pacifique.nicholas@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

From: Sahil Singh Sidhu <sahilsingh.sidhu@enbridge.com>
Sent: Tuesday, August 15, 2023 3:39 PM
To: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Can you please let me know the load for each lot if you have that info available.

Thanks,

Sahil Singh Sidhu
Sr Analyst New Business Projects
Construction Brantford

CELL: (519) 209-8538 | sahilsingh.sidhu@enbridge.com
101 Carter St, Brantford, ON N3S 0K6
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Customer Attachment - Residential enbridgegas.com/connect-to-gas
Customer Attachment - Developers enbridgegas.com/connect-to-gas/developers
Customer Attachment - Builders & HVAC's enbridgegas.com/connect-to-gas/builders-hvacs

---

From: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>
Sent: Tuesday, August 15, 2023 3:32 PM
To: Sahil Singh Sidhu <sahilsingh.sidhu@enbridge.com>
Cc: Brousseau, Kevin <kevin.brousseau@stantec.com>
Subject: [External] RE: 161414214- 2509 Cedar Creek Road - Utility

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Hi Sahil,

Thank you very much for getting back to me. As said earlier, we are still in the prelim design stage for Draft Plan approval. All we need currently is an understanding of your existing infrastructure in the area of the subject lands and if you have capacity to support the development.

Thanks,

Pacifique Nicholas, P.Eng., M.Eng., PMP®.
Project Coordinator - Community Development
Direct: 519 585-7484
Mobile: 226 581-2805
Fax: 519 579-6733
Pacifique.nicholas@stantec.com

Stantec
100-300 Hagey Boulevard
Waterloo ON N2L 0A4

From: Sahil Singh Sidhu <sahilsingh.sidhu@enbridge.com>
Sent: Monday, August 14, 2023 10:42 AM
To: Nicholas, Pacifique <Pacifique.Nicholas@stantec.com>

Cc: Brousseau, Kevin <kevin.brousseau@stantec.com>
Subject: FW: 161414214- 2509 Cedar Creek Road - Utility

Hi,

I received this from our department.

Can you please provide me with answers

Thanks,

Sahil Singh Sidhu
Sr Analyst New Business Projects
Construction Brantford

ENBRIDGE
CELL: (519) 209-8538 | sahilsingh.sidhu@enbridge.com
101 Carter St, Brantford, ON N3S 0K6
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Customer Attachment - Developers enbridgegas.com/connect-to-gas/developers
Customer Attachment - Builders & HVAC's enbridgegas.com/connect-to-gas/builders-hvacs

---

From: Ontario Lands <ONTLands@enbridge.com>
Sent: Monday, August 14, 2023 10:39 AM
To: Sahil Singh Sidhu <sahilsingh.sidhu@enbridge.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Good morning,
Being from North Dumfries, this is Kelly's area and she is off this week.
I can look into it, but require a bit of info first.

Do you have the Notice of Decision which contains the conditions of Draft Approval? We require the conditions that require the release being the document as issued by the Municipality that sites our conditions.

Thanks,
Barb

Barbara M.J. Baranow
Analyst Land Support
Lands

Enbridge.com
Integrity. Safety. Respect.

From: Sahil Singh Sidhu <sahilsingh.sidhu@enbridge.com>
Sent: Monday, August 14, 2023 10:24 AM
To: Ontario Lands <ONTLands@enbridge.com>; Kelly Buchanan <Kelly.Buchanan@enbridge.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Hi,

Can you please advice the customer what to do here.

Thanks,

Sahil Singh Sidhu
Sr Analyst New Business Projects
Construction Brantford

ENBRIDGE
CELL: (519) 209-8538 | sahilsingh.sidhu@enbridge.com
101 Carter St, Brantford, ON N3S 0K6
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Customer Attachment - Developers enbridgegas.com/connect-to-gas/developers
Customer Attachment - Builders & HVAC's enbridgegas.com/connect-to-gas/builders-hvacs

---

From: Sahil Singh Sidhu
Sent: Friday, August 4, 2023 8:16 AM
To: Ontario Lands <ONTLands@enbridge.com>
Subject: RE: 161414214- 2509 Cedar Creek Road - Utility

Hi,

I am just following up on this request.

Thanks,

Sahil Singh Sidhu
Sr Analyst New Business Projects
Construction Brantford

ENBRIDGE
CELL: (519) 209-8538 | sahilsingh.sidhu@enbridge.com
101 Carter St, Brantford, ON N3S 0K6
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Customer Attachment - Developers enbridgegas.com/connect-to-gas/developers
Customer Attachment - Builders & HVAC's enbridgegas.com/connect-to-gas/builders-hvacs

---

From: Sahil Singh Sidhu
Sent: Tuesday, July 25, 2023 10:03 AM
To: Ontario Lands <ONTLands@enbridge.com>
Subject: FW: 161414214- 2509 Cedar Creek Road - Utility

Good Morning,

This customer is looking for clearance letter I don't see any issues with this. Please let me know if you need anything.

Thanks,

Sahil Singh Sidhu
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